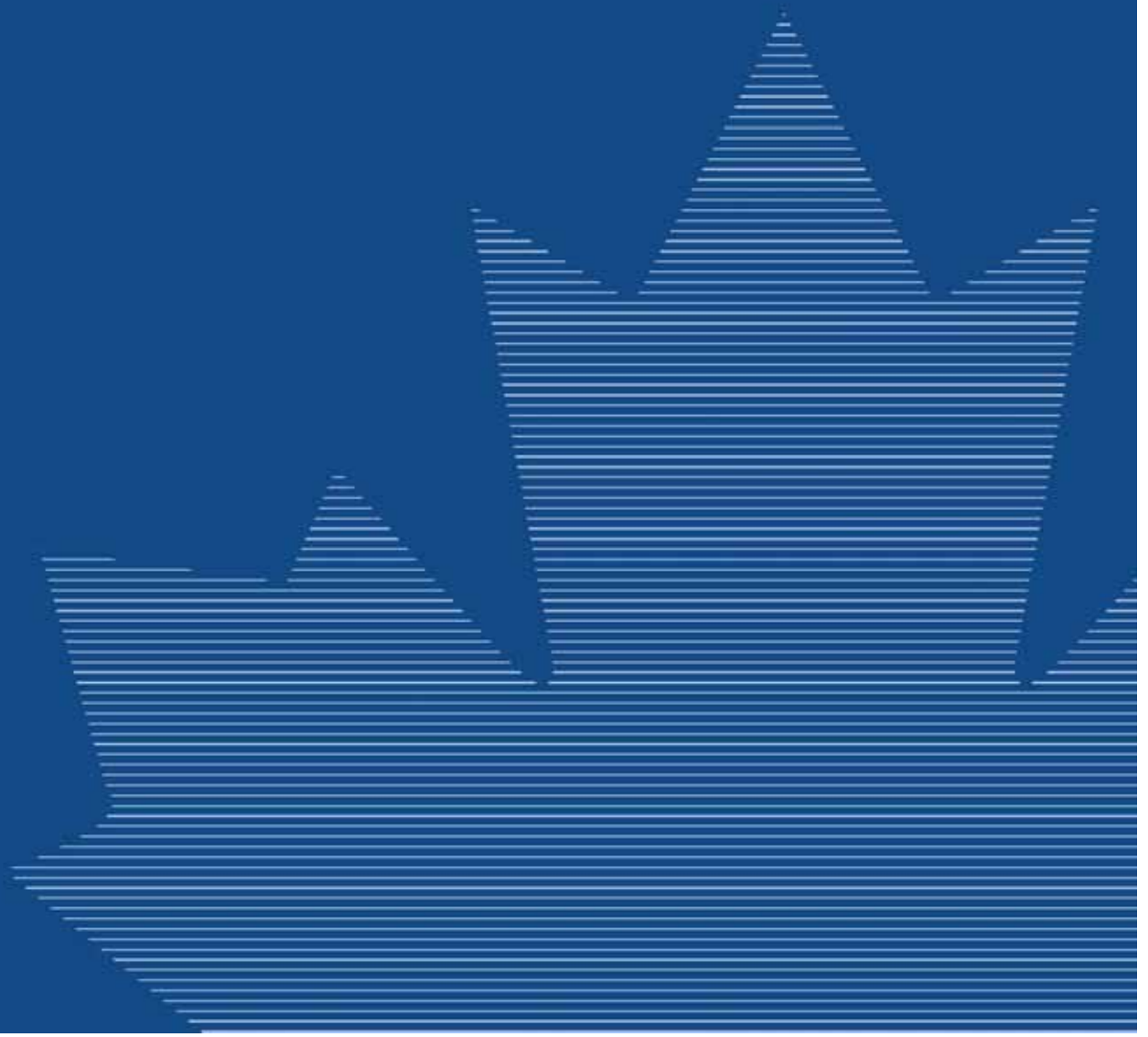
AECOM

Report

Barrick Gold Inc.

Existing Conditions Report and Screening Level Aquatic Ecological Risk Assessment for the Cullaton Lake Mine Site



AECOM

Barrick Gold Inc.

Existing Conditions Report and Screening Level Aquatic Ecological Risk Assessment for the Cullaton Lake Mine Site

Prepared by:

AECOM Canada Ltd.
2 – 512 Woolwich Street, Guelph, ON, Canada N1H 3X7
T 519.763.7783 F 519.763.1668 www.aecom.com

Project Number:

107651

Date:

July 9, 2009

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by AECOM Canada Ltd. ("Consultant") for the benefit of the client ("Client") in accordance with the agreement between Consultant and Client, including the scope of work detailed therein (the "Agreement").

The information, data, recommendations and conclusions contained in the Report:

- **are subject to the budgetary, time, scope, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations");**
- **represent Consultants' professional judgement in light of the Limitations and industry standards for the preparation of similar reports;**
- **may be based on information provided to Consultant which has not been independently verified;**
- **have not been updated since the date of issuance of the Report and their accuracy is limited to the time period and circumstances in which they were collected, processed, made or issued;**
- **must be read as a whole and sections thereof should not be read out of such context;**
- **were prepared for the specific purposes described in the Report and the Agreement;**
- **in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time.**

Unless expressly stated to the contrary in the Report or the Agreement, Consultant:

- **shall not be responsible for any events or circumstances that may have occurred since the date on which the Report was prepared or for any inaccuracies contained in information that was provided to Consultant;**
- **makes no representations whatsoever with respect to the Report or any part thereof, other than that the Report represents Consultant's professional judgement as described above, and is intended only for the specific purpose described in the Report and the Agreement;**
- **in the case of subsurface, environmental or geotechnical conditions, is not responsible for variability in such conditions geographically or over time.**

Except as required by law or otherwise agreed by Consultant and Client, the Report:

- **is to be treated as confidential;**
- **may not be used or relied upon by third parties.**

Any use of this Report is subject to this Statement of Qualifications and Limitations. Any damages arising from improper use of the Report or parts thereof shall be borne by the party making such use.

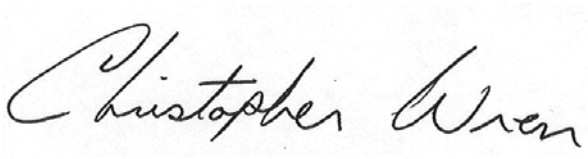
This Statement of Qualifications and Limitations is attached to and forms part of the Report.

Distribution List

# of Copies	Association / Company Name	PDF	Hard Copy
4	Barrick Gold Corporation	X	X
2	AECOM Canada	X	X

Signature Page

Report Reviewed By:



Christopher Wren, Ph.D.
Senior Environmental Scientist

Report Reviewed By:

Derek Hillis, Ph.D.
Senior Environmental Scientist

Report Reviewed By:

Rick Palmer, R.P.Bio
Water and Natural Resources Practice Lead

.

Executive Summary

Detailed studies were conducted in 2008 at the Cullaton Lake mine site to document existing environmental conditions, and to assess potential ecological risks associated with the site now and in the future.

Water quality in Shear Lake met the Water License limits for all parameters with limits.

The concentration of metals were elevated in seeps when compared to other stations which can be attributed to metal leaching from the yard area waste rock. Standing water in the seeps does not appear to be hydrologically connected to any surface waters and direct loading from any seeps is not expected.

The maximum concentrations of Al, Cd, Co, Cu, Fe and Pb in Shear Lake did exceed their respective CCME guidelines in some samples.

Sediment quality in Shear Lake was generally good. The concentrations of some metals were higher than the most stringent federal guidelines but were below the upper CCME or similar Ontario MOE sediment quality guidelines.

Benthic invertebrate samples were collected from a number of stream locations within the study area. There was some variability among stations that can likely be attributed to large differences in flow regimes between the different sites. There were no obvious indications that the benthic community had been impacted in stations downstream of potential sources of metals. The diversity of the benthic community in the Shear Lake samples was similar to results obtained at undisturbed sites in Nunavut from other studies.

Three different species of fish were captured in the study area including Arctic Grayling in Shear Lake itself. Given the nature of the existing fish habitat in this northern environment this species diversity would be expected in a non-impacted setting. The fisheries survey captured Arctic Grayling from a range of age classes (3 to 8 years) which includes both young and sexually mature fish. The calculated Condition Factor of the Grayling suggests the fish were healthy. Therefore, based on field observations the Grayling population in Shear Lake is not impacted by environmental conditions.

Migration of fish between Shear Lake and the Kognak River is possible under certain flow conditions at some times of the year. There is no indication that water quality is impairing movement or reproduction of this species in the study area.

The concentration of metals was measured in Arctic Grayling from Shear Lake. The concentrations were generally low. Mercury is the only parameter for which a tissue guideline exists for the protection of human health as well as for wildlife consumption. The concentration of mercury in Shear Lake fish (< 0.30 mg/kg) was well within the consumption guideline of 0.5 mg/kg. The concentrations of other metals in Shear Lake fish tissues were comparable to metal levels in fish from other undisturbed northern lakes. It is, therefore, concluded that there is no evidence that metals are accumulating in fish in the study area.

The Screening Level Risk Assessment (SLRA) ruled out potential risk to four metals identified as Chemicals of Concern, Cd, Co, Cu and Pb. Risk could not be ruled out, however, for Al and Fe based on the observed concentrations in Shear Lake and literature toxicity values though it appears as if Fe concentrations are similar to that found in a surrounding reference lake. The presence of a healthy Grayling population in Shear Lake provides empirical evidence that the literature values are not applicable to this species or the metals are not bioavailable at the concentrations measured.

Geochemical studies by Lorax (2009) did confirm that the thickness of the tailings cover was less (0.6 to 0.9 m) than prescribed in the closure plan (1.4m) and that oxidation of some zones is likely occurring with subsequent potential to be acid generating. Porewater of the tailings and waste rock contained elevated levels of several metals, but the levels were still below their respective Water License Limits.

Water quality in the Tailings Pond did not exceed any of the Water License Limits. The concentration of several parameters in the Tailing Pond water did exceed CCME guidelines for the protection of freshwater life but it is questionable if these guidelines should be applied to a waste management facility.

In summary, impairment of porewater and water in seeps is apparent in some locations at the site. The overall surface waters of the site are not significantly impacted by the former mine operation or existing conditions. This is particularly true for Shear Lake, which appears to support a healthy Arctic Grayling population. Chemical conditions within the waste rock, tailings and surface waters appear to be in equilibrium and no further changes in water quality are expected in the future.

Table of Contents

List of Figures

List of Tables

Appendices

1. Introduction

1.1 Background

The Cullaton Lake property is a closed mine site located in Nunavut, Canada (Figure 1). The property consists of a gravel airstrip, gravel road, and encapsulated waste rock (EWR) facility, covered dry tailings and a flooded tailings pond. The site became wholly owned by Barrick Gold Corporation (Barrick) through the acquisition of Homestake Canada Inc. (Homestake) in 2001. In 2005, after reviewing historic water quality objectives and closure activities, Barrick considered that it had completed the decommissioning activities and objectives described in the approved 1996 Final Abandonment and Restoration (Final A&R) Plan and sought concurrence from the Nunavut Water Board (NWB). The NWB initially responded by requesting input from Indian and Northern Affairs (INAC),

In response to the NWB request, INAC commissioned BGC Engineering Inc. (BGC) in 2006 to complete a desktop assessment of Barrick's progress toward achieving the objectives of the Final A&R Plan. BGC concluded that "the reclamation work completed to date has not yet achieved the objective of ensuring that there would be no long term environmental impacts." Suspected acid rock drainage and metal leaching (ARD/ML) impacts in the Shear Lake mine area, and at the tailings impoundment were identified as liabilities associated with the mine site.

Currently, the property is monitored under a post-closure water monitoring program, and annual reports are submitted by Barrick to the Nunavut Water Board. It is Barrick's ultimate objective to turn the mining and surface leases back to the Crown.

The existing water license for the Site contains discharge limits which are summarized below (Table 1). These limits are only applicable to water discharged from the tailings pond.

Table 1 Water Licence Effluent Criteria

Parameter	Maximum Average Concentration	Maximum Concentration of Any Grab Sample
Total Arsenic	0.30 mg/L	0.60 mg/L
Total Copper	0.20 mg/L	0.40 mg/L
Total Cyanide	0.80 mg/L	1.60 mg/L
Total Lead	0.20 mg/L	0.40 mg/L
Total Nickel	0.30 mg/L	0.60 mg/L
Total Zinc	0.30 mg/L	0.60 mg/L
Total Suspended Solids	25.0 mg/L	50 mg/L
Oil and Grease	Visible sheen	
pH	6.0 – 9.5	

Shear Lake was de-watered in 1984 to allow for mineral exploration under the lake bed. During the dewatering process fish were also captured and transferred live to Cullaton Lake. The fish capture program caught Lake Chub, Stickleback and one Sculpin. No Arctic Grayling were caught although they had been reported to be present in Shear Lake in 1983.

1.2 Objectives

The purpose of this report is to a) document existing (2008) environmental conditions at the site, b) to investigate the suspected ARD/ML impacts in the Shear Lake mine area and at the tailings impoundment, c) conduct a screening level risk assessment (SLRA), and d) describe the potential impacts that are predicted in the future, if any. The results of this study will help characterize the liability associated with the current environmental condition, as well as with certain predicted future conditions.

The study consisted of both field, and desktop modeling components. These components were carried out by AECOM Canada, Lorax Environmental and Northwest Hydraulic Consultants (NHC) as follows:

AECOM Canada (this report)

- Surface water quality (streams and Shear Lake)
- Sediment quality (Shear Lake)
- Benthic invertebrate community assessment (streams)
- Periphyton community assessment
- Fish community assessment (Shear Lake)
- Fish tissue analysis
- Screening Level Risk Assessment (SLRA)

Lorax (2009):

- Porewater chemistry
- Geochemical loading estimates from tailings, waste rock and airstrip material
- Measurements of ARD/metal leaching potential

Northwest Hydraulic Consultants (2009)

- Water balances for tailings pond and Shear Lake

The Lorax (2009) and NHC (2009) reports are provided as appendices to this document but key findings are integrated into this report to help assess overall conditions and potential environmental risks associated with the site.

2. Study Site Description

The Cullaton Lake property is a closed mine site, which is located in Nunavut approximately 420 km northwest of Churchill, Manitoba and 230 km west of Arviat, Nunavut (Figure 1). This site is located on the Canadian Shield and characterized by low relief and numerous lakes. The mine site is situated between Cullaton Lake and the Kognak River. The property currently consists of a gravel airstrip, gravel road, an encapsulated waste rock (EWR) facility, covered dry tailings and a flooded tailings pond. Site photos are provided in Appendix A. Currently, the property is monitored under a post-closure water monitoring program that requires Barrick to provide the Nunavut Water Broad with annual reports. It is the goal of Barrick to turn the mining and surface leases back to the Crown.

This page left blank intentionally

Cullaton Lake

AIRSTRIP

SW38

SW27

SW2

SW3

SW2b

SW20

SW6

SW12

SW7

SW11

SW25

SW8

SW9

SW32

SW26

See Inset A

Shear Lake

SW35

SW36

SW13u

SW13d

SW15u

SW15d

SW16u

SW16d

SW24

Kognak River

SW23

SW18u

SW18d

940-22

Tailings Pond #1

SW34, 940-18

Tailings Pond #2

940-19

940-2

940-20

SW33, 940-3

940-23

Quarry Pit

SW21

WSC (06HD001)

A

SW2b

SW20

Encapsulated Waste Rock Pile

G01

SW12

SW7

SW11

SW25

SW6

Waste Rock Pile

Shear Lake

MT1

MT2

G02

SW9

SW8

Shear Creek

0 50 100 m

SW32

SW26

CANADA

Project Location

Legend

- Surface Water Sample Sites
- Surface Water, Benthic Macroinvertebrate and Periphyton Sample Sites
- Seep Sample Sites
- Electrofishing Sample Sites
- Water Survey Canada Station
- MET Station
- Gillnets
- Minnow Traps
- Quarry Pit
- Encapsulated Waste Rock Pile
- Waste Rock Pile
- Tailings Pond
- Flow Direction

Base Mapping

Contours
- Index (50m)
- Intermediate (10m)

Hydrology
- Waterbody
- Watercourse

- Vegetation
- Wetland
- Road (decommissioned)

Base data: National Topographic Database (NTDB) compiled by Natural Resources Canada at 1:50,000 scale. Sampling performed by Gartner Lee Ltd., June 2008. Road GPS-tracked by Gartner Lee Ltd., June 2008. Airport footprint approximate; for reference purposes only. EWR pile, tailings ponds and quarry outlines, BGC Engineering, Inc. (2006). All other data, AECOM 2009.

N W E S

0 0.5 1
Kilometres

1:30,000
UTM Zone 14N, NAD 83

File Name: 107651_By1_Fig1_Samples_2008_09bFeb19.mxd

Prepared By: MM Date Issued: Feb, 2009
Reviewed By: KW Project Number: 107651

Barrick Gold

Project: Cullaton Lake Project
Location: Nunavut

2008 Sampling Locations

AECOM

Figure 1

File Location: E:\GIS\GIS_proj\Y2009\107651_Cullaton\By1_Sampling08\107651_By1_Fig1_Samples_2008_09bFeb19.mxd

Date Revised: February 19, 2009
Date Plotted: February 19, 2009

This page left blank intentionally.

3. Field Sampling Methodology

3.1 Surface Water Quality

An assessment of the water quality within the Cullaton Lake Mine study area was carried out in 2008. Surface water quality sampling was conducted to document the current water quality conditions within the study area and to help determine if the aquatic environment is currently impacted as a result of the past mining activities and presence of tailings and waste rock material.

The 2008 water quality program consisted of four field visits carried out in May, June, August and September. Samples were collected from several locations across the study area, which are depicted in Figure 1. A summary of samples collected during each field visit and their corresponding location are provided in Table 2. Samples were collected and submitted for analysis of a range of water quality parameters including general chemical parameters, cyanide, nutrients, total and dissolved metals. For the purposes of this assessment, only total metal levels are discussed in this report.

Table 2 Summary of Samples Collected in 2008

	Station	Type	May	June	August	September
	SHEAR LAKE STUDY AREA					
Un-named Streams	*Unnamed Stream (Upstream of Shear Lake)*	*R*		*SW2* *SW2B*		*SW2* *SW2B*
	Unnamed Input Stream to Shear Lake	*R*		*SW32*		*SW32*
Un-named Lake	*Unnamed Lake (Upstream of Shear Lake)*	*L*	*SW27*			
Shear Lake	*Shear Lake*	*L*	*SW25T* *SW25B*** *SW26T* *SW26B*	*SW7*	*SW25T* *SW25B* *SW26T* *SW26B*	*SW25T* *SW25B* *SW26T*
Seepages	*Seeps (waste rock)*	*Se*		*SW6*		*SW3* *SW6* *SW12* *SW20*
Shear Creek	*Shear Creek*	*R*		*SW8* *SW9**	*SW8* *SW9*	*SW8* *SW9* *SW35* *SW36*
	Shear Creek (at Kognak River)				*SW23*	*SW23*
Kognak River	*Upstream (Reference)*	*R*		*SW21***	*SW21***	*SW21*
	Downstream	*R*		*SW24*	*SW24*	*SW24*

	Station	Type	May	June	August	September
	TAILINGS IMPOUNDMENTS STUDY AREA					
Tailings Pond #1	*Tailings Pond #1*	*L*		*940-2* *940-19*		
Tailings Pond #1 Outlet	*Un-named stream*	*R*		*SW34/940-18*	*940-2*	*SW34*
Quarry Pit	*Quarry Pit*			*940-23*		
Seepages	*Seep (Tailings Pond #1)*	*Se*		*940-20* *940-22*		
Tailings Pond #2 Outlet	*Un-named stream*			*SW33*	*SW33*	*SW33*
	Station	**Type**	**May**	**June**	**August**	**September**
	OTHER AREAS					
Road Crossings	*Road crossings between Shear Lake and tailings ponds*	*R*		*SW13U* *SW13D* *SW16U* *SW16U* **SW18U** **SW18D**	*SW15U* **SW15D**	*SW15U*** **SW15D**
Air Strip	*Pond adjacent to quartzite stockpile*	**Se**		SW38		

Notes:

T – sample taken at lake surface; B – sample taken at lake bottom

U – upstream of the road crossing; D – downstream of the road crossing

* sample taken in duplicate

** sample taken in triplicate

R- riverine

L- lacustrine

Se- seep

3.1.1 Sampling Locations

Surface water samples were collected from numerous locations within the Cullaton Lake mine study area (Figure 1). For the purposes of this assessment, sample locations have been divided into two main assessment areas; the Shear Lake study area and the Tailings Impoundment study area. The reason for this division is that these areas are not hydrologically connected. Although both these areas eventually flow into the Kognak River, they have no influence on each other upstream of that point, and therefore, will be assessed separately. An 'Other' areas section has also been included in this assessment and encompasses the sample locations that occur at road crossings as well as the airport strip. Summaries of these sampling locations are provided below. A general discussion of water quality across the entire Cullaton Lake mine study area is also included in the results section of this report.

3.1.1.1 Shear Lake Area

The Shear Lake study area includes several sampling stations ranging spatially from upstream (reference) to the main study location (Shear Lake), the point source (seeps) as well as downstream (Shear Creek and Kognak River). Locations that are considered background reference sites are located upstream of Shear Lake and presumably do not have potential for point source influences to impact water quality. These locations include two un-named streams (SW2, SW2b, and SW32) that flow into Shear Lake as well as an un-named Lake (SW27). Several sampling locations were also included within Shear Lake itself (SW7, SW25, and SW26). A large pile of waste rock is also present within this study area and is located along the eastern shore of Shear Lake. Several samples were obtained from seepages that are present within this waste rock pile area (SW3, SW6, SW12 and SW20).

Shear Lake flows downstream to Shear Creek which eventually flows into the Kognak River. Four sampling locations are present on Shear Creek, starting from just downstream of the Shear Lake outlet (SW8 and SW9) to further downstream (SW35) and even further downstream (SW36). An additional Shear Creek sampling location is also present at the outlet to the Kognak River (SW23). The Kognak River was sampled at two locations, one upstream (SW21) of the entire Cullaton Lake mine study area and one downstream of the site located below the Shear Creek outlet (SW24). The upstream Kognak River location is also considered a background reference site.

3.1.1.2 Tailings Impoundment Area

The Tailings Impoundment study area includes several sampling locations within and surrounding Tailings Pond #1 and Tailings Pond #2 (Figure 1). Tailings Pond #1 (940-2 and 940-19) is upstream of Talings Pond #2 and it is connected by a small un-named stream (SW34 and 940-18). Tailings Pond #2 outlet (SW33) then flows out into the Kognak River via this un-named stream. Seepage locations (940-20 and 940-22) are also near the tailings ponds. An abandoned quarry pit is located within this area (940-23). An upstream sample location is present at the road crossing (SW18) and is included in this area to evaluate upstream conditions, although it is not assumed that this is an un-impacted reference site as it is likely influenced by the historical mining activities. The stream at this road crossing has been re-routed around the tailings pond locations and later rejoins the existing un-named stream downstream of Tailings pond #2 outlet. Additional water quality samples were collected in this area in 2008 as a requirement of the site Water Licence. Results from that assessment have been incorporated into this report.

3.1.1.3 Other Areas

There are two ‘Other’ areas that will be discussed in this report and they include several road crossing locations (SW13, SW15, SW16 and SW18) and down gradient of a waste rock pile at the airstrip (SW38). Roadway crossing sample locations are situated where several un-named streams cross the mine access road. The airport strip is located approximately 2 km north of Shear Lake (Figure 1).

3.1.2 Sample Collection Methods

All samples were collected as discrete grab samples. Stream and seepage samples were obtained by submerging a pre-cleaned laboratory provided bottle directly into the water to collect a sample at an approximate depth of 0.05 to 0.10 m below surface. Where possible, samples were collected from mid-stream. In the case where preservative was required, the sample was decanted into the preserved bottle. Lake samples were obtained at surface as well as at depth. The water depth was first measured by use of a weighted tape to determine where to collect the 'at depth' water sample. The sample was then collected by deploying a Kemmerer bottle from the boat. Once the bottle was at its appropriate depth a weighted messenger is sent down to trigger the sampler closed, capturing the water sample. The water was then decanted from the Kemmerer into laboratory provided sample bottles. Samples collected for dissolved metals and dissolved nutrients analysis were filtered in the field through 0.45-micron disposable filterware and preserved immediately after filtration.

All samples were kept cold by storing in a cooler packed with ice at all times between sample collection and delivery to the laboratory. Surface water samples were shipped via air cargo from Thompson, MB to Bodycote Testing Group (May) and Maxxam Analytics Inc in Vancouver, BC (June, August and September) for analysis of a wide range of water quality parameters. Both are CAEAL accredited environmental laboratories. Chain of custody forms were prepared and accompanied the samples and copies are also provided in Appendix B.

3.1.3 Quality Assurance/Quality Control

Quality assurance/quality control protocols are a necessary component to any environmental sampling program. For the purposes of maintaining data quality, a number of industry and corporate protocols were applied to this project including the use of appropriate field protocols, field replicate samples and laboratory duplicates.

Appropriate measures were taken in the field during sample collection to reduce potential for sample contamination. Field staff wore disposable nitrile gloves at all times when sampling and gloves were changed between sampling locations. Sampling equipment (Kemmerer bottle) was rinsed thoroughly with ambient water at each location prior to sampling.

Field replicates samples were collected and analysed as part of the water quality program. Field replicate samples were collected at a frequency of 10% of the total number of water samples (10 in total). The sites where field replicates were taken are indicated in Table 1 and also summarized below in Table 3. Replicate sample locations were chosen randomly and samples were collected sequentially for each field visit. In addition, various samples were split and analysed in duplicate by the laboratory to provide a measure of the analytical variability (precision). (Laboratory duplicates are prepared by the laboratory by splitting and analyzing a second aliquot of randomly selected samples. These duplicate samples provide data for the laboratory's internal QA/QC program, including method precision and accuracy data.)

Table 3 Summary of QAQC Replicate Sampling Locations and Number of Replicates Obtained

Location	Date	Number of Replicates
SW25	15-May-08	3
SW9	27-Jun-08	2
SW15	05-Sep-08	3
SW21	28-Jun-08	3
SW21	03-Aug-08	3
940-20	28-Jun-08	2
940-22	28-Jun-08	2
940-18	28-Jun-08	2
940-3	28-Jun-08	2
940-23	28-Jun-08	2

3.2 Sediment Quality

Sediment samples were collected in Shear Lake in August at two sites SW25 and SW26 (Figure 1). The sediment was collected with an Eckman dredge. Two Eckman dredge volumes (grabs) were collected at each site and combined in a clean plastic tub to be homogenized into composite samples. Laboratory sample jars were then directly filled with sediment. Samples were kept cold at all times between sample collection and delivery to the laboratory. Samples were shipped via air cargo from Thompson to Maxxam Analytics in Vancouver, BC which is a CAEAL accredited environmental laboratory. Chain of custody forms were prepared and accompanied the samples. Copies of these forms are provided in Appendix B. Samples were analyzed for the following parameters: pH, moisture and total metals.

3.2.1 Quality Assurance/ Quality Control

Appropriate measures were taken to reduce potential for sample contamination. Field staff wore disposable nitrile gloves when sampling. Replicates sediment samples were also collected.

3.3 Meteorology

On June 27, 2008 an Onset HOBO weather station was installed at the Cullaton Lake site. The station was installed in a clear area on the top of the bedrock outcrop approximately 300m north of Shear Lake. The station was programmed to continuously log data every 20 minutes for all sensors. During the August field visit two net solar radiation sensors were added to the station to model evapotranspiration.

The station includes the following components:

- 3m tripod tower;
- HOBO weather station logger;
- Relative humidity sensor;
- Temperature sensor;
- Barometric pressure sensor;
- Rain gauge (0.2mm);
- Wind speed sensor;
- Wind direction sensor; and
- Solar radiation sensor

During the August and September field visits AECOM personnel downloaded the data stored on the HOBO data logger using the HOBOware software. The batteries were replaced during the September field visit with new lithium batteries to extend data collection through the upcoming winter (i.e., winter 2008/2009).

3.4 Hydrology

Manual stream flow measurements were made using the Marsh-McBirney Flo-Mate for all field visits. Water level measurements were recorded using Solinst Leveloggers at sites SW9 (serial number 0021023706), SW32 (serial number 49646), SW2 (serial number 0021023687) and SW33 (serial number 48861).

Discharge calculations were conducted following the United States Geological Survey (USGS) mid-section method. The width of the stream was divided into panels depending on the total width of the stream and the variation in stream velocity across the section. A stream velocity measurement was taken in the middle of each panel. In most instances, the number of panels was such that only between 5% and 10% of the flow passed though each panel. Stream velocity measurements were collected at 60% of the total depth at each measurement point in the cross section. At points with depths greater than 40 cm, two velocity measurements were taken: one at 20% of the total depth and the other at 80% of the total depth. The velocity was calculated at each point and the average of the two flows was used as the contribution of flow from that panel.

During the June, July and August field visits; the water level loggers were downloaded and re-installed on each occasion and surveyed using a standard survey rod and level. The water level, the streambed, and the height of the water level logger in the water were surveyed at each logger station in relation to a benchmark (large spike) that was installed on the creek's bank. This allowed for calibration of the water level in relation to pressure being recorded by the logger.

In accordance with AECOM's stream gauging protocols, all stream gauging locations were established in straight channels, free from obstructions upstream or downstream and point velocities were taken at 10% intervals of the total channel width. Careful planning in selecting each site was done to ensure representative hydraulic conditions.

In order to calibrate the water level loggers for each station, the discrete flow and corresponding, surveyed water levels need to be plotted to establish rating curves for each station (SW2, SW9, SW32, and SW33). The rating curve provides a relationship between stage and discharge. This relationship is plotted and an equation of the trend line between steam flow and stage is used to determine flow values for all stage readings recorded by the water level logger. Once the rating curves are established, it is then possible to construct a hydrograph for each station using the water level data from the water level loggers. The water level loggers are currently installed at all sites and are continuing to collect data.

3.5 Benthic Invertebrate Community

A benthic invertebrate community study was conducted on the Cullaton Lake area from September 1st through to September 6th, 2008. The study design implemented was Control/Impact with the use of an upstream (assumed un-impacted) reference station (SW2) to be compared to the downstream exposure stations (SW9, SW23, SW33 & SW34). These benthic sample locations have been summarized below in Table 4, and are also shown in Figure 1.

Table 4 Summary of Benthic Sampling Station Locations

Station	Location
SW2*	Un-named Creek flowing from un-named lake into Shear Lake
SW9	Shear Creek, downstream of road crossing
SW23	Shear Creek at the outlet to Kognak River
SW33	Tailings Pond #2 outflow
SW34	Tailings Pond #1 outflow

** Indicates reference station*

Benthic invertebrate sampling was conducted by AECOM aquatic biologists and carried out by the same individuals at each site to ensure consistency. A Surber sampler was used with a mesh size of 250 microns. Sampling involved placing the mouth of the Surber net perpendicular to, and facing the flow of water. The hinged frame rested on the stream bed, providing a fixed sampling area. Rocks within the sample area were rubbed and agitated by hand, causing the benthic invertebrates living in the sample area to be loosened away from substrate and be swept into the net by the current. Materials captured in the net were then washed into the sample bottle, and the net was further examined for any benthic invertebrates left on the net. This process was repeated to obtain multiple replicate samples (five) from each site sampled with the exception of SW34 where only two replicate samples were taken as water levels were extremely low (see photo log in A). This replication process was in an effort to capture any site variability. Replicate samples were preserved as individual samples with denatured alcohol (85% ethanol).

Benthic samples were submitted to a qualified taxonomist, Cordillera Consulting, for sorting and identification to the lowest taxonomic level possible. A total of twenty two samples were received at Cordillera Consulting on September 10th 2008 for processing. Upon receipt, samples were checked for preservative and systematically entered into the Cordillera Consulting data base. Samples were sieved through a 250µm

sieve, to remove clay and preservative and then elutriated to remove sand and gravel. The sand and gravel was examined under a low power dissecting scope, to verify the presence of any remaining organisms before discarding. The remaining organic debris was also examined under dissecting scopes for invertebrates. All samples had a sorting efficiency of greater than 90%. Several samples (eight) had large total number of organisms present; therefore, sub-sampling was applied to these eight samples by dividing the sample by a fraction of the sample volume. The numbers reported for these sub-sampled samples were not multiplied out to whole sample numbers.

Water quality samples for full chemical analysis were also obtained concurrently with the benthic community assessment. General site habitat surveys were conducted at each of the benthic sampling stations. These surveys provide a general characterization of habitat within the study area to identify any potential influences habitat may have on the benthic community structure.

3.5.1 Quality Assurance/Quality Control

Benthic invertebrate sampling was conducted by a qualified aquatic biologist and carried out by the same individual at each site to ensure consistency. Multiple samples (5) were taken from each site sampled in an effort to capture site variability, with the exception of SW34 where only 2 samples were taken as water levels were extremely low (as seen in the photo log). Cordillera Consulting conducted the laboratory analysis of the benthic invertebrate samples and is qualified for identification and enumeration of benthic invertebrate samples.

3.6 Periphyton Community

Periphyton samples were collected from five locations in the study area, SW2, SW33, SW23, SW9 and SW34 (see Figure 1). Samples were collected by scraping the periphyton off rocks. All rocks used to sample periphyon were traced with wax paper to determine the total area sampled. Each sample was transferred to a sterile 500 mL plastic bottle and preserved with Lugol's iodine solution. All samples were submitted to Fraser Environmental for periphyton biomass, taxonomic composition and biomass.

To calculate the area of periphyton habitat sampled within each outline, wax paper outlines were scanned to JPG file format at high resolution. The images were then rasterized and imported into AutoCAD where new vector boundaries were created based on the outside edge of the wax paper for each sample. This process ensured minimal margin of error and allowed for quick calculation once the scans were complete. The samples collected are summarized in Table 5.

Table 5 Summary of Periphyton Sample Areas

Site	Replicate	Area (cm2)
SW2	1	100.0
SW2	2	100.0
SW2	3	100.0
SW2	4	100.0
SW2	5	100.0
SW9	1	128.0
SW9	2	249.5
SW9	3	180.8
SW9	4	257.0
SW9	5	181.7
SW23	1	157.4
SW23	2	131.8
SW23	3	147.4
SW23	4	119.4
SW23	5	187.7
SW33	1	200.6
SW33	2	172.1
SW33	3	74.1
SW33	4	109.7
SW33	5	107.9
SW34	1	189.0
SW34	2	64.7

3.6.1 Quality Assurance/Quality Control

Periphyton sampling was conducted by a qualified aquatic biologist and carried out by the same individual at each site to ensure consistency. Multiple samples, 5, were taken from each site sampled in an effort to capture any site variability with the exception of SW34 where only 2 samples were taken as water levels were extremely low (as seen in the photo log). Fraser Environmental conducted the laboratory analysis of the periphyton samples and is qualified for species composition of periphyton samples.

3.7 Fisheries

3.7.1 Fish Community

Fish were sampled under Fisheries and Oceans Canada License number S-08/09-1046-NU, Animal Use Protocol (AUP) number FWI-ACC-2008-2009-063 entitled "Cullaton Lake", and Nunavut Research Institute Scientific Research Licence number 0301408N-A.

Fish sampling was conducted between September 3-5, 2008. Surveys were conducted in Shear Lake, Shear Creek (SW9), inflow from unnamed lake into Shear Lake (SW2 to SW2b) and the outflow of Tailings Pond #2 (SW33). Various capture methods were employed, including gill netting, minnow trapping and electrofishing. Gillnetting and minnow trapping were used in Shear Lake, while electrofishing was conducted in Shear Creek (SW9), inflow from unnamed lake into Shear Lake (SW2 to SW2b) and outflow of Tailings Pond #2 (SW33). The electrofisher used was a Smith-Root LR24 backpack electrofisher.

All fish captured were transferred to a live-holding bucket, identified to species, counted, and the majority were weighed and measured for fork and/or total length before being released alive. A portion of fish were sacrificed for the collection of tissue samples for metal analysis. Fish sampled for metal analysis were sent to Maxxam Analytics Inc. in Burnaby, BC. Scales were collected from Arctic Grayling from above the lateral line between the dorsal and anal fins, placed on wax paper and put in labelled envelopes. Scale envelopes were then sent to North Shore Environmental Services in Thunder Bay, ON for ageing analysis.

The catch per unit effort (CPUE) for minnow traps is expressed as the number of fish per trap per hour. CPUE for gill nets is expressed as the number of fish per hour. CPUE for electrofishing is expressed as number of fish captured per minute. A condition factor (K) value was calculated to determine the relationship between fish length and weight as an index to quantify fish 'health' where:

$$K = (W*100/L^3)$$

Where W is the weight of fish in grams and L is the length of fish in mm. When interpreting fish condition factors, the calculated value is compared to the value 1, if the condition factor is >1 it indicates fish are generally in healthy condition, whereas condition factors <1 indicate possibly less health fish.

3.7.2 Quality Assurance/Quality Control

All samples were collected using industry standard procedures and equipment. Fish collection and measurement was conducted by qualified fisheries biologists. Maxxam, the lab used for tissue sample analysis is accredited by the Canadian Association for Environmental Analytical Laboratories (CAEAL) and maintains a rigorous quality assurance/quality control process.

3.7.3 Fish Tissue Residues

Fish were collected under Fisheries and Oceans Canada License number S-08/09-1046-NU, Animal Use Protocol (AUP) number FWI-ACC-2008-2009-063 entitled “Cullaton Lake”, and Nunavut Research Institute Scientific Research License number 0301408N-A.

Fish sampling for tissue residues was conducted on September 3 and 5, 2008 in Shear Lake, and in the stream connecting Shear Lake to the unnamed lake to the North. Randomly selected individuals of each species from the fish community survey were sacrificed for tissue residue analysis. Any incidental mortalities were also sent to the lab for tissue residue analysis. All fish samples for tissue residue analysis were packaged in Whirl Pak® sampling bags (sterilized) and were kept frozen on dry ice until delivery to Maxxam Analytics, Vancouver B.C. All of the Ninespine Stickleback sampled were composited together into a single sample due to the small size fish making it difficult for the lab to analyze individually. Lake Chub (n=12) were packaged and analyzed as individual whole fish. The Arctic Grayling (n=6) were packaged and analyzed individually; however, only the midsection of the fish (no head, tail or internal organs as these were removed in the field using a dissecting scalpel) was analyzed. Maxxam Analytics measured total metal levels for 31 elements by ICPMS in the tissues received.

4. Field Sampling Results

4.1 Surface Water Quality

As described previously, surface water quality data collected from the Cullaton Lake mine study area will be discussed as separate areas of interest within the study area. These areas include the Shear Lake area, Tailings Impoundment area, and Other areas (roadway crossings and airport strip).

4.1.1 Quality Assurance/ Quality Control

A total of ten water quality samples were collected in replicate as part of the quality assurance and quality control component of our sampling program. The standard deviation and mean were calculated among replicate samples for each parameter by station to produce an average percent deviation overall for each replicated sample. The results of these calculations are summarized in Table 6.

Table 6 Summary of Field QAQC Samples Average Percent Deviation

Location	Date Sampled	# of Replicates	Average Deviation (%)
SW25	15-May-08	3	7
SW9	27-Jun-08	2	21
SW15	05-Sep-08	3	9
SW21	28-Jun-08	3	13
SW21	03-Aug-08	3	11
940-20	28-Jun-08	2	7
940-22	28-Jun-08	2	5
940-18	28-Jun-08	2	7
940-3	28-Jun-08	2	10
940-23	28-Jun-08	2	7

The overall calculated average deviation was 10% for the replicate samples collected during the water quality sampling program. This suggests good reproducibility of sampling methods and analytical results providing confidence in the data.

4.1.2 Shear Lake Area

A summary of water quality results for sample locations within the Shear Lake area are provided in Tables 7-10 under each water quality section described below. Full analytical results are provided in Appendix B. The analytical results were first compared to Water License limits then to the Canadian Council of Ministers of the Environment's (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG-PAL) (CCME, 2007). Where a CCME (2007) value was not available the Ontario Provincial Water Quality Objectives (PWQO) were utilized (if a criteria value was present).

Data are also included in Tables 7-10 for the Kognak River upstream reference location and Kognak River downstream of the input from the Mine Site.

4.1.2.1 General Chemistry

Results for general chemical and physical parameters obtained through analysis are summarized in Table 7 and include:

- pH
- Conductivity
- Total Suspended Solids (TSS)
- Total Dissolved Solids (TDS)
- Turbidity
- Dissolved Organic Carbon (DOC)
- Total Organic Carbon (TOC)
- Hardness
- Alkalinity

This page left blank intentionally

Table 7 Summary of General Water Quality Parameters for the Cullaton Lake Study Area in 2008

						Shear Lake Up-stream Inputs (Reference)					Upstream Lake (Reference)			Shear Lake					Seeps					Shear Creek					Shear Creek (outlet to Kognak River)					Kognak River- Upstream (Reference)					Kognak River- Downstream				
				PWQO	Water Licence	SW2(2), SW2b(2), SW32(2)					SW27(1)			SW7(1), SW25(8)*, SW26(5)*					SW3(1), SW6(2), SW12(1), SW20(1)					SW8(3), SW9(4), SW35(1), SW36(1)					SW23(2)					SW21(7)**					SW24(3)				
	Units	CCME a	Notes			Min	Max	Avg	Exc.	% of ND		Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND
Conductivity	µS/cm					23	31	**27**			**154**			35	167	**93**			160	1400	**690**			26	49	**37**			33	33	**33**			14	73	**39**			14	18	**16**		
pH	pH units	**6.5-9.0**			**6.0-9.5**	6.4	6.7	**6.5**	1/6		**7.0**			5.3	6.9	**6.5**	3/14		2.7	4.1	**3.5**	5/5		4.9	7.0	**6.0**	6/9		6.9	7.2	**7.1**			6.6	7.5	**7.2**			6.7	7.1	**6.8**		
Hardness	mg/L					10	13	**12**			**72**			14	69	**38**			32	170	**98**			10	18	**15**			16	16	**16**			6	42	**21**			7	8	**7**		
Total Suspended Solids	mg/L				**50**	1	3	**2**		50%	**33**			1	5	**2**		21%	1	3	**2**		60%	1	4	**3**			1	1	**1**			1	1	**1**		86%	1	1	**1**		67%
Total Dissolved Solids	mg/L					16	34	**24**			**83**			32	102	**62**			76	720	**383**			24	110	**41**			32	32	**32**			12	58	**33**			14	24	**18**		
Total Organic Carbon	mg/L					8	12	**9**			**39**			6	18	**13**			1	5	**3**		20%	7	10	**8**			7	8	**7**			3	8	**5**			4	5	**4**		
Dissolved Organic Carbon	mg/L					8	11	**9**			**30**			8	16	**12**			3	5	**3**		20%	6	9	**8**			6	7	**7**			3	7	**5**			4	4	**4**		
Alkalinity, Total (as CaCO3)	mg/L					2.2	4.1	**3.4**			**60.0**			0.5	250.0	**32.5**		7%	ND	ND	**ND**		####	0.5	8.4	**2.6**			6.7	12.0	**9.4**			2.5	29.0	**14.5**			2.4	5.7	**3.7**		
Turbidity	NTU					0	2	**1**			**18**			1	5	**2**			0	2	**1**			1	3	**2**			1	1	**1**			0	1	**1**			1	1	**1**		

Foot Notes:
All units mg/L unless otherwise noted
a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2007
b) Minimum dissolved oxygen level for the protection of early life stages of cold-water biota (9.5 mg/L). A level of 6.5 mg/L is protective of older life stages of cold-water biota.
c) Main guideline value is expressed as nitrate (13 mg NO3-/L); the alternate value, expressed as N (2.9 mg as N/L), is presented
d) 0.005 mg/L at pH <6.5; 0.1 mg/L at pH ≥6.5
e) An alternative, hardness-dependent, site-specific guideline may be used in place of the generic value. The site-specific values at water hardnesses of 10 and 60 mg/L are 10 ^ {0.86[log(hardness)]-3.2} = 0.0046 and 0.021 ug/L, respectively.
f) The guideline value for Cr(VI) was conservatively applied to the measured total Cr concentration.
g) The guideline value varies with hardness. The value for a hardness of 0-120 mg/L as CaCO3 is presented. Other values are 3 ug/L and 4 ug/L at hardnesses 120-180 mg/L and >180 mg/L, respectively.
h) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 2 ug/L, 4 ug /L and 7 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.
i) The guideline value for inorganic mercury is presented. This value may not prevent accumulation of methylmercury in aquatic life. Use of the inorganic mercury guideline value for screening total mercury concentrations would not be appropriate if any i
j) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 65 ug/L, 110 ug /L and 150 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.
*Average of sample and replicate
number of exceedances of criterion

This page left blank intentionally

pH

As shown in Table 7, the pH of water in the seeps within the waste rock was low with an average reading of 3.5. In 3 of 14 water samples from Shear Lake the pH was below the CCME guideline criteria range of 6.5-9.0 as well below the site Water Licence range of 6.0 to 9.0. The Kognak River had an average pH range of 7.2 to 7.7 and the Un-named Lake location had an average pH of 7.0.

Conductivity

Conductivity showed a wide range from 23 to 1400 µs/cm depending on the site. The average conductivity readings within Shear Lake ranged from 35 to 167 µs/cm. The average found at the seeps location (690µs/cm) was much higher. There is no guideline criterion for conductivity. However, conductivity is a useful general indicator of chemical loading at mines sites. The presence of increased levels of chloride and nutrients may also influence conductivity readings.

As shown in Figure 2, conductivity was highest at the seeps. Conductivity readings were slightly higher at the upstream Un-named Lake and Shear Lake when compared to all other Un-named streams, Shear Creek and Kognak River sample locations.

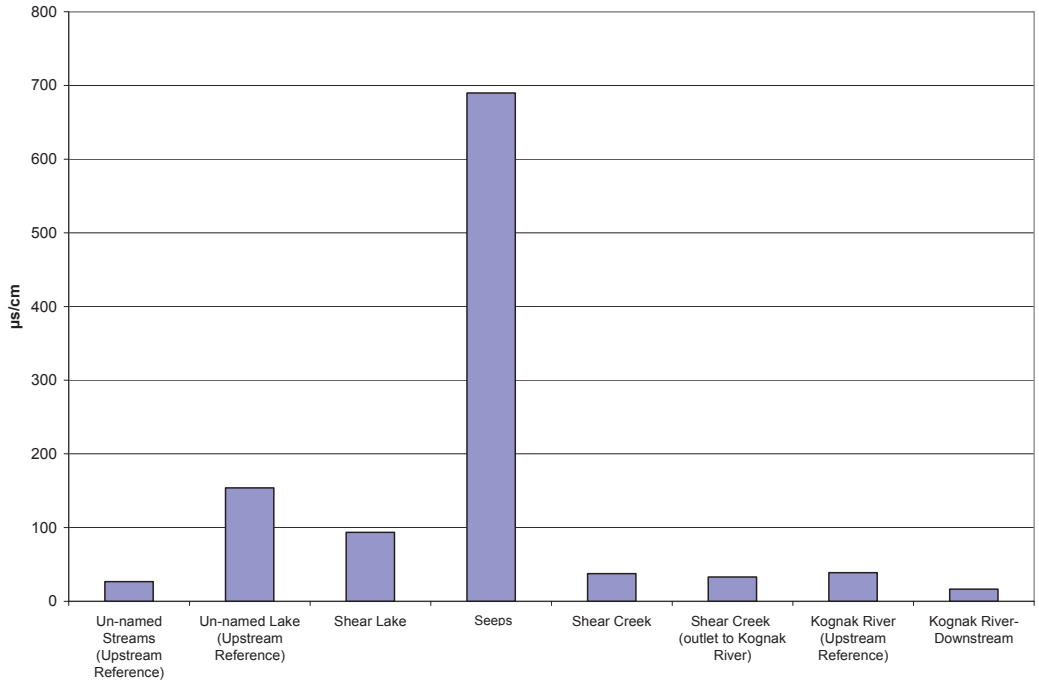


Figure 2 Shear Lake Area Average Conductivity Readings Measured in 2008

Total Suspended, Total Dissolved Solids and Turbidity

The average total suspended solids for locations within the Shear Lake study area ranged from 1 to 3 mg/L, not included in this range is a single sample collected at the Un-named Lake location that had a TSS result of 33 mg/L. This elevated level of TSS is likely due to sampling procedures, with disturbance of the lake bottom during sample collection and not a reflection of normal conditions. Turbidity, which is directly related to particles present in the water column were directly comparable to TSS results. The average turbidity results ranged from 1 to 2 NTU among the Shear Lake study area stations with the exception to the Un-named Lake station that had a elevated turbidity of 18 NTU which relates to the elevated TSS result found at this station. No samples exceeded the sites Water License criteria of 50 mg/L and there is no federal guideline for this parameter. Sources of solids loading within the study area are expected to be limited but could include in-stream erosion as well as surface water run-off from the surrounding developed lands (roads). The average total dissolved solids (TDS) results for the Shear Lake area locations ranged from 18 to 83 mg/L, with the exception of higher levels found among the seep locations (average 383 mg/L).

Dissolved and Total Organic Carbon (DOC and TOC)

The average total and dissolved organic carbon for locations within the Shear Lake study area ranged from 3 to 13 mg/L, not included in this range is a single sample collected at the Un-named Lake location that had TOC and DOC results of 39 and 30 mg/L respectively. The increase in organics at the Un-named Lake location is consistent with elevated TSS and turbidity results.

Alkalinity and Hardness

The average range for hardness was 7 to 78 mg/L and the average alkalinity measured ranged from non-detectable to 60 mg/L. These are typical ranges for northern Canadian waters. Alkalinity and hardness are basic parameters that characterize water quality and measuring the presence of calcium carbonate as well as its ability to buffer acidity. They are parameters that are directly influenced by the origin of the water and what geologic formation it is in contact with. These parameters identify the waters sensitivity to acidic pollution as well as the type of fish species that inhabit it.

4.1.2.2 Dissolved Anions (Chloride, Sulfate and Cyanide)

Results for dissolved anion parameters are summarized in Table 8 and include chloride, sulphate and total and WAD cyanide. Water licence limits exist for total cyanide only.

Chloride

Average chloride concentrations for locations within the Shear Lake study area were generally very low and ranged from 0.8 to 1.9 mg/L. There was one higher chloride value of 37 mg/L at the Shear Creek location (SW9). Concentrations generally did not reflect any trend when upstream reference locations were compared to Shear Lake or downstream sample locations.

Table 8 Summary of Surface Water Dissolved Anion Parameters for the Cullaton Lake Study Area in 2008

						Shear Lake Up-stream Inputs					Upstream Lake			Shear Lake					Seeps					Shear Creek					Shear Creek (outlet to Kognak River)					Kognak River- Upstream (Reference)					Kognak River- Downstream				
				PWQO	Water Licence	SW2(2), SW2b(2), SW32(2)					SW27(1)			SW7(1), SW25(8)*, SW26(5)*					SW3(1), SW6(2), SW12(1), SW20(1)					SW8(3), SW9(4), SW35(1), SW36(1)					SW23(2)					SW21(7)**					SW24(3)				
	Units	CCME a	Notes			Min	Max	Avg	Exc.	% of ND		Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND
Chloride (Cl)	mg/L					0.8	5.3	**1.9**			**1.0**			0.6	7.1	**1.8**		7%	0.6	2.2	**1.4**		40%	0.5	37.0	**4.8**			0.8	0.9	**0.9**			0.7	0.8	**0.8**		71%	0.5	4.2	**1.8**		
Sulfate (SO4)	mg/L					0.9	3.3	**1.8**		50%	**14.0**			5.7	51.8	**26.8**			56.0	350.0	**186.4**			3.8	15.0	**8.9**			0.9	1.2	**1.1**			1.1	1.5	**1.3**		43%	1.2	1.3	**1.3**		33%
Total Cyanide	mg/L	**0.005**			**1.6**	0.0007	0.0016	**0.0009**			**0.0020**			0.0007	0.0010	**0.0009**		7%	0.0006	0.0006	**0.0006**		75%	0.0005	0.0009	**0.0007**			0.0005	0.0017	**0.0011**			0.0008	0.0017	**0.0011**		43%	0.0011	0.0011	**0.0011**		67%
WAD Cyanide	mg/L					ND	ND	**ND**		100%				ND	ND	**ND**		100%	ND	ND	**ND**		100%	0.0005	0.0006	**0.0005**			0.0005	0.0005	**0.0005**			ND	ND	**ND**		100%	ND	ND	**ND**		100%

Foot Notes:
All units mg/L unless otherwise noted
a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2007
b) Minimum dissolved oxygen level for the protection of early life stages of cold-water biota (9.5 mg/L). A level of 6.5 mg/L is protective of older life stages of cold-water biota.
c) Main guideline value is expressed as nitrate (13 mg NO3-/L); the alternate value, expressed as N (2.9 mg as N/L), is presented
d) 0.005 mg/L at pH <6.5; 0.1 mg/L at pH ≥6.5
e) An alternative, hardness-dependent, site-specific guideline may be used in place of the generic value. The site-specific values at water hardnesses of 10 and 60 mg/L are 10 ^ {0.86[log(hardness)]-3.2} = 0.0046 and 0.021 ug/L, respectively.
f) The guideline value for Cr(VI) was conservatively applied to the measured total Cr concentration.
g) The guideline value varies with hardness. The value for a hardness of 0-120 mg/L as CaCO3 is presented. Other values are 3 ug/L and 4 ug/L at hardnesses 120-180 mg/L and >180 mg/L, respectively.
h) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 2 ug/L, 4 ug /L and 7 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.
i) The guideline value for inorganic mercury is presented. This value may not prevent accumulation of methylmercury in aquatic life. Use of the inorganic mercury guideline value for screening total mercury concentrations would not be appropriate if any i
j) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 65 ug/L, 110 ug /L and 150 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.
*Average of sample and replicate
number of exceedances of criterion

This page left blank intentionally

Sulfate

The average sulfate concentrations for the locations within the Shear lake study area ranged from 1.1 to 26.8 mg/L, not included in this range was an elevated average found at the seeps location (186.4 mg/L). There is no water quality criterion for sulphate. The elevated sulphate reading in the seep may be a by-product of oxidizing waste rock.

As shown in Figure 3, sulphate was highest at the seeps. Concentrations were slightly higher at the upstream Un-named Lake and Shear Lake when compared to all other Un-named stream, Shear Creek and Kognak River sample locations.

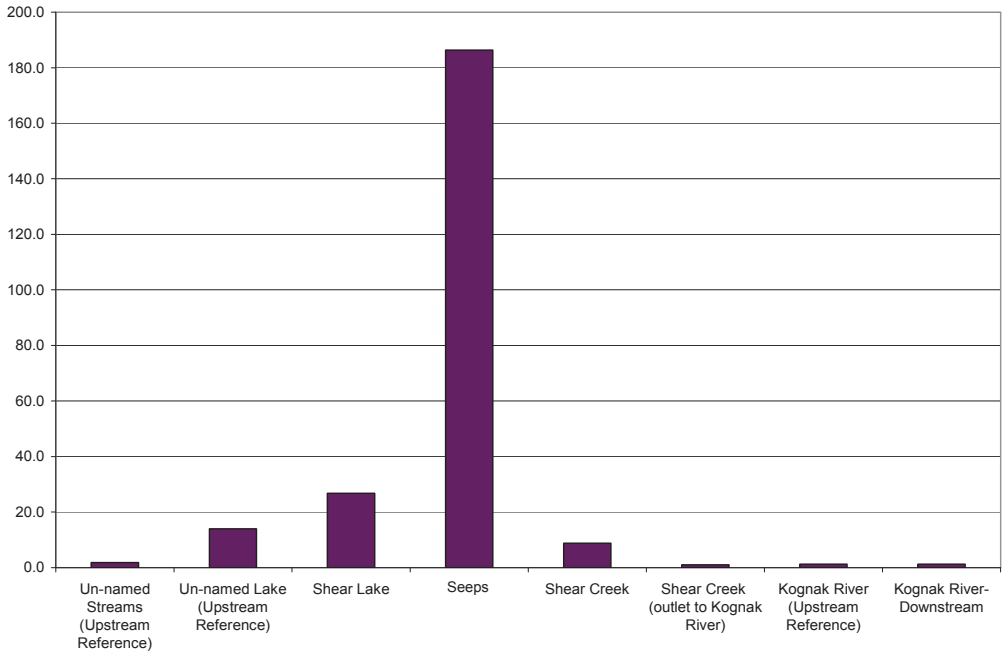


Figure 3 Shear Lake Area Average Sulphate Concentrations for 2008

Cyanide

The average cyanide concentrations for locations within the Shear Lake study area were low and ranged from 0.0006 to 0.002 mg/L. No samples at any location exceeded the CCME criteria of 0.005 mg/L, nor did they exceed the Water Licence criteria of 1.6 mg/L.

WAD cyanide average concentrations ranged from non-detectable to 0.005 mg/L. Cyanide concentrations generally did not reflect any trend when upstream reference locations were compared to Shear Lake or downstream sample locations.

Nutrients

Results for nutrients parameters are summarized in Table 9 and include:

- Ammonium as N
- Nitrate as N
- Nitrite as N
- Total Kjeidahl Nitrogen (TKN)
- Total Nitrogen
- Total Phosphorus
- Orthophosphate as P

There are no water license limits for any of these parameters.

Nitrate and Nitrite as N

The average nitrate as N concentrations for locations within the Shear Lake study area were low and ranged from 0.005 to 0.040 mg/L, not included in this range was an elevated average found at the seeps location (0.279 mg/L). No samples at any location exceeded the CCME criteria of 0.005 mg/L, nor did it exceed the CCME Nitrate as N criteria of 2.9 mg/L. Shear Lake nitrate as N concentrations were slightly elevated above other stations with an average concentration of 0.04 mg/L. Nitrite as N concentrations ranged from non-detectable to 0.008 mg/L. No samples at any location exceeded the CCME criteria of 0.06 mg/L.

Phosphorus

The average total phosphorus concentrations for locations within the Shear Lake study area ranged from 0.005 to 0.0057 mg/L, not included in this range was one elevated value recorded at the Un-named Lake location (0.09 mg/L). This elevated level of phosphorus corresponds with a higher TSS level at this location as previously discussed. Only the one single elevated sample exceeded the PWQO guideline criterion of 0.02 mg/L. Phosphorus concentrations generally did not reflect any trend when upstream reference locations were compared to Shear Lake or downstream sample locations. Total phosphorus is a nutrient that can contribute to increased algal growth.

Other Nutrients

All other remaining nutrients followed a similar trend as described above; nutrient concentrations were slightly elevated at the Un-named Lake location and can again be related to the elevated TSS results. Overall, nutrients are present in low concentrations and are not a concern within the Shear Lake area.

Table 9 Summary of Surface Water Nutrient Concentrations for the Cullaton Study Area in 2008

						Shear Lake Up-stream Inputs					Upstream Lake			Shear Lake					Seeps					Shear Creek					Shear Creek (outlet to Kognak					Kognak River- Upstream (Reference)					Kognak River- Downstream				
				PWQO	Water Licence	SW2(2), SW2b(2), SW32(2)					SW27(1)			SW7(1), SW25(8)*, SW26(5)*					SW3(1), SW6(2), SW12(1), SW20(1)					SW8(3), SW9(4), SW35(1), SW36(1)					SW23(2)					SW21(7)**					SW24(3)				
	Units	CCME a	Notes			Min	Max	Avg	Exc.	% of ND		Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND
Ammonium as N	mg/L					0.01	0.02	**0.02**		67%	**0.61**			0.01	0.06	**0.03**		64%	0.11	0.50	**0.33**		20%	0.01	0.22	**0.07**			0.01	0.10	**0.06**			0.01	0.11	**0.06**			0.06	0.19	**0.10**		
						2.6	3.5	**3.1**						NA	NA	**NA**			248.0	248.0	**248.0**			2.9	3.2	**3.0**								1.7	2.0	**1.8**			1.8	1.8	**1.8**		
Nitrate as N	mg/L	**2.9**	**c**			0.002	0.094	**0.017**			**0.010**			0.005	0.110	**0.040**		29%	0.006	0.792	**0.279**			0.002	0.034	**0.008**			0.007	0.026	**0.017**			0.003	0.012	**0.005**		14%	0.010	0.014	**0.012**		33%
Nitrite as N	mg/L	**0.06**				0.002	0.003	**0.002**			**ND**		100%	0.005	0.005	**0.005**		93%	0.008	0.008	**0.008**		80%	0.002	0.008	**0.003**			0.002	0.002	**0.002**			ND	ND	**ND**		100%	ND	ND	**ND**		100%
Nitrate and Nitrite as N	mg/L					0.002	0.097	**0.022**		17%	**0.010**			0.005	0.110	**0.040**		29%	0.006	0.792	**0.280**			0.002	0.036	**0.010**			0.007	0.026	**0.017**			0.003	0.012	**0.005**		14%	0.010	0.014	**0.012**		33%
Total Kjeldahl Nitrogen	mg/L					0.19	0.40	**0.28**			**2.02**			0.24	0.70	**0.45**			0.15	0.81	**0.48**			0.21	0.35	**0.28**			0.20	0.30	**0.25**			0.14	0.24	**0.19**			0.16	0.20	**0.17**		
Total Nitrogen	mg/L					0.19	0.49	**0.33**						0.24	0.34	**0.30**			0.16	1.00	**0.54**			0.28	0.36	**0.32**			0.21	0.32	**0.27**			0.14	0.18	**0.16**			0.18	0.20	**0.19**		
Total Phosphorus	mg/L			**0.02**		0.004	0.007	**0.006**			**0.090**	1/1		0.005	0.006	**0.005**		43%	0.004	0.007	**0.005**		40%	0.004	0.007	**0.006**			0.004	0.005	**0.005**			0.002	0.004	**0.003**			0.004	0.005	**0.005**		33%
Orthophosphate as P	mg/L					0.001	0.002	**0.002**			**0.080**			0.001	0.060	**0.031**			0.004	0.013	**0.006**			0.002	0.004	**0.003**			0.003	0.003	**0.003**			0.001	0.004	**0.002**			0.002	0.003	**0.002**		

Foot Notes:
All units mg/L unless otherwise noted
a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2007
b) Minimum dissolved oxygen level for the protection of early life stages of cold-water biota (9.5 mg/L). A level of 6.5 mg/L is protective of older life stages of cold-water biota.
c) Main guideline value is expressed as nitrate (13 mg NO3-/L); the alternate value, expressed as N (2.9 mg as N/L), is presented
d) 0.005 mg/L at pH <6.5; 0.1 mg/L at pH ≥6.5
e) An alternative, hardness-dependent, site-specific guideline may be used in place of the generic value. The site-specific values at water hardnesses of 10 and 60 mg/L are 10 ^ {0.86[log(hardness)]-3.2} = 0.0046 and 0.021 ug/L, respectively.
f) The guideline value for Cr(VI) was conservatively applied to the measured total Cr concentration.
g) The guideline value varies with hardness. The value for a hardness of 0-120 mg/L as CaCO3 is presented. Other values are 3 ug/L and 4 ug/L at hardnesses 120-180 mg/L and >180 mg/L, respectively.
h) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 2 ug/L, 4 ug /L and 7 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.
i) The guideline value for inorganic mercury is presented. This value may not prevent accumulation of methylmercury in aquatic life. Use of the inorganic mercury guideline value for screening total mercury concentrations would not be appropriate if any i
j) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 65 ug/L, 110 ug /L and 150 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.
*Average of sample and replicate
number of exceedances of criterion

This page left blank intentionally

4.1.2.3 Metals

Results for general metals parameters obtained through laboratory analysis are provided in Table 10 and include:

- Aluminum (Al)
- Antimony (Sb)
- Arsenic (As)
- Barium (Ba)
- Beryllium (Be)
- Bismuth (Bi)
- Boron (B)
- Cadmium (Cd)
- Calcium (Ca)
- Chromium (Cr)
- Cobalt (Co)
- Copper (Cu)
- Iron (Fe)
- Lead (Pb)
- Litium (Li)
- Magnesium (Mg)
- Manganese (Mn)
- Molybdenum (Mo)
- Nickel (Ni)
- Potassium (K)
- Selenium (Se)
- Silicon (Si)
- Silver (Ag)
- Sodium (Na)
- Strontium (Sr)
- Thallium (Tl)
- Tin (Sn)
- Titanium (Ti)
- Uranium (U)
- Vanadium (V)
- Zinc (Zn)
- Zirconium (Zr)

Water licence limits exist for As, Cu, Pb, Ni and Zn. No metal concentrations exceeded their respective water licence limits. Metals found to exceed either provincial (PWQO) or federal (CCME) water quality guidelines in one or more samples collected within the Shear Lake study area include:

- Aluminum (Al)
- Cadmium (Cd)
- Chromium (Cr)
- Cobalt (Co)*
- Copper (Cu)
- Iron (Fe)
- Lead (Pb)
- Nickel (Ni)
- Uranium (U)*
- Zinc (Zn)

**Indicates exceedence of PWQO criterion.*

Aluminum concentrations exceed CCME guidelines at all locations. Elevated aluminum levels are typical of northern Canadian waters, although the high reading of 15.0 mg/L at the seeps is significantly elevated above all other stations. Cadmium also exceeds the CCME criteria at all stations except the Shear Creek sampling location at the outlet to the Kognak River.

Iron concentrations were higher than the CCME guideline at many locations, with exception of the most downstream locations as well as the reference upstream Kognak River location. Chromium exceeds the CCME criteria only at the upstream Un-named Lake, and the seeps and decreases in concentration moving downstream. Copper exceeds the CCME criterion in most samples at the upstream Un-named Lake, Shear Lake and Shear Creek sampling locations. Lead exceeds the CCME criterion at Shear Lake and the seeps only. Cobalt exceeds the PWQO criterion at the Shear Creek and seep locations. Nickel, uranium and zinc concentrations exceed the CCME and PWQO criterions only at the seep locations. Mercury was non-detectable at most locations and where present was detected at very low concentrations (0.00001 to 0.00002 mg/L).

This page left blank intentionally

Table 10 Summary of Surface Water Metal Concentrations within the Shear Lake Study Area in 2008

						Shear Lake Up-stream Inputs (Reference)					Upstream Lake			Shear Lake					Seeps					Shear Creek					Shear Creek (outlet to Kognak River)					Kognak River- Upstream (Reference)					Kognak River- Downstream				
				PWQO	Water Licence	SW2(2), SW2b(2), SW32(2)					SW27(1)			SW7(1), SW25(8)*, SW26(5)*					SW3(1), SW6(2), SW12(1), SW20(1)					SW8(3), SW9(4), SW35(1), SW36(1)					SW23(2)					SW21(7)**					SW24(3)				
	Units	CCME a	Notes			Min	Max	Avg	Exc.	% of ND		Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND
Aluminum	mg/L	**0.005**	**d**			0.0789	0.1330	**0.1075**	6/6		**0.3590**	1/1		0.0924	0.3510	**0.2399**	14/14		0.5260	15.2000	**6.4872**	5/5		0.0926	0.4110	**0.2100**	9/9		0.0347	0.0362	**0.0355**	2/2		0.0077	0.0178	**0.0123**	7/7		0.0093	0.0173	**0.0132**	3/3	
Antimony	mg/L			**0.02**		0.00002	0.00003	**0.00003**			**ND**		100%	0.00002	0.00004	**0.00003**		50%	0.00003	0.00003	**0.00003**		80%	0.00002	0.00003	**0.00002**		11%	ND	ND	**ND**		100%	0.00003	0.00004	**0.00003**		57%	ND	ND	**ND**		100%
Arsenic	mg/L	**0.005**			**0.60000**	0.00031	0.00049	**0.00040**			**0.00270**			0.00036	0.00070	**0.00049**			0.00062	0.00095	**0.00073**			0.00032	0.00042	**0.00036**			0.00026	0.00029	**0.00028**			0.00008	0.00091	**0.00043**			0.00007	0.00009	**0.00008**		
Barium	mg/L					0.00965	0.01200	**0.01134**			**0.09000**			0.00932	0.05800	**0.03172**			0.00840	0.07970	**0.02962**			0.00927	0.01490	**0.01231**			0.00895	0.01010	**0.00953**			0.00614	0.01080	**0.00830**			0.00669	0.00741	**0.00713**		
Beryllium	mg/L					0.00001	0.00002	**0.00001**		50%	**ND**		100%	0.00002	0.00007	**0.00003**		43%	0.00046	0.00197	**0.00111**			0.00002	0.00008	**0.00004**			ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%
Bismuth	mg/L					ND	ND	**ND**		100%	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	0.000007	0.000007	**0.000007**		89%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%
Boron	mg/L			**0.2**		ND	ND	**ND**		100%	**ND**		100%	0.002	0.003	**0.003**		71%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%
Cadmium	mg/L	**1.7E-05**	**e**			0.000006	0.000098	**0.000038**	3/6	17%	**0.000030**	1/1		0.000013	0.000220	**0.000103**	11/14		0.000381	0.002880	**0.001421**	5/5		0.000015	0.000090	**0.000048**	7/9		0.000006	0.000007	**0.000007**			0.000006	0.000028	**0.000018**	2/7	43%	0.000005	0.000044	**0.000025**	1/3	33%
Calcium	mg/L					2.75	3.74	**3.31**			**20.80**			3.70	19.40	**10.81**			8.19	39.10	**25.58**			2.90	4.80	**3.97**			4.05	4.11	**4.08**			1.51	10.90	**5.29**			1.59	1.80	**1.70**		
Chromium	mg/L	**0.001**	**f**			0.0003	0.0005	**0.0004**			**0.0020**	1/1		0.0003	0.0010	**0.0007**			0.0004	0.0228	**0.0090**	2/5		0.0003	0.0008	**0.0005**			0.0002	0.0002	**0.0002**			0.0001	0.0001	**0.0001**		57%	0.0001	0.0001	**0.0001**		67%
Cobalt	mg/L			**0.0009**		0.00008	0.00072	**0.00023**			**0.00720**	1/1		0.00040	0.00760	**0.00366**	12/14		0.02560	0.26800	**0.13104**	5/5		0.00040	0.00468	**0.00214**	9/9		0.00006	0.00011	**0.00008**			0.00001	0.00004	**0.00002**			0.00001	0.00004	**0.00002**		
Copper	mg/L	**0.002**	**g**		**0.4**	0.00157	0.00199	**0.00184**			**0.00400**	1/1		0.00329	0.00900	**0.00636**	14/14		0.00690	0.19600	**0.08528**	5/5		0.00225	0.00923	**0.00450**	9/9		0.00113	0.00120	**0.00117**			0.00032	0.00129	**0.00074**			0.00037	0.00046	**0.00042**		
Iron	mg/L	**0.3**				0.104	0.618	**0.253**	2/6		**13.000**	1/1		0.406	0.853	**0.602**	14/14		0.091	38.800	**11.264**	3/5		0.317	2.070	**0.808**	9/9		0.083	0.130	**0.107**			0.018	0.054	**0.033**			0.017	0.049	**0.029**		
Lead	mg/L	**0.001**	**h**		**0.4**	0.00001	0.00007	**0.00004**			**ND**		100%	0.00007	0.00470	**0.00085**	3/14		0.00010	0.00245	**0.00104**	2/5		0.00005	0.00016	**0.00010**			0.00001	0.00002	**0.00001**			0.00001	0.00003	**0.00002**			0.00001	0.00007	**0.00003**		
Lithium	mg/L					ND	ND	**ND**		100%	**0.00200**			0.00060	0.00300	**0.00172**			0.00290	0.02790	**0.01366**			0.00050	0.00120	**0.00083**		11%	0.00060	0.00060	**0.00060**			0.00050	0.00070	**0.00060**			0.00050	0.00060	**0.00053**		
Magnesium	mg/L					0.72	1.02	**0.85**			**5.10**			1.02	5.00	**2.81**			2.68	17.60	**8.34**			0.75	1.60	**1.14**			1.41	1.47	**1.44**			0.65	3.45	**1.78**			0.67	0.75	**0.71**		
Manganese	mg/L					0.00100	0.04780	**0.01861**			**2.04000**			0.01770	0.31800	**0.15889**			1.76000	6.18000	**3.73200**			0.02830	0.10500	**0.06278**			0.00716	0.01650	**0.01183**			0.00289	0.00414	**0.00376**			0.00322	0.01430	**0.00754**		
Mercury	mg/L	**0.026**	i			0.00001	0.00001	**0.00001**			**ND**		100%	0.00001	0.00001	**0.00001**		86%	0.00001	0.00002	**0.00002**		60%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	0.00001	0.00001	**0.00001**		57%	ND	ND	**ND**		100%
Molybdenum	mg/L	**0.073**				0.00005	0.00008	**0.00006**			**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	0.00005	0.00009	**0.00007**		71%	0.00006	0.00006	**0.00006**		67%
Nickel	mg/L	**0.025**	j		**0.6**	0.00219	0.00332	**0.00266**			**0.01300**			0.00270	0.01380	**0.00776**			0.04580	0.17800	**0.10476**	5/5		0.00247	0.00603	**0.00392**			0.00131	0.00145	**0.00138**			0.00016	0.00163	**0.00076**			0.00018	0.00023	**0.00021**		
Potassium	mg/L					0.40	0.60	**0.54**			**2.80**			0.49	2.60	**1.47**			0.83	3.37	**1.84**			0.50	0.65	**0.59**			0.66	0.71	**0.69**			0.35	0.68	**0.49**			0.37	0.40	**0.38**		
Selenium	mg/L	**0.001**				0.00004	0.00005	**0.00004**			**ND**		100%	0.00004	0.00020	**0.00008**		71%	0.00008	0.00043	**0.00021**		20%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	0.00005	0.00006	**0.00006**		71%	ND	ND	**ND**		100%
Silicon	mg/L					0.5	1.4	**0.9**			**6.9**			0.2	5.4	**2.7**			0.3	16.2	**6.8**			0.2	1.3	**0.8**			0.6	0.7	**0.7**			0.1	0.7	**0.3**			0.1	0.2	**0.2**		
Silver	mg/L	**0.0001**				0.00001	0.00001	**0.00001**			**0.00002**			0.00001	0.00001	**0.00001**		93%	0.00001	0.00005	**0.00003**		40%	0.00001	0.00001	**0.00001**		78%	ND	ND	**ND**		100%	0.00001	0.00001	**0.00001**		57%	ND	ND	**ND**		100%
Sodium	mg/L					0.51	0.70	**0.63**			**3.30**			0.59	2.80	**1.57**			0.71	1.48	**1.02**			0.48	0.74	**0.61**			0.52	0.54	**0.53**			0.46	0.70	**0.57**		14%	0.47	0.49	**0.48**		
Strontium	mg/L					0.01020	0.01390	**0.01202**			**0.08000**			0.01320	0.06700	**0.03732**			0.05230	0.13500	**0.09330**			0.01020	0.01770	**0.01440**			0.01510	0.01540	**0.01525**			0.00856	0.04120	**0.02185**			0.00939	0.00985	**0.00964**		
Sulfur	mg/L										**5.2**			15.0	17.5	**16.5**																	NA	NA	**NA**			NA	NA	**NA**		
Thallium	mg/L	**0.0008**				0.000002	0.000003	**0.000002**			**ND**		100%	0.000002	0.000003	**0.000002**		57%	0.000024	0.000111	**0.000070**			0.000002	0.000005	**0.000003**		22%	0.000002	0.000002	**0.000002**		50%	0.000005	0.000009	**0.000007**		71%	ND	ND	**ND**		100%
Tin	mg/L					ND	ND	**ND**		100%	**ND**		100%	0.000010	0.000090	**0.000050**		64%	0.000010	0.000010	**0.000010**		80%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%
Titanium	mg/L					0.0006	0.0008	**0.0007**		17%	**0.0039**			0.0008	0.0025	**0.0015**			0.0009	0.0028	**0.0015**			0.0005	0.0014	**0.0010**			0.0005	0.0007	**0.0006**		50%	ND	ND	**ND**		100%	0.0006	0.0006	**0.0006**		67%
Uranium	mg/L			**0.005**		0.00005	0.00009	**0.00007**			**ND**		100%	0.00015	0.00036	**0.00021**		43%	0.00022	0.01740	**0.00717**	2/5		0.00009	0.00043	**0.00021**			0.00006	0.00006	**0.00006**			0.00004	0.00007	**0.00005**			0.00005	0.00005	**0.00005**		
Vanadium	mg/L			**0.006**		0.0002	0.0002	**0.0002**		67%	**0.0008**			0.0002	0.0002	**0.0002**		57%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%
Zinc	mg/L	**0.03**			**0.6**	0.0008	0.0016	**0.0011**			**0.0040**			0.0015	0.0140	**0.0071**		57%	0.0258	0.2260	**0.1132**	4/5		0.0013	0.0064	**0.0037**			0.0006	0.0007	**0.0007**			0.0003	0.0019	**0.0007**			0.0009	0.0022	**0.0014**		
Zirconium	mg/L			**0.004**		0.0002	0.0003	**0.0003**			**0.0020**		100%	0.0002	0.0010	**0.0003**		36%	0.0001	0.0002	**0.0001**		40%	0.0002	0.0004	**0.0003**			0.0002	0.0002	**0.0002**			ND	ND	**ND**		100%	ND	ND	**ND**		100%

Foot Notes:
All units mg/L unless otherwise noted
a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2007
b) Minimum dissolved oxygen level for the protection of early life stages of cold-water biota (9.5 mg/L). A level of 6.5 mg/L is protective of older life stages of cold-water biota.
c) Main guideline value is expressed as nitrate (13 mg NO3-/L); the alternate value, expressed as N (2.9 mg as N/L), is presented
d) 0.005 mg/L at pH <6.5; 0.1 mg/L at pH ≧6.5
e) An alternative, hardness-dependent, site-specific guideline may be used in place of the generic value. The site-specific values at water hardnesses of 10 and 60 mg/L are 10 ^ {0.86[log(hardness)]-3.2} = 0.0046 and 0.021 ug/L, respectively.
f) The guideline value for Cr(VI) was conservatively applied to the measured total Cr concentration.
g) The guideline value varies with hardness. The value for a hardness of 0-120 mg/L as CaCO3 is presented. Other values are 3 ug/L and 4 ug/L at hardnesses 120-180 mg/L and >180 mg/L, respectively.
h) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 2 ug/L, 4 ug /L and 7 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.
i) The guideline value for inorganic mercury is presented. This value may not prevent accumulation of methylmercury in aquatic life. Use of the inorganic mercury guideline value for screening total mercury concentrations would not be appropriate if any i
j) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 65 ug/L, 110 ug /L and 150 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.
*Average of sample and replicate
nber of exceedances of criter

This page left blank intentionally

Figures 4 through 7 show the spatial pattern of metal concentrations for select metals. The average metal concentrations for the seeps were consistently higher than the other locations. This indicates that the seeps are being impacted with metals leaching from the waste rock pile. The average Shear Lake and Shear Creek (downstream of Shear Lake) metal concentrations are slightly elevated relative to the upstream reference locations as well as the further downstream Shear Creek location (at mouth of Kognak River) and Kognak River locations. The Kognak River is generally comparable when the upstream reference site is related to downstream site. The Un-named Lake location had elevated average iron levels above all other sample locations. This increase in iron is attributed to the increased TSS result found at this location as indicated previously.

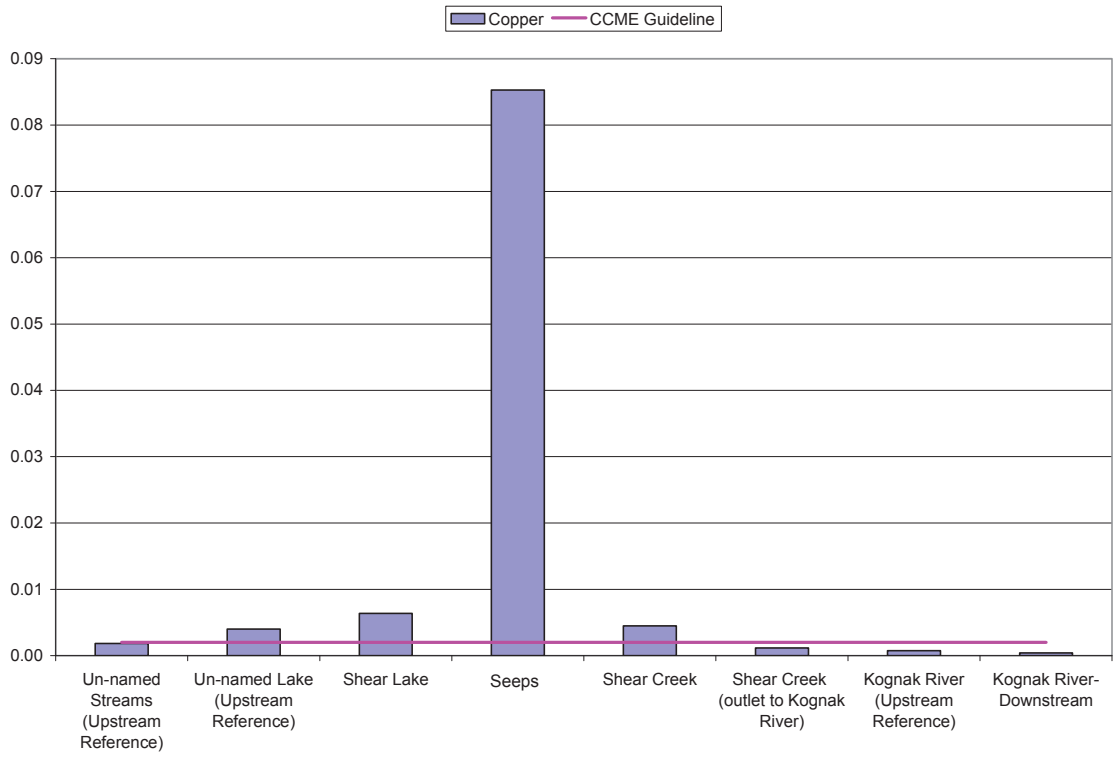


Figure 4 Average Concentrations for Copper (mg/L) for the Shear Lake Study Area in 2008

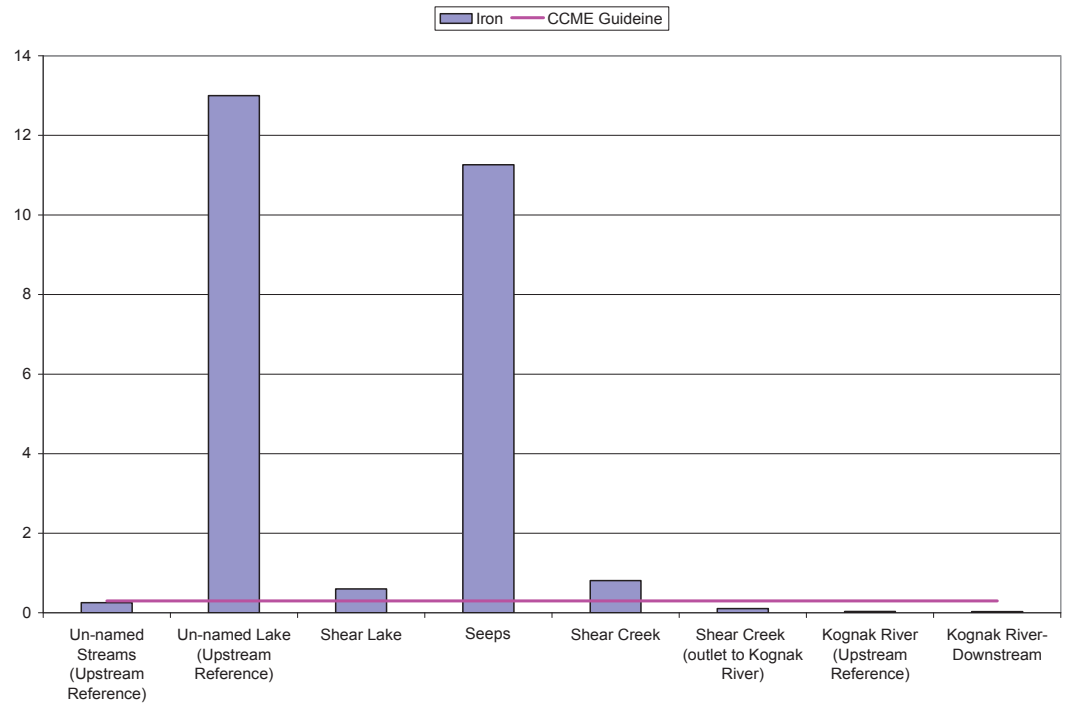


Figure 5 Average Concentrations for Iron (mg/L) for the Shear Lake Study Area in 2008

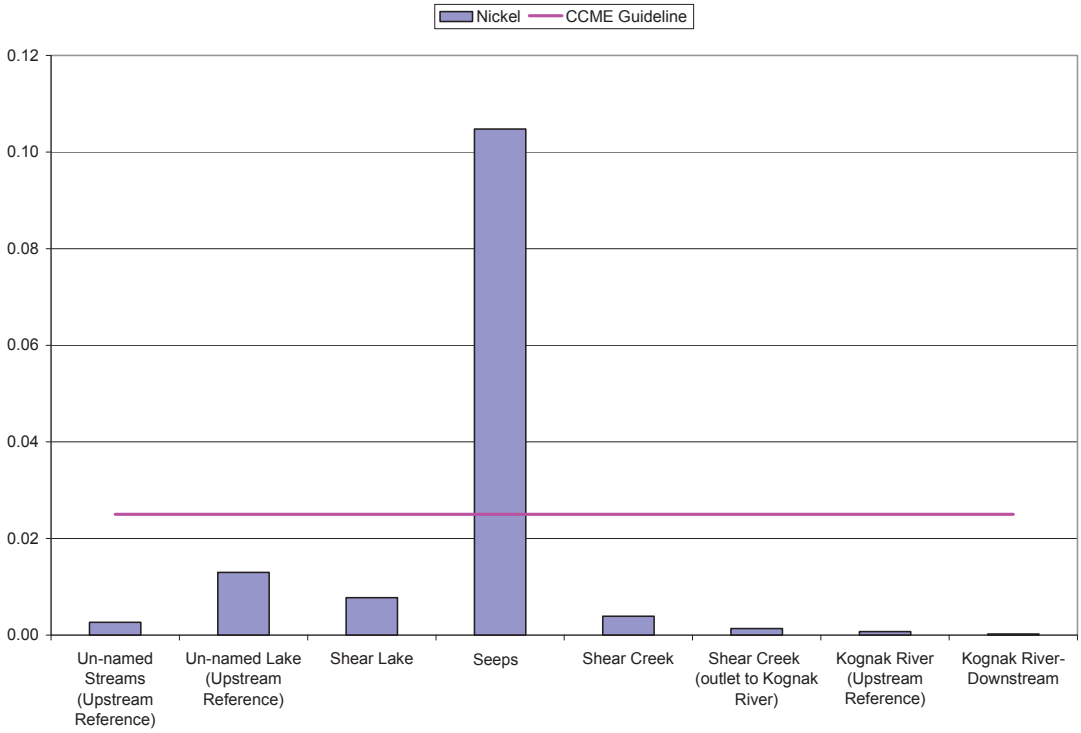


Figure 6 Average Concentrations for Nickel (mg/L) for the Shear Lake Study Area in 2008

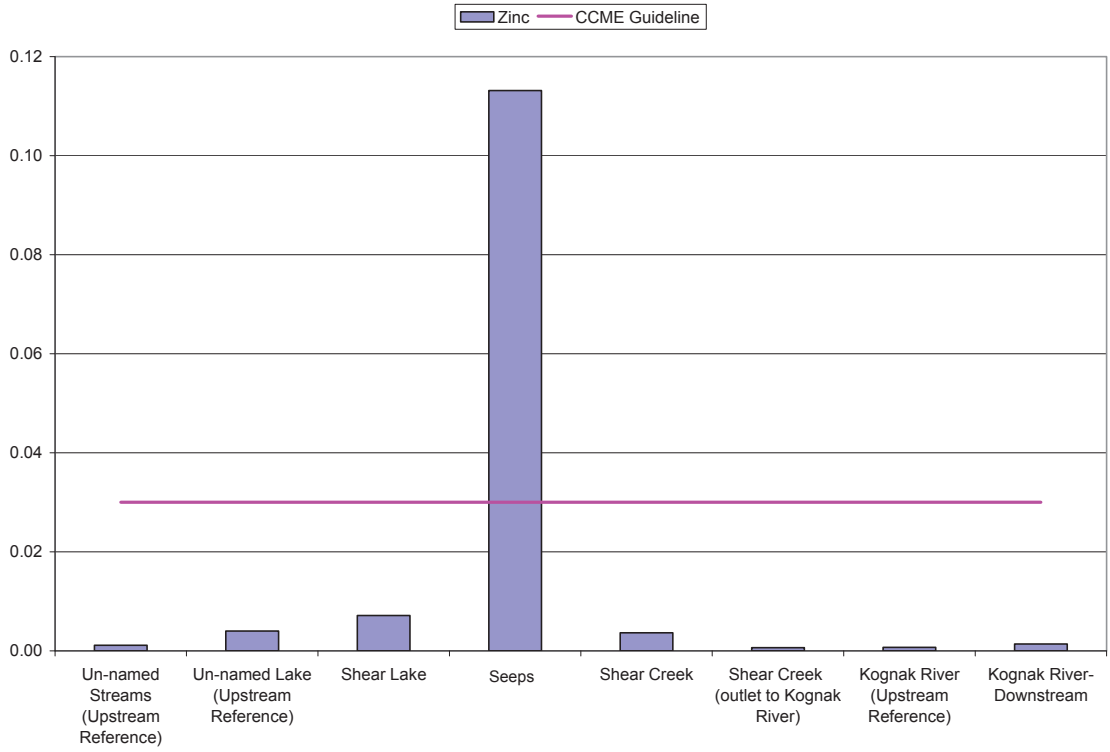


Figure 7 Average Concentrations for Zinc (mg/L) for the Shear Lake Study Area in 2008

4.1.2.4 Summary of Shear Lake Area Water Quality Results

Some general observations can be made regarding the Shear Lake study area water quality from the 2008 surface water sampling program:

- Water pH within Shear Lake was generally within CCME guidelines and Water License Limits with some exceptions.
- Low (acidic) pH was observed in the waste rock seeps.
- TSS values were very low with the exception of a single sample collected at the upstream Un-named Lake location. This is likely due to field sampling methods and not a reflection of normal conditions. This increase in TSS also relates to higher readings of turbidity, TOC and DOC at this station.
- Chloride, conductivity, sulphate and TDS concentrations were elevated at the seeps relative to all other locations within the study area, indicating that the water quality of the seeps is impacted by the waste rock pile. Concentrations of these parameters were otherwise low in the surface waters.
- Cyanide concentrations were low to non-detectable at all sites and well below the Water License limits,

- Nutrients were non-detectable or present in low concentration. One single phosphorus value was higher than the PWQO guideline in the Un-named Lake location as a result of elevated TSS in the sample. Nitrate was also slightly elevated at the seeps and Shear Lake locations. Nutrients in general do not appear to be a concern within the Shear Lake study area.
- Water quality was similar in the Kognak River between the upstream reference and downstream locations.
- The concentrations of metals were below their respective Water License limits. Metal concentrations in general were elevated at the seeps when related to other stations and can likely be attributed to metal leaching from the waste rock pile.
- The concentrations of Al, Cd, Co, Cu, Fe and Pb exceeded their respective CCME guidelines in Shear Lake

4.1.3 Tailings Impoundment Area

A summary of water quality results for sample locations within the Tailings Impoundment area is provided in Table 11. Full analytical results are provided in Appendix B. The analytical results were first compared to the Water License limits and then to Canadian Council of Ministers of the Environment's (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG-PAL) (CCME, 2007). Criteria were not available from the CCME (2007) for many of the chemical parameters analyzed in the surface water. For parameters that did not have a CCME value the Ontario Provincial Water Quality Objectives (PWQO) were then utilized, if a criteria value was present. These comparisons are provided only for reference purposes as application of water quality criteria to a tailings pond facility may not be appropriate.

4.1.3.1 General Chemistry

Average pH readings were comparable among all stations with an average range of 7.40 to 8.05. All water samples were within pH range of the Water Licence limits and CCME criteria. Average conductivity readings for the area ranged from 99 to 867µs/cm with the most elevated readings present at the Tailings Pond #1 and seeps. Average TDS results were elevated at the Tailings Pond #1 and seeps. TSS and turbidity levels were very low at all stations. TOC and DOC are only detectable at both tailings pond outlets, in very low concentrations.

4.1.3.2 Dissolved Anions (Chloride, Sulfate and Cyanide)

Average chloride concentrations ranged from non-detectable to 4.95 mg/L within the tailings impoundment area. Chloride levels are elevated at the Tailings Pond #1, seeps and both outflow pond locations (Table 11). Sulphate levels are elevated at the Tailings Pond #1, seeps and Tailings pond outlets with an average range of 168 to 395 mg/L. Other locations within the study area had a range of concentrations from 6.2 to 38 mg/L. Cyanide concentrations were above the CCME guidelines at the Tailings Pond #1 and the Tailings Pond #1 outlet locations with an average concentration range of 0.004 to 0.006 mg/L. The Water licence criterion for cyanide was not exceeded. The cyanide concentrations at other locations ranged from non-detectable to 0.002 mg/L.

Table 11 Summary of Surface Water Quality Results for the Tailing Impoundment Area in 2008

			Upstream Road Crossings									Tailings Pond #1					Seeps (Tailings)					Tailings Pond #1 Outlet					Tailings Pond #2 Outlet					Quarry Pit				
Station		Water Quality Guidelines	PWQO		Water Licence	SW18U			SW18D			940-2(2), 940-19(2)					940-20(2), 940-22(2)					SW34(3), 940-18(2)					SW34(3), 940-18(2)					940-23 (2)				
Date	Units	CCME a	Notes			28-Jun-08	Exc.	% of ND	28-Jun-08	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND	Min	Max	Avg	Exc.	% of ND
Conductivity	µS/cm					**99**			**110**			410	1200	**805**			800	930	**867.5**			400	550	**458**			190	300	**222**			110	110	**110**		
pH		6.5-9.0			6.0-9.5	**7.4**			**7.5**			7.5	7.9	**7.7**			8	8.1	**8.05**			7.5	8	**7.64**			7.7	8	**7.8**			7.4	7.4	**7.4**		
Hardness						**49.0**			**57.2**			161	765	**459.25**			361	547	**456**			159	219	**183.2**			79.7	121	**92.94**			45.1	46.7	**45.9**		
Total Suspended Solids	mg/L				50	**ND**		100%	**ND**		100%	1	2	**1.3333333**		25%	1	6	**3**			1	1	**1**		40%	2	2	**2**			2	2	**2**		50%
Total Dissolved Solids	mg/L					**88**			**94**			250	970	**610**			520	720	**625**			250	340	**282**			130	180	**150**			64	68	**66**		
Total Organic Carbon	mg/L					**11**			**11**			NA	NA	**NA**			NA	NA	**NA**			2	3	**3**			11	14	**12**			NA	NA	**NA**		
Dissolved Organic Carbon	mg/L					**11**			**11**			NA	NA	**NA**			NA	NA	**NA**			2	3	**2**			11	14	**12**			NA	NA	**NA**		
Alkalinity, Total (as CaCO3)						**36**			**40**			33	110	**71.5**			120	240	**180**			36	54	**41.6**			58	100	**69**			21	22	**21.5**		
Turbidity	NTU					**0.6**			**0.5**			1	1.7	**1.325**			1.3	10.1	**5.625**			0.6	1.2	**0.94**			1.2	1.8	**1.56**			0.7	0.9	**0.8**		
Chloride (Cl)						**ND**		100%	**0.7**			2.8	3.1	**3.0**			4.2	5.7	**5.0**			2.8	3.9	**3.2**			1.7	2.6	**2.1**			0.8	0.8	**0.8**		
Sulfate (SO4)						**6.2**			**11.0**			160.0	650.0	**395.0**			200.0	420.0	**312.5**			140.0	190.0	**168.0**			31.0	60.0	**38.0**			26.0	29.0	**27.5**		
Total Cyanide		0.005			1.6	**0.0015**			**0.0014**			0.0008	0.0089	**0.0049**	2/4		0.0013	0.0039	**0.0026**			0.0036	0.0077	**0.0067**	3/4		0.0016	0.0023	**0.0018**			ND	ND	**ND**		100%
WAD Cyanide																						ND	ND	**ND**		100%	0.0008	0.0008	**0.0008**		50%	NA	NA	**NA**		
Ammonium as N						**0.12**			**0.02**			NA	NA	**NA**								0.01	0.14	**0.08**			0.03	0.10	**0.07**							
						4.2			**2.8**			2.1	4.0	**3.1**			3.2	4.3	**3.9**			2.1	2.2	**2.1**			1.7	1.9	**1.8**			1.7	2.3	**2.0**		
Nitrate as N		2.9	c			**ND**		100%	**0.002**			0.006	0.015	**0.011**		25%	0.002	0.016	**0.007**			0.006	0.017	**0.012**		20%	0.003	0.015	**0.006**		20%	0.056	0.073	**0.065**		
Nitrite as N		0.06				**ND**		100%	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	0.003	0.003	**0.003**		80%	0.003	0.003	**0.003**		80%	0.002	0.002	**0.002**		
Nitrate and Nitrite as N						**ND**		100%	**0.002**			0.006	0.015	**0.011**		25%	0.002	0.016	**0.007**			0.006	0.020	**0.013**		20%	0.003	0.018	**0.007**			0.058	0.075	**0.067**		
Total Kjeldahl Nitrogen						**0.33**			**0.31**			NA	NA	**NA**			NA	NA	**NA**			0.14	0.19	**0.17**			0.69	0.69	**0.69**			NA	NA	**NA**		
Total Nitrogen												NA	NA	**NA**			NA	NA	**NA**			0.16	0.19	**0.18**			0.69	0.71	**0.70**			NA	NA	**NA**		
Phosphorus	mg/L			**0.020**		**0.005**			**0.004**			0.007	0.010	**0.009**			0.011	0.034	**0.022**			0.004	0.006	**0.005**			0.012	0.026	**0.018**			0.004	0.004	**0.004**		
Orthophosphate as P						**0.001**			**0.001**			0.001	0.001	**0.001**		75%	ND	ND	**ND**		100%	0.001	0.002	**0.002**		60%	0.001	0.003	**0.002**		40%	0.001	0.005	**0.003**		
Aluminum	mg/L	0.005	d			**0.0163**	1/1		**0.0159**	1/1		0.0054	0.1020	**0.0442**	4/4		0.0143	0.0264	**0.0210**	4/4		0.0156	0.0186	**0.0173**	3/5		0.0208	0.0294	**0.0268**	3/5		0.0278	0.0304	**0.0291**	2/2	
Antimony	mg/L			**0.020**		**0.00004**			**0.00004**			0.00004	0.00025	**0.00014**			0.00018	0.00023	**0.00021**			0.00004	0.00007	**0.00005**			0.00008	0.00010	**0.00008**			0.00010	0.00010	**0.00010**		
Arsenic	mg/L	0.005			0.6	**0.00198**			**0.00175**			0.00239	0.00563	**0.00344**	1/4		0.00330	0.00339	**0.00336**			0.00129	0.00236	**0.00161**			0.00260	0.00339	**0.00310**			0.00084	0.00084	**0.00084**		
Barium	mg/L					**0.01350**			**0.01390**			0.01150	0.02100	**0.01635**			0.02810	0.03650	**0.03213**			0.01190	0.01540	**0.01316**			0.01260	0.01710	**0.01424**			0.00498	0.00502	**0.00500**		
Beryllium	mg/L					**ND**		100%	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%
Bismuth	mg/L					**ND**		100%	**ND**		100%	0.000007	0.000012	**0.000010**		50%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%
Boron	mg/L			**0.200**		**ND**		100%	**ND**		100%	0.110	0.110	**0.110**		50%	0.140	0.140	**0.140**		50%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%
Cadmium	mg/L	0.000017	e			**0.000016**			**0.000042**	1/1		0.000022	0.001120	**0.000411**	4/4		0.000026	0.000080	**0.000050**	4/4		0.000007	0.000010	**0.000008**		20%	0.000007	0.001140	**0.000245**	1/1		0.000015	0.000018	**0.000017**	1/1	
Calcium	mg/L					**14.50**			**17.00**			41.70	209.00	**124.28**			93.60	159.00	**126.85**			41.70	56.80	**47.78**			20.40	29.50	**23.36**			12.00	12.40	**12.20**		
Chromium	mg/L	0.001	f			**0.0002**			**0.0001**			0.0003	0.0004	**0.0004**		50%	0.0001	0.0002	**0.0002**		25%	ND	ND	**ND**		100%	0.0001	0.0002	**0.0001**			0.0001	0.0001	**0.0001**		50%
Cobalt	mg/L			**0.001**		**0.00015**			**0.00012**			0.00099	0.00227	**0.00148**			0.00096	0.00314	**0.00202**			0.00091	0.00148	**0.00112**			0.00029	0.00040	**0.00033**			0.00011	0.00012	**0.00011**		
Copper	mg/L	0.002	g		0.4	**0.00093**			**0.00090**			0.00110	0.00157	**0.00137**			0.00238	0.00423	**0.00325**	4/4		0.00085	0.00113	**0.00094**			0.00321	0.00380	**0.00363**	3/5		0.00092	0.00102	**0.00097**		
Iron	mg/L	0.3				**0.148**			**0.134**			0.259	0.490	**0.373**	3/4		0.086	0.307	**0.194**	1/4		0.037	0.132	**0.098**			0.149	0.272	**0.210**			0.070	0.086	**0.078**		
Lead	mg/L	0.001	h		0.4	**0.00003**			**0.00003**			0.00098	0.00186	**0.00153**	3/4		0.00005	0.00023	**0.00013**			0.00009	0.00045	**0.00030**			0.00006	0.00008	**0.00006**			0.00009	0.00009	**0.00009**		
Lithium	mg/L					**0.00070**			**0.00060**			0.00050	0.00160	**0.00108**			0.00060	0.00220	**0.00140**			0.00050	0.00080	**0.00060**			0.00080	0.00120	**0.00098**			ND	ND	**ND**		100%
Magnesium	mg/L					**3.09**			**3.57**			13.60	59.10	**36.10**			30.90	36.30	**33.83**			13.30	18.90	**15.56**			6.97	11.60	**8.43**			3.70	3.80	**3.75**		
Manganese	mg/L					**0.03070**			**0.02330**			0.09610	0.14700	**0.11553**			0.03190	0.52500	**0.26355**			0.01060	0.07260	**0.04568**			0.02410	0.05700	**0.04478**			0.01410	0.01420	**0.01415**		
Mercury	mg/L	0.026	i			**0.00001**			**0.00001**			ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	0.00001	0.00001	**0.00001**		60%	0.00001	0.00001	**0.00001**		50%
Molybdenum	mg/L	0.073				**0.00007**			**0.00008**			0.00019	0.00035	**0.00027**			0.00083	0.00217	**0.00149**			0.00017	0.00061	**0.00034**			0.00042	0.00054	**0.00047**			0.00023	0.00023	**0.00023**		
Nickel	mg/L	0.025	j		0.6	**0.00236**			**0.00219**			0.00194	0.00883	**0.00548**			0.00415	0.00644	**0.00530**			0.00085	0.00124	**0.00108**			0.00357	0.00434	**0.00382**			0.00128	0.00141	**0.00135**		
Potassium	mg/L					**0.62**			**0.66**			2.33	4.98	**3.64**			4.51	6.78	**5.62**			2.26	3.31	**2.68**			1.41	1.71	**1.53**			0.57	0.58	**0.58**		
Selenium	mg/L	0.001				**0.00005**			**ND**		100%	0.00010	0.00010	**0.00010**		50%	0.00009	0.00010	**0.00010**			0.00006	0.00006	**0.00006**		100%	0.00008	0.00014	**0.00011**			0.00005	0.00005	**0.00005**		50%
Silicon	mg/L					**1.1**			**1.1**			0.2	2.5	**1.4**			0.1	0.7	**0.4**			0.2	0.3	**0.2**		40%	0.1	0.3	**0.2**			0.1	0.1	**0.1**		
Silver	mg/L	0.0001				**ND**		100%	**ND**		100%	0.00001	0.00001	**0.00001**			0.00001	0.00001	**0.00001**		50%	0.00001	0.00001	**0.00001**		20%	0.00002	0.00003	**0.00003**			0.00001	0.00001	**0.00001**		
Sodium	mg/L					**0.94**			**1.08**			7.36	17.40	**12.35**			12.00	52.30	**31.88**			16.60	24.80	**19.74**			7.06	14.80	**9.48**			2.00	2.07	**2.04**		
Strontium	mg/L					**0.05950**			**0.07290**			0.16700	0.75200	**0.45975**			0.41000	0.54500	**0.47600**			0.16400	0.24000	**0.19360**			0.09120	0.13300	**0.10604**			0.06640	0.06720	**0.06680**		
Sulfur	mg/L					**NA**			**NA**			NA	NA	**NA**			NA	NA	**NA**			NA	NA	**NA**			NA	NA	**NA**			NA	NA	**NA**		
Thallium	mg/L	0.0008				**ND**		100%	**ND**		100%	0.00000	0.00001	**0.00000**			0.00001	0.00001	**0.00001**			0.00000	0.00000	**0.00000**		20%	0.00000	0.00001	**0.00000**			0.00000	0.00000	**0.00000**		
Tin	mg/L					**ND**		100%	**ND**		100%	0.00004	0.00008	**0.00005**		25%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%
Titanium	mg/L					**ND**		100%	**ND**		100%	0.0017	0.0036	**0.0027**		50%	0.0007	0.0010	**0.0008**			0.0005	0.0009	**0.0007**		60%	0.0006	0.0010	**0.0007**		20%	0.0012	0.0013	**0.0013**		
Uranium	mg/L			**0.005**		**0.00009**			**0.00010**			0.00039	0.00168	**0.00104**			0.00685	0.01110	**0.00899**			0.00038	0.00046	**0.00040**			0.00043	0.00075	**0.00055**			0.00028	0.00028	**0.00028**		
Vanadium	mg/L			**0.006**		**ND**		100%	**ND**		100%	ND	ND	**ND**		100%	0.0002	0.0002	**0.0002**		75%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%
Zinc	mg/L	0.03			0.6	**0.0406**	1/1		**0.0020**			0.0011	0.0182	**0.0092**			0.0011	0.0022	**0.0015**			0.0003	0.0011	**0.0005**			0.0009	0.0025	**0.0014**			0.0077	0.0086	**0.0082**		
Zirconium	mg/L			**0.004**		**0.0001**			**0.0001**			ND	ND	**ND**		100%	0.0002	0.0002	**0.0002**		50%	ND	ND	**ND**		100%	ND	ND	**ND**		100%	ND	ND	**ND**		100%

Foot Notes:
All units mg/L unless otherwise noted
a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2007
b) Minimum dissolved oxygen level for the protection of early life stages of cold-water biota (9.5 mg/L). A level of 6.5 mg/L is protective of older life stages of cold-water biota.
c) Main guideline value is expressed as nitrate (13 mg NO3-/L); the alternate value, expressed as N (2.9 mg as N/L), is presented
d) 0.005 mg/L at pH <6.5; 0.1 mg/L at pH ≥6.5
e) An alternative, hardness-dependent, site-specific guideline may be used in place of the generic value. The site-specific values at water hardnesses of 10 and 60 mg/L are 10 ^ {0.86[log(hardness)]-3.2} = 0.0046 and 0.021 ug/L, respectively.
f) The guideline value for Cr(VI) was conservatively applied to the measured total Cr concentration.
g) The guideline value varies with hardness. The value for a hardness of 0-120 mg/L as CaCO3 is presented. Other values are 3 ug/L and 4 ug/L at hardnesses 120-180 mg/L and >180 mg/L, respectively.
h) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 2 ug/L, 4 ug /L and 7 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.
i) The guideline value for inorganic mercury is presented. This value may not prevent accumulation of methylmercury in aquatic life. Use of the inorganic mercury guideline value for screening total mercury concentrations would not be appropriate if any i
j) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 65 ug/L, 110 ug /L and 150 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.
*Average of sample and replicate

Exceedes

This page left blank intentionally

4.1.3.3 Nutrients

In general nutrients were non-detectable or present in very low concentrations within the Tailings Impoundment area and are not expected to be a concern to water quality (Table 11).

4.1.3.4 Metals

No metal concentrations in the Tailings Ponds exceeded their respective Water Licence criterions. Metals that exceeded either provincial (PWQO) or federal (CCME) water quality guidelines in one or more samples collected within the Tailings Impoundment study area include:

- Aluminum (Al)
- Arsenic (As)
- Cadmium (Cd)
- Copper (Cu)
- Iron (Fe)
- Lead (Pb)
- Zinc (Zn)

Aluminum concentrations exceed CCME guidelines at all locations. An elevated aluminum concentration is typical of northern Canadian waters as it is an abundant native element. The Tailings Pond #1 location had slightly elevated concentrations when compared to other sites. Cadmium was marginally above CCME criteria at all stations except the upstream road crossing and Tailings Pond #1 outlet location. Arsenic, lead, zinc and iron only exceeded the CCME criteria in a few samples and were not significantly elevated. Mercury was non-detectable at most locations and otherwise was present in very low concentrations (0.00001 mg/L).

Comparisons with CCME criteria are made in this report to provide a frame of reference. However, the tailings pond is a waste management facility and water quality guidelines for the protection of freshwater life (i.e. CCME guidelines) are not directly applicable.

Figures 8 through 11 show the spatial pattern of metal concentrations for select metals. The average metals concentrations for the Tailings Pond #1 location were slightly higher than other locations in the Tailings Impoundment area. This is not surprising and indicates that surface water at this location is likely impacted with leaching metals from the tailings. Generally metals concentrations are lower at the upstream road crossing location when concentrations are related to the downstream tailings ponds, seeps, quarry and outflows.

The upstream road crossing location had one zinc level that was higher than all other sample locations. The reason for this is uncertain and may be attributed to sampling or laboratory error.

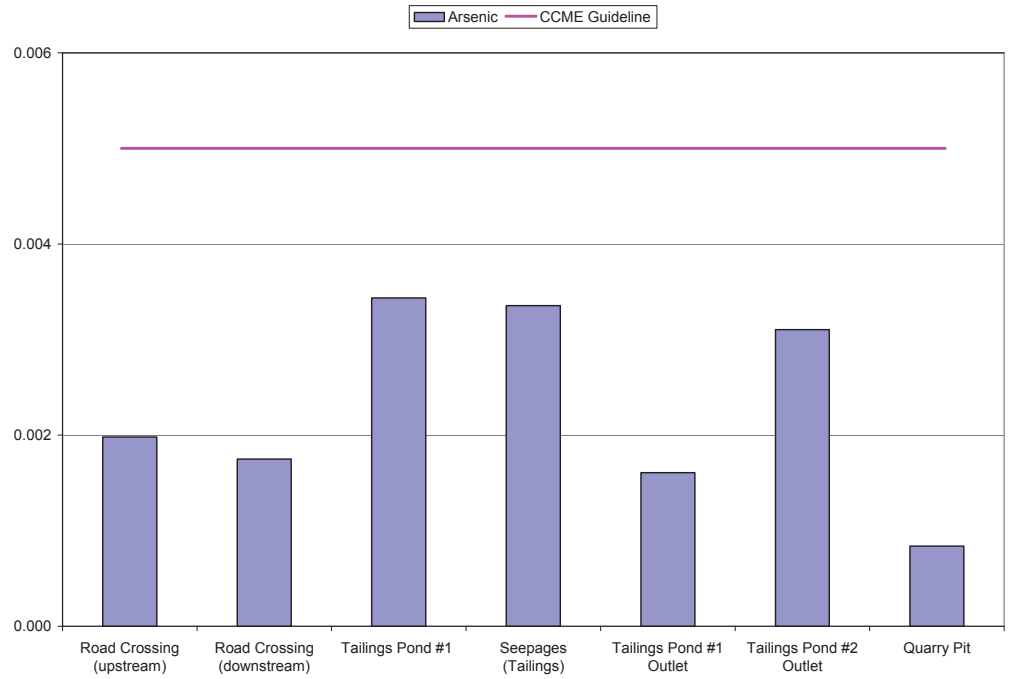


Figure 8 Average Arsenic Concentrations (mg/L) for theTailings Impoundment Study Area in 2008

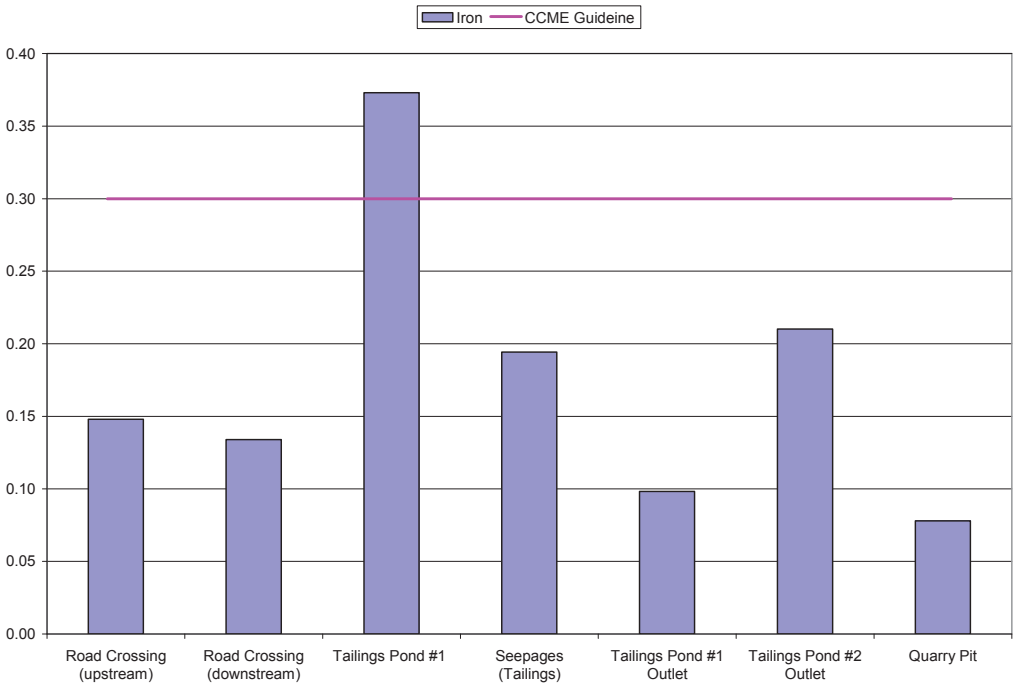


Figure 9 Average Iron Concentrations (mg/L) in the Tailings Impoundment Study Area in 2008

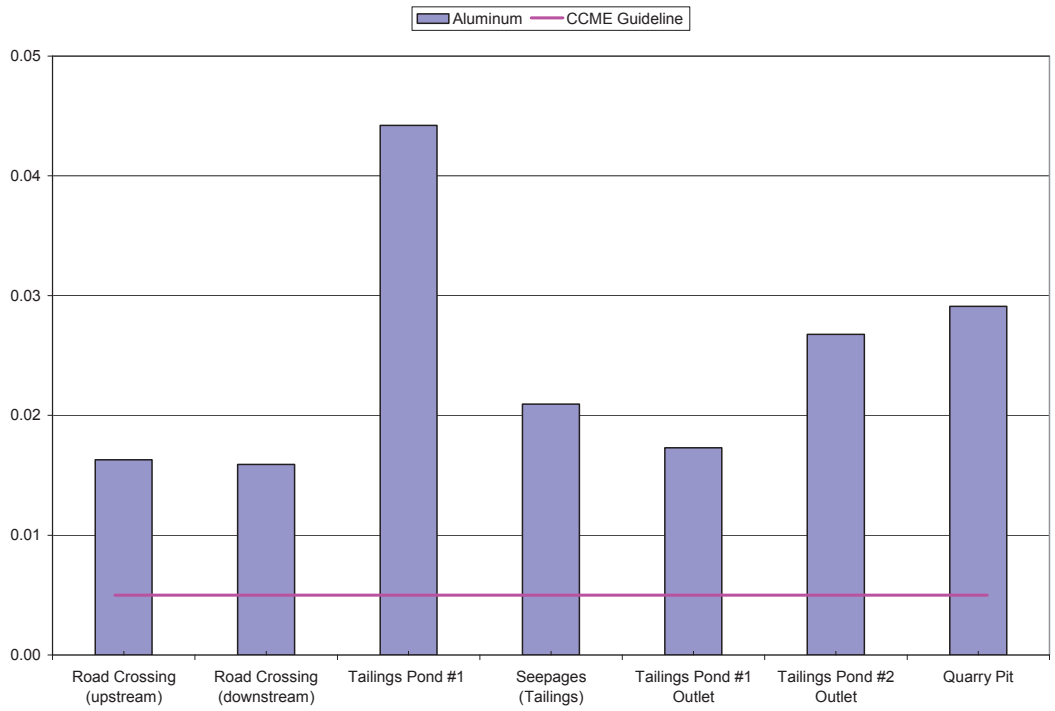


Figure 10 Average Aluminum Concentrations (mg/L) for the Tailings Impoundment Study Area in 2008

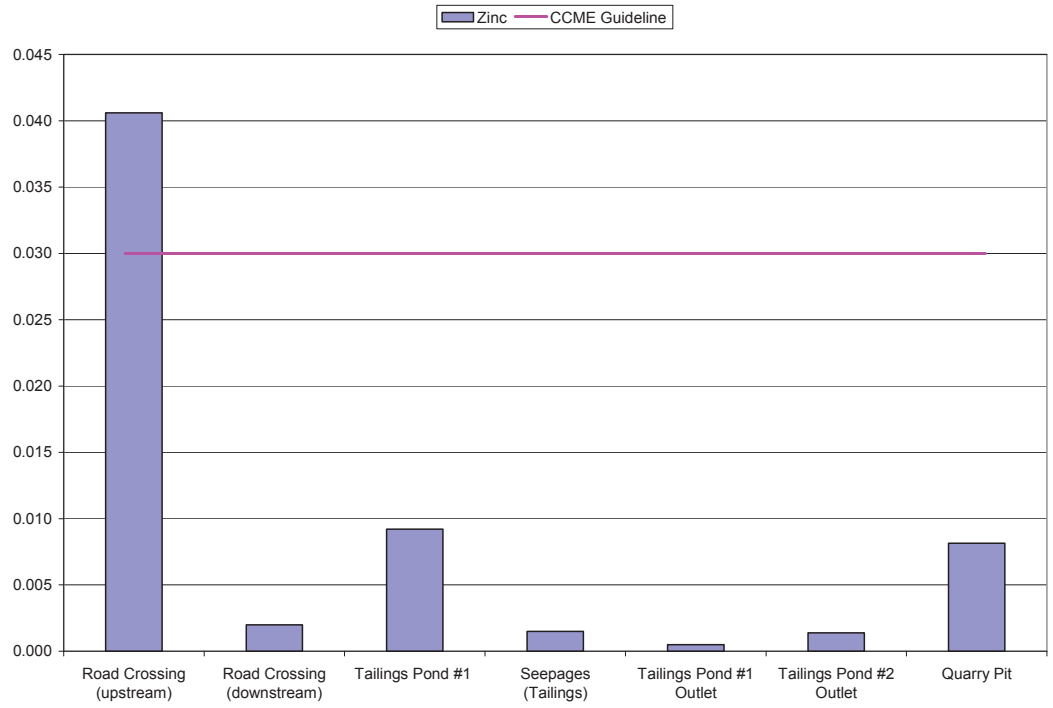


Figure 11 Average Zinc Concentrations (mg/L) for the Tailings Impoundment Study Area in 2008

4.1.3.5 Summary of the Tailings Impoundment Area Water Quality Results

Water quality in the tailings ponds is understandably affected by the waste material deposited at these sites. However, evaluation of the available data does not show any pronounced effect on water quality in the Kognak River (Tables 7-10). Water quality at the downstream site (SW24) is similar to upstream of the tailings basins, with exception of chloride which has a slightly higher average concentration downstream (1.8 mg/L) compared with upstream (0.8 mg/L) which may suggest some effect of loading from the tailings ponds (Table 8).

4.1.4 Other Areas (Road Crossings and Airstrip)

A summary of water quality results for sample locations within the Road Crossings and Airstrip is provided in Table 12. Full analytical results are provided in Appendix B. The analytical results first were compared Water Licence limits then to the Canadian Council of Ministers of the Environment's (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG-PAL) (CCME, 2007). Criteria were not available from the CCME (2007) for many of the chemical parameters analyzed in the surface water. For parameters that did not have a CCME value the Ontario Provincial Water Quality Objectives (PWQO) were then utilized, if a criteria value was present.

4.1.4.1 General Chemistry

The road crossing locations had pH readings that were comparable among all stations with an average range of 6.80 to 7.60 which fall within the CCME criterion. The single pH measurement obtained for the Airstrip location (3.70) was below CCME guidelines. Average conductivity readings for the road crossings ranged from 33 to 110µs/cm, while conductivity at the Airstrip location was higher (440 µs/cm). TDS results were also elevated at the Airstrip location. Therefore, water quality adjacent to the waste rock stockpile adjacent to the airstrip appears to be affected, but the data are only based on one sample, and there does not appear to be a hydrologic connection between this sample location and any other surface waters. TSS and turbidity levels were very low at all stations. TOC and DOC are only present in very low concentrations and not present at the Airstrip location. Data from this one Airstrip sample contrast with the findings of the Lorax (2009) investigation that revealed low levels of sulphide and near-neutral pH in porewater of samples from Airstrip materials.

There is no significant difference in the concentrations of water quality parameters when upstream road crossings are compared to the same downstream location. This suggests that material used to build the local access road is not impacting water quality of the lateral streams.

4.1.4.2 Dissolved Anions (Chloride, Sulfate and Cyanide)

Average chloride concentrations ranged from non-detectable to 2.1 mg/L within the 'Other areas'. Sulphate levels ranged from non-detectable to 11 mg/L among the road crossing stations. Sulphate was significantly higher in the single Airstrip sample with a result of 160 mg/L. Cyanide concentrations were very low and did not exceed guidelines at any location. Water licence criterion was not exceeded for any parameter.

Table 12: Summary of Surface Water Quality Results for the Road Crossings and Air Strip Areas in 2008

						Road Crossings													AirStrip
		Water Quality Guidelines		PWQO	Water Licence	SW13 (Upstream)	SW13 (Downstream)	SW15 (Upstream)					SW15 (Downstream)			SW16 (Upstream)	SW16 (Downstream)	SW18 (Upstream)	SW18 (Downstream)	SW38
	Units	CCME a	Notes			28-Jun-08	28-Jun-08	4-Aug-08	5-Sep-08	5-Sep-08	5-Sep-08	Avg	4-Aug-08	5-Sep-08	Avg	28-Jun-08	28-Jun-08	28-Jun-08	28-Jun-08	28-Jun-08
Conductivity	µS/cm					32	33	52	58	58	58	56.50	53	57	55.000	47	47	99	110	440
pH	pH units	6.5-9.0			6.0-9.5	6.8	6.8	7.3	7.3	7.3	7.3	7.30	7.4	7.2	7.300	7.2	7.2	7.4	7.5	*3.7*
Hardness	mg/L					15.7	15.9	25.5	27.2	27.4	27.7	26.95	25.6	27.8	26.700	23.6	23.4	49.0	57.2	119
Total Suspended Solids	mg/L				50	<1	<1	2	<1	<1	<1	1.25	2	1	1.500	<1	<1	<1	<1	<1
Total Dissolved Solids	mg/L					30	32	50	26	100	60	59.00	46	48	47.000	44	46	88	94	300
Total Organic Carbon	mg/L					13	14	10	11	11	11	11	9	11	10	9	9	11	11	-
Dissolved Organic Carbon	mg/L					12	13	8	11	11	11	10	7	11	9	8	9	11	11	-
Alkalinity, Total (as CaCO3)	mg/L					6.6	5.7	23	16	16	16	17.75	34	15	24.500	15	15	36	40	<0.5
Turbidity	NTU					0.5	0.5	4.4	1.0	1.1	1.0	1.88	1.9	0.9	1.400	0.5	0.4	0.6	0.5	0.4
Chloride (Cl)	mg/L					0.8	2.1	0.7	0.9	0.8	0.7	0.8	0.7	0.9	0.8	0.7	0.7	<0.5	0.7	0.7
Sulfate (SO4)	mg/L					<0.5	<0.5	0.6	<0.5	0.5	0.8	0.6	1.2	0.8	1.0	<0.5	<0.5	6.2	11.0	160.0
Total Cyanide	mg/L	0.005			1.6	0.0015	0.0012	0.0008	0.0011	0.0011	0.0010	0.0010	0.0009	0.0010	0.0010	0.0010	0.0010	0.0015	0.0014	<0.0005
WAD Cyanide	mg/L							<0.0005	<0.0005	0.0005	0.0005	0.0005	<0.0005	<0.0005	0.0005					
Ammonium as N	mg/L					0.05	<0.01	0.17	<0.01	<0.01	<0.01	0.05	0.12	<0.01	0.07	<0.01	0.02	0.12	0.02	
						2.7	3.0									2.2	2.2	4.2	2.8	62.0
Nitrate as N	mg/L	2.9	c			<0.002	<0.002	<0.002	0.004	0.005	0.005	0.004	0.033	0.008	0.021	0.003	0.005	<0.002	0.002	0.007
Nitrite as N	mg/L	0.06				<0.002	0.002	<0.002	0.002	0.003	0.002	0.002	<0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nitrate and Nitrite as N	mg/L					<0.002	<0.002	<0.002	0.006	0.008	0.007	0.006	0.033	0.010	0.022	0.003	0.005	<0.002	0.002	0.007
Total Kjeldahl Nitrogen	mg/L					0.28	0.31	0.27	0.28	0.32	0.28	0.29	0.25	0.30	0.28	0.25	0.24	0.33	0.31	
Total Nitrogen	mg/L							0.27	0.29	0.33	0.29	0.30	0.28	0.31	0.30					
Phosphorus	mg/L			**0.02**		0.004	0.005	0.012	0.004	0.005	0.005	0.007	0.009	0.005	0.007	0.003	0.004	0.005	0.004	0.004
Orthophosphate as P	mg/L					0.002	0.003	0.001	0.003	0.005	0.004	0.003	0.001	0.003	0.002	0.002	0.009	0.001	0.001	0.002
Aluminum	mg/L	0.005	d			*0.1660*	*0.1720*	*0.0734*	*0.1010*	*0.1040*	*0.1060*	0.0961	*0.0630*	*0.0965*	0.0798	*0.0571*	*0.0562*	*0.0163*	*0.0159*	*6.9000*
Antimony	mg/L			**0.02**		0.00004	0.00004	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00006	0.00006	0.00005	0.00004	0.00004	0.00004	<0.00002
Arsenic	mg/L	0.005			0.6	0.00055	0.00053	0.00143	0.00083	0.00085	0.00083	0.00099	0.00100	0.00083	0.00092	0.00055	0.00051	0.00198	0.00175	0.00066
Barium	mg/L					0.01350	0.01370	0.01590	0.01690	0.01640	0.01720	0.01660	0.01730	0.01780	0.01755	0.00863	0.00858	0.01350	0.01390	0.03090
Beryllium	mg/L					<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	<00001	<0.00001	0.00142
Bismuth	mg/L					<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	########	<0.000005	<0.000005	0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Boron	mg/L			**0.2**		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.050	<0.05	<0.05	0.050	<0.05	<0.05	0.050	<0.05	<0.05
Cadmium	mg/L	0.000017	e			*0.000060*	*0.000121*	0.000005	0.000005	0.000008	0.000005	########	0.000007	0.000005	0.000006	*0.000027*	0.000005	0.000016	*0.000042*	*0.001990*
Calcium	mg/L					4.70	4.69	7.59	8.06	8.11	8.21	7.99	7.61	8.21	7.91	6.97	6.91	14.50	17.00	30.30
Chromium	mg/L	0.001	f			0.0006	0.0006	0.0003	0.0004	0.0005	0.0004	0.0004	0.0003	0.0004	0.0004	0.0002	0.0002	0.0002	0.0001	*0.0023*
Cobalt	mg/L			**0.0009**		0.00009	0.00030	0.00061	0.00011	0.00011	0.00012	0.00024	0.00050	0.00012	0.00031	0.00004	0.00005	0.00015	0.00012	0.13800
Copper	mg/L	0.002	g		0.4	*0.00267*	*0.00271*	0.00155	0.00181	0.00197	0.00192	0.00181	0.00148	0.00192	0.00170	0.00188	0.00181	0.00093	0.00090	*0.04370*
Iron	mg/L	0.3				0.085	0.131	*0.761*	0.135	0.155	0.154	0.301	*0.433*	0.176	0.305	0.061	0.061	0.148	0.134	*0.994*
Lead	mg/L	0.001	h		0.4	0.00003	0.00006	0.00010	0.00002	0.00003	0.00002	0.00004	0.00003	0.00002	0.00003	0.00003	0.00001	0.00003	0.00003	*0.00377*
Lithium	mg/L					<0.0005	0.00050	0.00060	0.00070	0.00070	0.00060	0.00065	0.00060	0.00070	0.00065	<0.0005	<0.0005	0.00070	0.00060	0.01210
Magnesium	mg/L					0.97	1.02	1.58	1.72	1.74	1.75	1.70	1.61	1.76	1.69	1.49	1.49	3.09	3.57	10.60
Manganese	mg/L					0.00082	0.00953	0.03520	0.00382	0.00381	0.00381	0.01166	0.02390	0.00470	0.01430	0.00646	0.00611	0.03070	0.02330	5.34000

Table 12: Summary of Surface Water Quality Results for the Road Crossings and Air Strip Areas in 2008

						Road Crossings													AirStrip
		Water Quality Guidelines		PWQO	Water Licence	SW13 (Upstream)	SW13 (Downstream)	SW15 (Upstream)					SW15 (Downstream)			SW16 (Upstream)	SW16 (Downstream)	SW18 (Upstream)	SW18 (Downstream)	SW38
	Units	CCME a	Notes			28-Jun-08	28-Jun-08	4-Aug-08	5-Sep-08	5-Sep-08	5-Sep-08	Avg	4-Aug-08	5-Sep-08	Avg	28-Jun-08	28-Jun-08	28-Jun-08	28-Jun-08	28-Jun-08
Mercury	mg/L	0.026	i			<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	0.00001	<0.00001
Molybdenum	mg/L	0.073				0.00008	0.00007	<0.00005	<0.00005	<0.00005	<0.00005	0.00005	0.00005	<0.00005	0.00005	0.00009	0.00011	0.00007	0.00008	<0.00005
Nickel	mg/L	0.025	j		0.6	0.00409	0.00423	0.00281	0.00257	0.00274	0.00274	0.00272	0.00278	0.00276	0.00277	0.00208	0.00206	0.00236	0.00219	*0.11800*
Potassium	mg/L					0.77	0.75	0.77	0.69	0.70	0.71	0.72	0.80	0.73	0.77	0.70	0.70	0.62	0.66	0.89
Selenium	mg/L	0.001				<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00004	<0.00004	<0.00004	0.00004	<0.00004	<0.00004	0.00005	<0.00004	0.00033
Silicon	mg/L					1.8	1.9	0.3	1.4	1.5	1.6	1.2	0.4	1.6	1.0	0.7	0.7	1.1	1.1	6.8
Silver	mg/L	0.0001				<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.00001	<0.000005	<0.000005	0.00001	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Sodium	mg/L					0.77	0.80	0.86	0.95	0.97	0.97	0.94	0.86	0.98	0.92	0.68	0.51	0.94	1.08	1.55
Strontium	mg/L					0.01390	0.01390	0.02220	0.02560	0.02470	0.02570	0.02455	0.02360	0.02620	0.02490	0.02210	0.02230	0.05950	0.07290	0.12800
Thallium	mg/L	0.0008				<0.000002	<0.000002	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	<0.000002	<0.000002	<0.000002	<0.000002	0.00003
Tin	mg/L					<0.00001	<0.00001	<0.00001	<0.00001	0.00005	<0.00001	0.00002	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00002
Titanium	mg/L					0.0012	0.0011	0.0017	0.0007	0.0008	0.0006	0.0010	0.0015	0.0010	0.0013	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Uranium	mg/L			**0.005**		0.00012	0.00011	0.00008	0.00011	0.00011	0.00011	0.00010	0.00008	0.00011	0.00009	0.00007	0.00007	0.00009	0.00010	0.00306
Vanadium	mg/L			**0.006**		0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Zinc	mg/L	0.03			0.6	0.0012	0.0025	0.0007	0.0008	0.0024	0.0007	0.0012	0.0013	0.0006	0.0010	0.0013	0.0005	0.0406	0.0020	*0.1170*
Zirconium	mg/L			**0.004**		0.0004	0.0004	0.0002	0.0003	0.0003	0.0003	0.0003	0.0002	0.0003	0.0003	0.0001	0.0001	0.0001	0.0001	0.0001

Foot Notes:
All units mg/L unless otherwise noted
a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2007
b) Minimum dissolved oxygen level for the protection of early life stages of cold-water biota (9.5 mg/L). A level of 6.5 mg/L is protective of older life stages of cold-water biota.
c) Main guideline value is expressed as nitrate (13 mg NO3-/L); the alternate value, expressed as N (2.9 mg as N/L), is presented
d) 0.005 mg/L at pH <6.5; 0.1 mg/L at pH ≥6.5
e) An alternative, hardness-dependent, site-specific guideline may be used in place of the generic value. The site-specific values at water hardnesses of 10 and 60 mg/L are 10 ^ {0.86[log(hardness)]-3.2} = 0.0046 and 0.021 ug/L, respectively.
f) The guideline value for Cr(VI) was conservatively applied to the measured total Cr concentration.
g) The guideline value varies with hardness. The value for a hardness of 0-120 mg/L as CaCO3 is presented. Other values are 3 ug/L and 4 ug/L at hardnesses 120-180 mg/L and >180 mg/L, respectively.
h) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 2 ug/L, 4 ug /L and 7 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.
i) The guideline value for inorganic mercury is presented. This value may not prevent accumulation of methylmercury in aquatic life. Use of the inorganic mercury guideline value for screening total mercury concentrations would not be appropriate if any i
j) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 65 ug/L, 110 ug /L and 150 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.
*Average of sample and replicate
Exceedence

Differences in anion concentrations between upstream road crossings compared to the same downstream location were found to be minimal.

4.1.4.3 Nutrients

In general nutrients were non-detectable or present in very low concentrations within the 'Other areas' and are not expected to be a concern to water quality (Table 11).

4.1.4.4 Metals

No metal levels exceeded their respective Water License limits. Metals that exceeded either the provincial (PWQO) or federal (CCME) water quality guidelines in one or more samples collected within the 'Other areas' include:

- Aluminum (Al)
- Cadmium (Cd)
- Chromium (Cr)
- Copper (Cu)
- Iron (Fe)
- Lead (Pb)
- Zinc (Zn)

Aluminum concentrations exceed CCME guidelines at all locations. An elevated aluminum concentration is typical of northern Canadian waters as it is an abundant native element, the Air strip location had an elevated concentration when compared to other sites with a concentration of 6.92 mg/L. Copper exceeded in both samples collected at the SW13 station. Iron had a single exceedence at the SW15 downstream location. Zinc also had a single exceedence at the SW18 location. All metals parameters listed above exceed CCME guidelines at the Airstrip location. Mercury was non-detectable at most locations and present in very low concentrations (0.00001 mg/L). In terms of metals, there is no significant difference in concentrations when upstream road crossings are compared to the same downstream location.

4.1.4.5 Summary of the 'Other Areas' Water Quality Results

In summary, the single sample collected at the Airstrip seep location had elevated levels for conductivity, TDS, sulphate and metals as well as a low pH (acidic) when related to other locations within the 'Other areas'. The waste rock stockpile located up gradient of the sample location at the south margin of the airstrip consists entirely of the orthoquartzite rock found at the Shear Lake seeps. Water quality data indicates that there is no significant difference in measurements or concentrations when upstream road crossings are compared to the same downstream location. These locations also appear to be minimally impacted by the historical mining activity as measured concentrations are generally low.

4.1.5 Cullaton Lake Mine Site Water Quality Summary

- In summary, surface water quality of Shear Lake is not significantly impacted by site conditions,
- Water License Limits are in place for pH, TSS, Total cyanide, As, Cu, Pb, Ni and Zn. All measurements in the tailings ponds were within the License Limits,
- Water quality has been impacted in seepages located near the waste rock pile that lies along the eastern shore of Shear Lake, as well as seepages found near the Tailings Impoundment area, Tailings Pond #1 and adjacent to the Airstrip seepage location,
- There is no evidence that these seeps have any direct hydrological connections to surface waters on the site,
- Several road crossing locations were also assessed. The results indicate that there is no significant difference in concentrations between upstream road crossings compared to the same downstream location,
- The concentrations of Al, Fe and sulphate are elevated in Shear Lake and Shear Creek relative to the upstream reference samples as well as the downstream receiving waters (farther downstream on Sheer Creek and the Kognak River),
- Water quality at the upstream Kognak River location are comparable to the downstream location, indicating that there is no measurable impact on surface water quality to the Kognak River from the mine site.

4.2 Sediment Quality

Sediment samples were collected from two locations in Shear Lake in August 2008. Sampling locations are depicted in Figure 1. The samples were analyzed in the lab for pH and total metals. The analytical results were compared to the CCME Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CSQG-PAL) (CCME, 2002). The analytical results are presented in Appendix B. Laboratory analysis for metals included;

- Aluminum (Al)
- Antimony (Sb)
- Arsenic (As)
- Barium (Ba)
- Beryllium (Be)
- Bismuth (Bi)
- Cadmium (Cd)
- Calcium (Ca)
- Chromium (Cr)
- Cobalt (Co)
- Copper (Cu)
- Iron (Fe)
- Lead (Pb)
- Magnesium (Mg)
- Manganese (Mn)
- Mercury (Hg)
- Molybdenum (Mo)
- Nickel (Ni)
- Potassium (K)
- Selenium (Se)
- Silver (Ag)
- Sodium (Na)
- Strontium (Sr)
- Thallium (Tl)
- Tin (Sn)
- Titanium (Ti)
- Vanadium (V)
- Zinc (Zn)
- Zirconium (Zr)

CSQG-PAL were not available from the CCME (2002) for many of the chemical parameters analyzed in the sediment[1]. These parameters have not been compared to any guideline values.

In general, metal levels were quite low. The only parameters whose concentrations exceeded the CSQG-PAL in either sample were arsenic, chromium and copper; however, in all cases only the interim freshwater sediment quality guideline (ISQG) was exceeded (i.e., the probable effects level [PEL] was not exceeded in any sample). The CSQG-PAL, ranges and averages of reported values for the three parameters with exceedances of the Interim Sediment Quality Guideline (ISQG) are presented in Table 13. The CSQG-PAL, ranges and averages of reported values for the four parameters that do not exceed the ISQG are presented in Table 14.

Table 13 Analytical Results in Sediment Samples for Parameters with Measured Concentrations in Exceedance of the ISQG (bold) (Note that the PEL Was Not Exceeded in Any Sample)

	CSQG-PAL		Analytical Results	
	ISQG	PEL	SW25	SW26
Arsenic (mg/kg dw)	5.9	17	2.9	8.0
Chromium (mg/kg dw)	37.3	90	44	75
Copper (mg/kg dw)	35.7	197	35.2	60.8

Table 14 Analytical Results in Sediment Samples for Parameters with Measured Concentrations Less than the ISQG

	CSQG-PAL		Analytical Results	
	ISQG	PEL	SW25	SW26
Cadmium (mg/kg dw)	0.6	3.5	0.34	0.60
Lead (mg/kg dw)	35	91.3	6.4	8.6
Mercury (mg/kg dw)	0.17	0.486	<0.05	<0.05
Zinc (mg/kg dw)	123	315	52	88

For each parameter, the range of concentrations between the ISQG and the PEL is termed the "possible effect range," within which adverse biological effects occasionally occur. Data in Environment Canada's Biological Effects Database indicate that an arsenic concentration between the ISQG and the PEL (i.e., between 5.9 and 17 mg/kg) is associated with adverse biological effects in 25% of cases. The observed incidences of adverse biological effects at concentrations of chromium and copper between the ISQG and PEL values are 19 and 38%, respectively.

Sediment samples were not collected from a background or reference site. Therefore, it cannot be determined if the existing sediment metal concentrations in Shear Lake represent natural conditions or reflect some effects from the mine activities. Regardless, the sediment metal concentrations are not extreme and below the federal Probable Effect Levels (PEL).

[1] *CSQG-PAL were not available for the following elements: aluminum antimony, barium, beryllium, bismuth, cobalt, iron, magnesium, manganese, molybdenum, nickel, phosphorus, potassium, selenium, silver, sodium, strontium, thallium, tin, titanium, uranium, vanadium and zirconium.*

4.3 Meteorology

Tables 15 and 16 show the summary of the daily and monthly meteorology data collected at Cullaton Lake, Nunavut between June 28 and September 6, 2008. Figure 12 shows daily average temperature and total daily precipitation between June 28 and September 6, 2008. The total precipitation recorded between June 28 and September 6, 2008 was 129.6 mm.

Table 15 Daily Meteorology data from June 28 to September 6, 2008 at Cullaton Lake, Nunavut.

Date	Average Temperature (°C)	Total Precipitation (mm)	Average Relative humidity (%)	Average Wind Speed (km/hr)	Maximum wind speed (km/hr)	Average Wind direction	Average barometric Pressure (mm, Hg)	Average Solar Radiation, (W/m²) facing down	Average Solar Radiation, (W/m²) facing up
6/28/2008	19.74	0.2	52.52	12.79	31.4	80.56	740.28		
6/29/2008	17.43	1.8	66.23	16.30	55.4	86.14	736.33		
6/30/2008	13.92	2.4	76.38	16.52	46.8	202.36	730.77		
7/1/2008	11.26	0.4	72.19	18.08	36.1	281.01	738.32		
7/2/2008	10.27	0	77.02	15.92	36.7	236.11	740.13		
7/3/2008	12.00	0	63.07	10.32	25.4	250.88	737.57		
7/4/2008	12.81	1.8	59.37	7.38	32.7	260.33	734.71		
7/5/2008	11.97	0	62.30	13.92	46.8	279.81	733.76		
7/6/2008	8.02	8.4	88.57	22.53	48.7	242.51	732.92		
7/7/2008	7.77	0	83.20	13.25	27.4	305.70	738.36		
7/8/2008	10.96	0	68.42	5.67	22.7	163.74	740.01		
7/9/2008	13.89	0	59.87	10.51	33.4	121.01	737.33		
7/10/2008	15.79	0	60.03	15.57	48.1	80.23	735.31		
7/11/2008	15.59	0	60.88	11.93	38.1	54.14	735.57		
7/12/2008	14.69	0	63.79	6.93	33.4	117.88	733.63		
7/13/2008	14.66	0.2	69.24	11.61	42.1	139.93	729.28		
7/14/2008	12.09	0	72.91	19.78	44.7	199.50	729.47		
7/15/2008	12.60	0	64.56	18.07	35.4	200.60	734.57		
7/16/2008	14.09	0.2	67.64	11.08	32.1	185.38	738.02		
7/17/2008	15.18	2.8	66.90	11.44	46.1	176.35	738.02		
7/18/2008	18.48	0.2	59.78	12.73	28.0	114.48	738.00		
7/19/2008	20.08	0	53.13	13.47	33.4	87.17	738.09		
7/20/2008	20.82	0	57.00	16.36	41.4	74.68	737.57		
7/21/2008	22.62	0	54.68	25.14	53.4	86.63	735.50		
7/22/2008	20.93	0	58.63	21.28	44.7	129.67	733.26		
7/23/2008	19.30	0	54.89	8.12	24.0	137.79	737.21		
7/24/2008	15.51	0	77.29	18.94	44.1	280.03	735.73		
7/25/2008	14.55	3.6	86.33	20.72	42.7	263.96	734.26		
7/26/2008	12.63	0	82.45	22.49	50.1	227.87	736.01		
7/27/2008	12.41	0	74.69	9.99	28.7	200.84	736.95		
7/28/2008	15.63	0	68.73	8.61	30.1	90.95	733.55		

Date	Average Temperature (°C)	Total Precipitation (mm)	Average Relative humidity (%)	Average Wind Speed (km/hr)	Maximum wind speed (km/hr)	Average Wind direction	Average barometric Pressure (mm, Hg)	Average Solar Radiation, (W/m²) facing down	Average Solar Radiation, (W/m²) facing up
7/29/2008	13.40	4.2	85.03	13.24	32.7	227.07	734.10		
7/30/2008	12.41	0	81.05	13.14	29.4	221.48	737.03		
7/31/2008	13.12	0	74.78	21.51	50.1	36.50	736.38		
8/1/2008	12.93	0	77.09	25.16	50.1	14.30	738.27		
8/2/2008	11.24	0	78.01	22.75	42.1	118.06	735.87		
8/3/2008	9.29	6.4	90.84	24.93	48.1	317.16	731.29		
8/4/2008	10.30	2.6	92.02	16.85	32.1	265.95	731.28	9.37	66.12
8/5/2008	13.01	0.2	85.54	18.41	37.4	223.00	733.61	17.36	104.72
8/6/2008	14.41	0.2	72.25	22.07	59.4	203.73	737.89	39.93	237.64
8/7/2008	15.10	0.2	67.84	5.58	31.4	200.57	738.44	38.12	229.32
8/8/2008	12.61	16	88.95	11.38	40.8	153.30	739.41	9.15	63.28
8/9/2008	19.43	1	73.15	18.31	46.1	118.29	737.52	32.97	212.22
8/10/2008	21.20	0	66.87	8.02	29.4	202.56	735.66	41.19	251.65
8/11/2008	20.69	0	72.67	9.21	35.4	169.18	735.25	38.32	234.37
8/12/2008	21.12	0	63.30	16.30	40.1	132.12	734.68	40.45	238.42
8/13/2008	13.33	0	91.68	22.66	40.1	315.94	739.84	12.59	74.82
8/14/2008	15.45	3.4	88.55	18.91	66.8	95.29	737.30	21.65	136.07
8/15/2008	13.02	0.4	77.09	28.08	58.8	205.61	735.00	26.97	164.42
8/16/2008	9.87	7.4	90.35	11.63	42.7	131.09	735.01	13.44	90.72
8/17/2008	12.22	0.2	79.28	17.06	44.1	193.22	734.19	32.93	212.88
8/18/2008	12.71	2	88.38	10.76	28.0	84.25	732.83	11.80	89.30
8/19/2008	16.90	2.6	79.94	23.32	51.4	146.30	724.88	23.30	121.85
8/20/2008	3.34	9.8	86.30	23.00	44.1	300.21	735.06	2.97	22.67
8/21/2008	5.01	2.4	75.98	20.41	40.1	322.83	735.43	17.62	112.59
8/22/2008	7.73	0	68.48	10.41	32.1	264.60	738.71	31.92	194.83
8/23/2008	9.15	0	69.48	10.86	28.7	162.45	739.53	38.48	242.80
8/24/2008	11.10	0.2	81.24	17.90	33.4	203.36	736.13	29.05	182.77
8/25/2008	8.11	2.8	96.26	24.69	52.1	210.64	730.51	5.55	39.26
8/26/2008	11.47	4.4	95.21	13.32	33.4	199.83	726.80	20.86	144.77
8/27/2008	7.85	33.4	98.27	25.22	58.1	272.80	716.42	2.42	20.99
8/28/2008	5.15	6	93.71	42.53	78.8	175.68	716.14	9.31	61.28
8/29/2008	8.10	0	83.14	27.29	58.1	146.86	724.67	23.18	136.11
8/30/2008	7.69	0	80.26	15.81	40.8	145.83	726.79	21.49	157.14
8/31/2008	7.52	0.8	81.44	28.30	61.5	148.32	726.80	22.50	139.03
9/1/2008	7.03	1	85.76	29.15	65.4	156.94	731.60	21.80	134.45
9/2/2008	7.99	0	83.19	16.55	39.4	176.20	737.97	17.37	107.48
9/3/2008	8.72	0	80.12	9.14	30.7	208.57	738.91	22.32	151.12
9/4/2008	5.77	0	84.52	11.11	31.4	252.19	740.45	11.38	70.13
9/5/2008	5.25	0	79.10	8.43	24.7	166.94	739.75	19.38	108.25
9/6/2008	3.74	0	85.50	15.22	42.1	196.47	737.42	2.73	16.55

Table 16 Monthly average Meteorology data.

Month	Average Temperature (°C)	Total Precipitation (mm)	Average Relative Humidity (%)	Average Wind Speed (km/hr)	Maximum wind speed (km/hr)	Average Barometric Pressure (mm Hg)	Average Solar Radiation, (W/m²) facing down	Average Solar Radiation, (W/m²) facing up
July	14.4	21.8	68.7	14.5	37.5	735.8	-	-
August	11.8	102.4	81.7	19.1	44.7	732.9	22.7	142.2

Dashes indicate no data

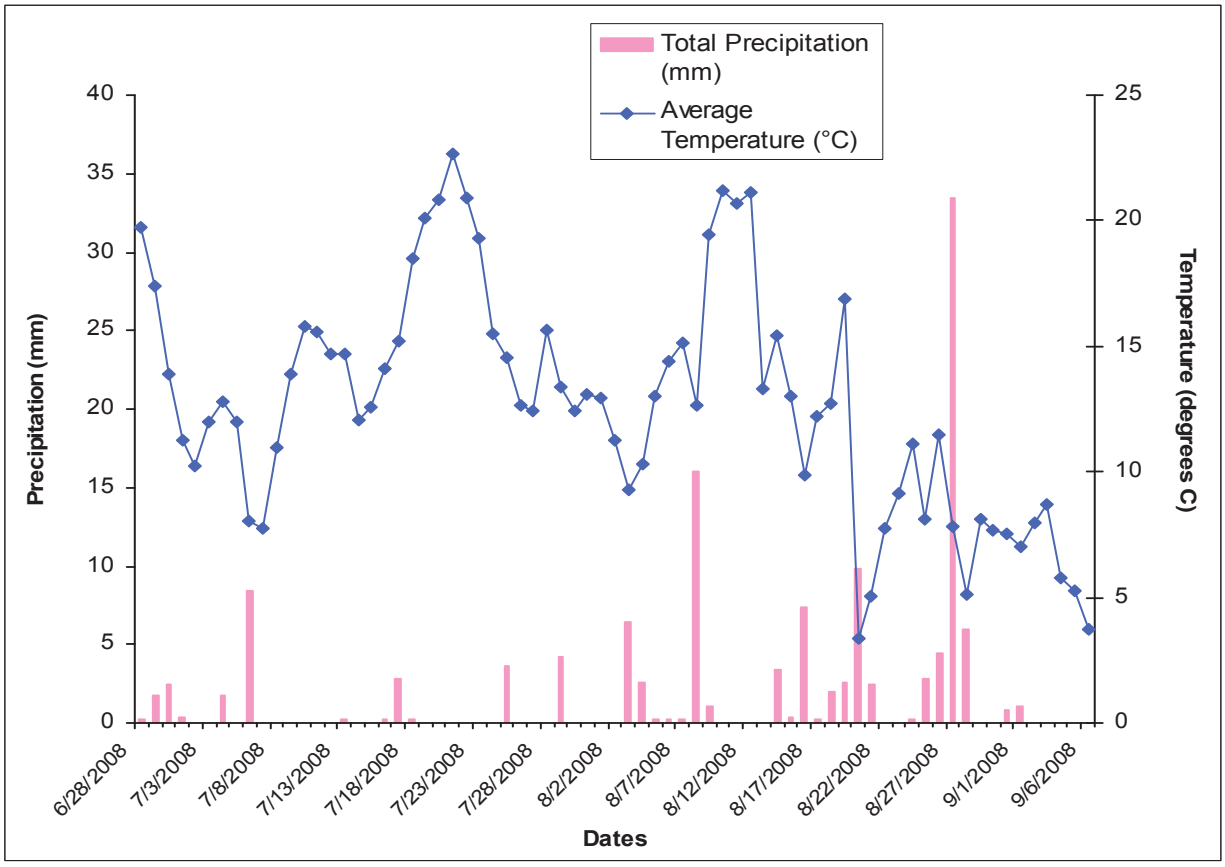


Figure 12 Average Daily Temperature and Total Daily Precipitation from June 28 to September 6, 2008, Cullaton Lake, Nunavut.

4.4 Hydrology

Table 17 shows the discrete discharge measurements at various locations in June, August and September 2008. During the August sampling trip, most of the creeks and road crossings were dry. No hydrographs or rating curves were produced due to the limited number of data points collected and to the particularly dry year.

Table 17 Summary of Discharge Measurements in 2008, Cullaton Lake, Nunavut.

Station	Waterbody Name	Discharge (L/s)		
		June	August	September
SW9	Downstream Site on Shear Creek	64.9	0.19	40.0
SW32	Shear Lake inflow	33.0	No flow	13.0
SW2	Unnamed Creek (upstream of Shear Lake)	10.7	Dry	10.0
SW35	Further downstream on Shear Creek	-	-	62.0
SW36	Further downstream on Shear Creek	-	-	33.0
SW23	Shear Creek outflow at Kognak River	-	-	248.0
SW33	Tailings Pond #2 outlet	9.6	Dry	7.0

Dashes indicate no data were collected

Stations SW35 and SW36 were not establish until September

4.5 Benthic Invertebrate Community

Benthic invertebrate community assessments are commonly used to evaluate the relative health of aquatic environments including water and sediment quality. In this study, the benthic macroinvertebrate community is assessed to determine whether the benthic community is impacted as a result of historical mining activities within the Cullaton Lake Mine study area. Table 18 provides a brief summary of basic habitat conditions present at each of the benthic sample locations.

Table 18 Summary of Basic Habitat Features at Sample Locations

Site	Approx. Water Depth (m)	Approx Stream Width (m)	Morphology	Substrate Description
SW2	0.10	3.00	low gradient riffle	cobble, gravel and boulders
SW9	0.05	6.00	low gradient riffle	cobble, gravel and boulders
SW23	0.20	4.00	low gradient riffle	cobble, gravel and boulders
SW33	0.10	1.00	low gradient riffle	cobble, gravel and boulders
SW34	0.05	0.20	low gradient run	cobble, gravel and boulders

Although basic habitat features of the sites are physically similar (Table 18), photographs of the sites (Appendix A) suggest there are considerable differences in flow characteristics which can significantly affect the benthic community.

The following benthic invertebrate community descriptors were calculated from the taxonomic data:

a) relative abundance of major taxonomic groups; and
b) species richness (lowest practical level)

A summary of benthic community assessment descriptor results is provided in Table 19 below. A full summary table of taxonomic results are provided in Appendix C. Sampling locations for aquatic field investigations are depicted in Figure 1.

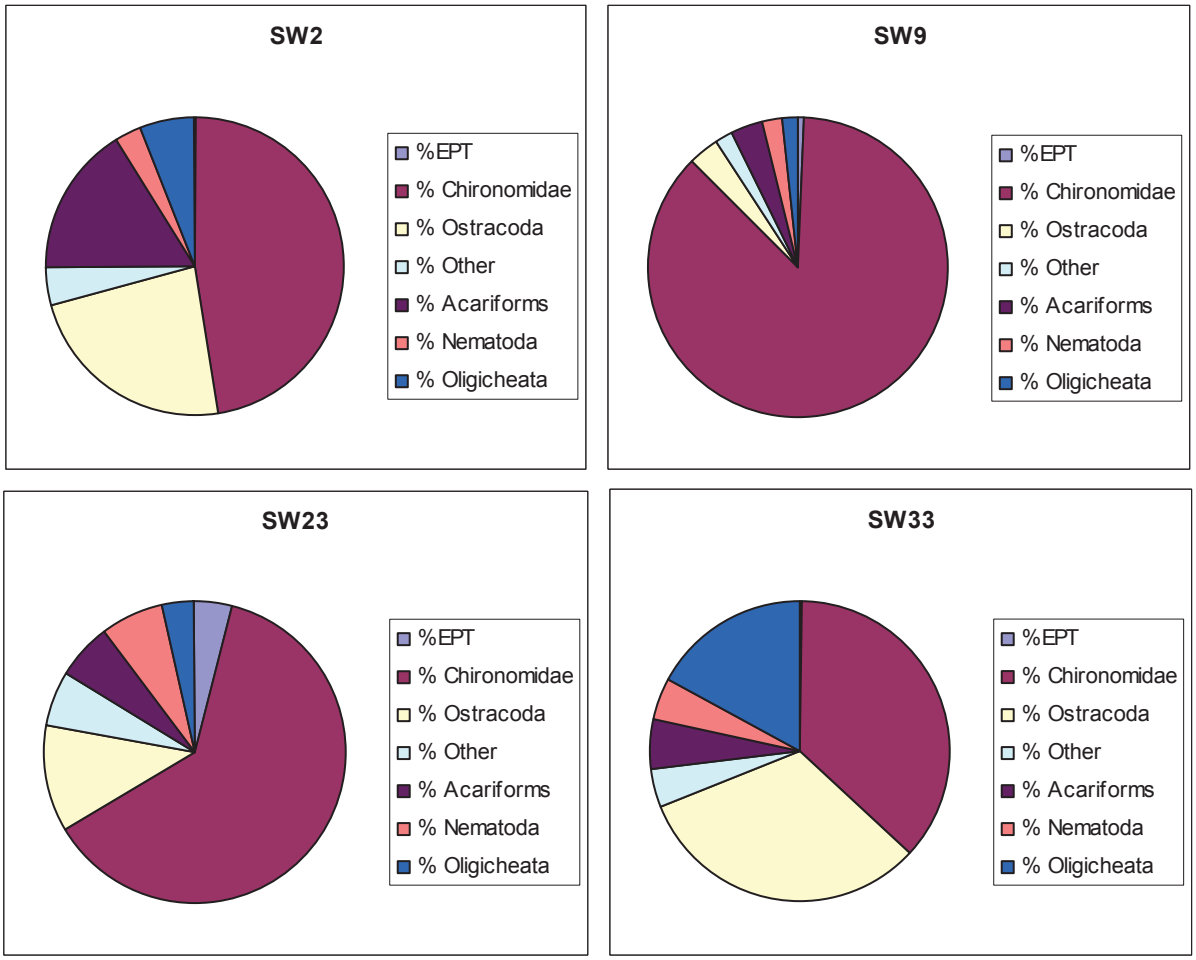
Comparisons can be made between SW2 (upstream of Shear Lake) and SW9 (downstream of Shear Lake) and also between SW34 (upstream of Tailings Pond) and SW33 (downstream of Tailings Pond).

Table 19 Summary of the Cullaton Lake Study Area Benthic Community Descriptor Results

		Total Number of Organisms	Species Richness	% EPT	% Chironomidae	% Ostracoda	% Oligicheata	% Acariforms	% Nematoda	% Other
SW2	Rep 1	240	18	0	54	28	1	11	1	5
	Rep 2	245	15	0	48	21	2	8	13	8
	Rep 3	158	16	1	47	28	8	15	1	2
	Rep 4	360	24	1	38	24	4	27	1	7
	Rep 5	84	11	0	49	15	7	21	0	7
	AVG.	**217**	**17**	**0**	**47**	**23**	**4**	**16**	**3**	**6**
SW9	Rep 1	959	19	1	95	2	1	1	0	0
	Rep 2	449	13	0	90	3	3	3	0	1
	Rep 3	391	13	1	88	4	1	5	1	1
	Rep 4	361	14	1	90	2	1	5	0	1
	Rep 5	374	13	0	72	4	3	5	9	6
	AVG.	**507**	**14**	**0**	**87**	**3**	**2**	**4**	**2**	**2**
SW23	Rep 1	425	22	2	81	9	2	3	3	0
	Rep 2	403	26	4	75	3	5	6	2	5
	Rep 3	88	18	8	59	6	9	9	8	1
	Rep 4	335	22	3	49	22	7	4	11	4
	Rep 5	240	23	4	48	16	6	9	12	5
	AVG.	**298**	**22**	**4**	**62**	**11**	**6**	**6**	**7**	**3**
SW33	Rep 1	153	17	1	41	8	7	9	3	32
	Rep 2	301	17	0	54	27	5	7	1	6
	Rep 3	328	20	0	27	25	5	6	17	20
	Rep 4	1391	20	0	17	75	1	1	1	5
	Rep 5	377	16	0	44	24	4	3	2	23
	AVG.	**510**	**18**	**0**	**37**	**32**	**4**	**5**	**5**	**17**
SW34	Rep 1	35	6	0	49	9	9	0	11	23
	Rep 2	244	7	2	36	9	11	1	2	38
	AVG.	**140**	**7**	**1**	**42**	**9**	**10**	**0**	**7**	**30**

4.5.1 Relative Abundance of Major Taxonomic Groups

Benthic invertebrate communities at each station were reviewed for relative abundance between each of the taxonomic groups present. Key taxonomic groups present include EPT [Ephemeroptera (mayflies) Plecoptera (stoneflies) and Trichoptera (caddisflies)], Chironomidae (midges), Acariforms (water mites), Nematoda (roundworms), Ostracoda (seed shrimp), Oligochaeta (aquatic worms), and 'Other', which includes Coleoptera (beetles), Hemiptera (true bugs), Collembola (springtails), Gastropoda (snails), Tuberellia (flatworms), Hydrozoa (freshwater jellyfish) and Other Dipterans (winged flies). A summary of the relative organism abundance of each station is presented in Figure 13, with each identified taxonomic group expressed as a percent of total number of organisms.



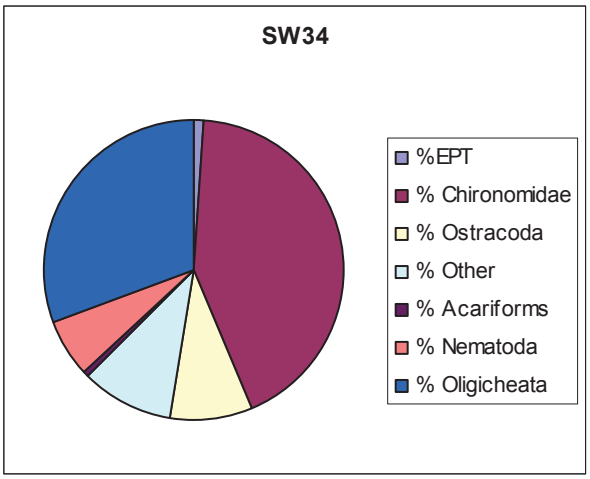


Figure 13 Benthic Community Relative Abundance at the Cullaton Lake Study Area (Replicate Samples Averaged by Station)

The Chironomidae (midge) species were the dominant taxa group present at all stations within the study area. The highest portion was present at station SW9 (87%), followed by stations SW23 (62%), SW2 (47%), SW34 (42%) and SW33 (37%). The Chironomidae group are the most widely distributed benthic macroinvertebrate group, having adapted to nearly every type of aquatic environment, as species have a wide range of tolerance to impacted environments (SWCSMH, 2008). The Ostracoda (seed shrimp) taxa group had the second highest abundance overall. Stations had the following abundances present; SW33 (32%), SW2 (23%), SW23 (11%), SW34 (9%) and SW9 (3%). Like the Chironomidae group, the Ostracoda group occur in practically every aquatic environment. The Ostracoda can be free-swimming for all or part of their life-cycle, but are more commonly classified as benthonic, living among aquatic plants or crawling on or through the sediment (Athersuch, J, 1989). This group is also considered very tolerant to environmental pollution (SWCSMH, 2008). The Oligochaeta (aquatic worms) taxa group was also present with the following abundances; SW34 (10%), SW33 (4%), SW2 (4%), SW23 (6%) and SW9 (2%). The Oligochaeta taxon is often identified as “pollution indicators” associated with organic polluted waters (Mackie, 2004). The Acariforms (water mites), Nematoda (roundworms) and ‘Other’ taxon groups were also represented at each station, SW2 (16%, 3%, 6%), SW9 (4%, 2%, 2%), SW23 (6%, 7%, 3%), SW33 (5%, 5%, 17%) and SW34 (0%, 7%, 30%), respectively.

The EPT taxa group abundance was also calculated as the EPT group, in general, are sensitive to pollution and associated with good quality aquatic environments (Mackie, 2004). EPT species abundances were low at all stations and ranged from 0% to 4% of total community. The following is a summary of abundances at each station, SW2 (0%), SW9 (0%), SW23 (4%), SW33 (0%) and SW34 (1%).

Overall, there was considerable variance between stations. Species abundance differences are likely attributed to the variances in hydrology among the study area locations. For example, when comparing results at SW2 (upstream of Shear Lake) to SW9 (downstream of Shear Lake) it should be remembered that flow at SW9 is considerably greater than in the upstream station, which in fact was dry in August. Species in general were dominated by the presence of those that are commonly abundant in a wide range of habitat

and are considered pollution tolerant. Good water quality indicators (EPT) otherwise known as intolerant species were absent or present in very low percentages, this is too be expected in these habitat conditions.

4.5.2 Species Richness

Species richness, which is a count of the total number of different species observed at a site, ranged from 7 to 22 between the five stations. Replicate samples were averaged by station to obtain average species counts. Results of these calculations are provided in Table 19. A total of 80 species were collected within the study area (all five sites). Station SW23 (Shear Lake Creek at the outlet to Kognak River) had the greatest species richness with a total of 22 species. The greatest water flows were also recorded at this station.

Other stations had lower overall species richness including SW33 (Tailings Pond #2 Outlet which was dry in August and low flow at other times) with 18 species, SW2 (Reference Site) with 17 species, and station SW9 (Shear Creek, downstream of Shear Lake) with 14 species. Station SW34 (Tailings Pond #1 Outlet) had lower species richness with a count of 7 species. The benthic species richness for stations across the Cullaton Lake mine study are presented in Figure 14.

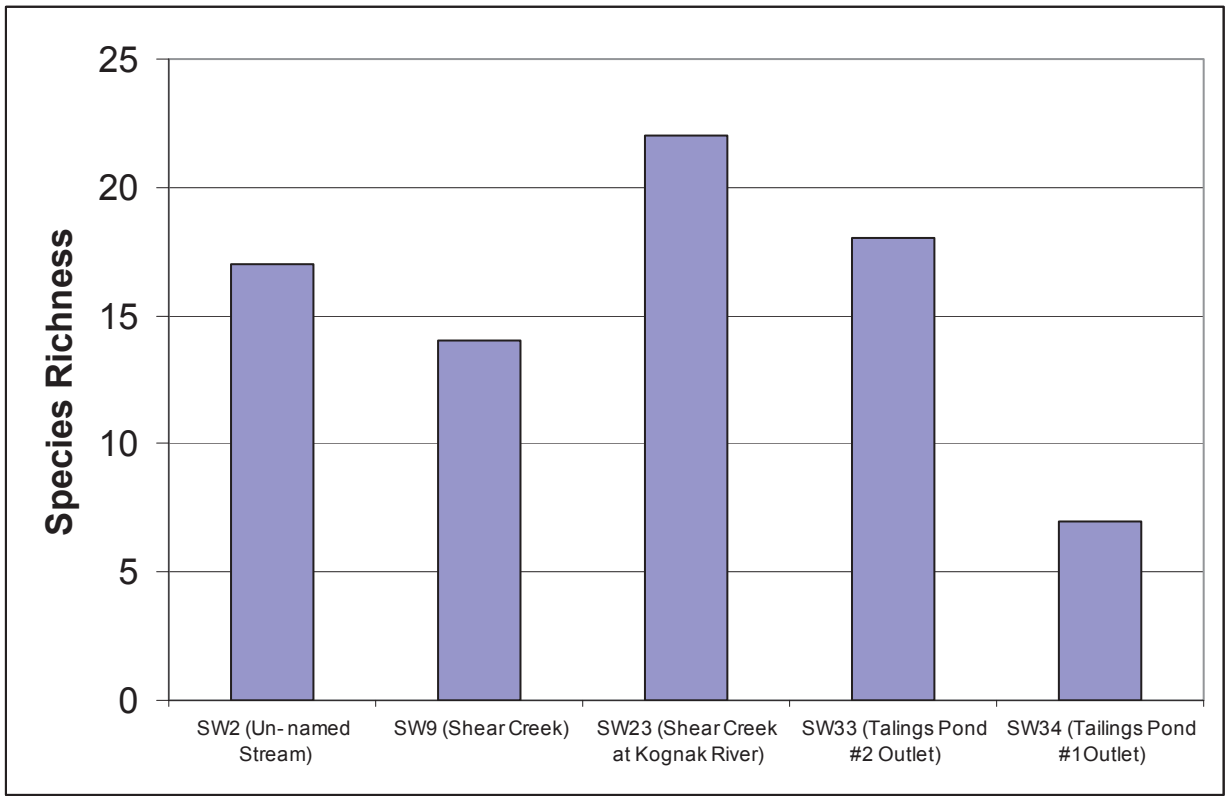


Figure 14 Cullaton Lake Study Area Benthic Species Richness

Overall, variability in species richness is reflected when stations are related to each other. No trend is observed when Shear Creek locations (SW9 and SW23) are related to the upstream reference station (SW2). Species richness was lowest at station SW34 (Tailings Pond #1 Outlet), and highest at station SW23 (Shear Creek at the Kognak River). The low species diversity observed at station SW34 is likely the result of the poor habitat conditions present, with very low flow present (see photo in Appendix A) but also may be affected by the water quality in Tailings Pond #1. In general, variability in species richness among stations is likely attributed to the hydrological variances that occur among stations.

The number of taxa (species richness) ranged from an average of 7 to 22 at the different stream locations. Northern aquatic environments often have lower diversity than southern aquatic systems due to the nature of the environment with long periods of ice cover and generally low nutrient status. In other surveys (2007-2008) of non-impacted small lakes in Nunavut benthic species richness ranged from 6 to 18 species in near-shore samples (Garner Lee, High Lake unpublished data). The Cullaton Lake data are similar to these other results.

4.5.3 Summary

Overall, species richness was relatively similar across all stations with the exception of SW34 which displayed lower diversity and abundance than the other stations. No trends were apparent when downstream exposure stations were related to the upstream reference station. In general habitat quality is adequate to support a benthic invertebrate community. Species were in general, dominated by the presence of those that are commonly abundant in a wide range of habitat and are considered pollution tolerant. Good water quality indicators otherwise known as intolerant species were absent or present in very low percentages.

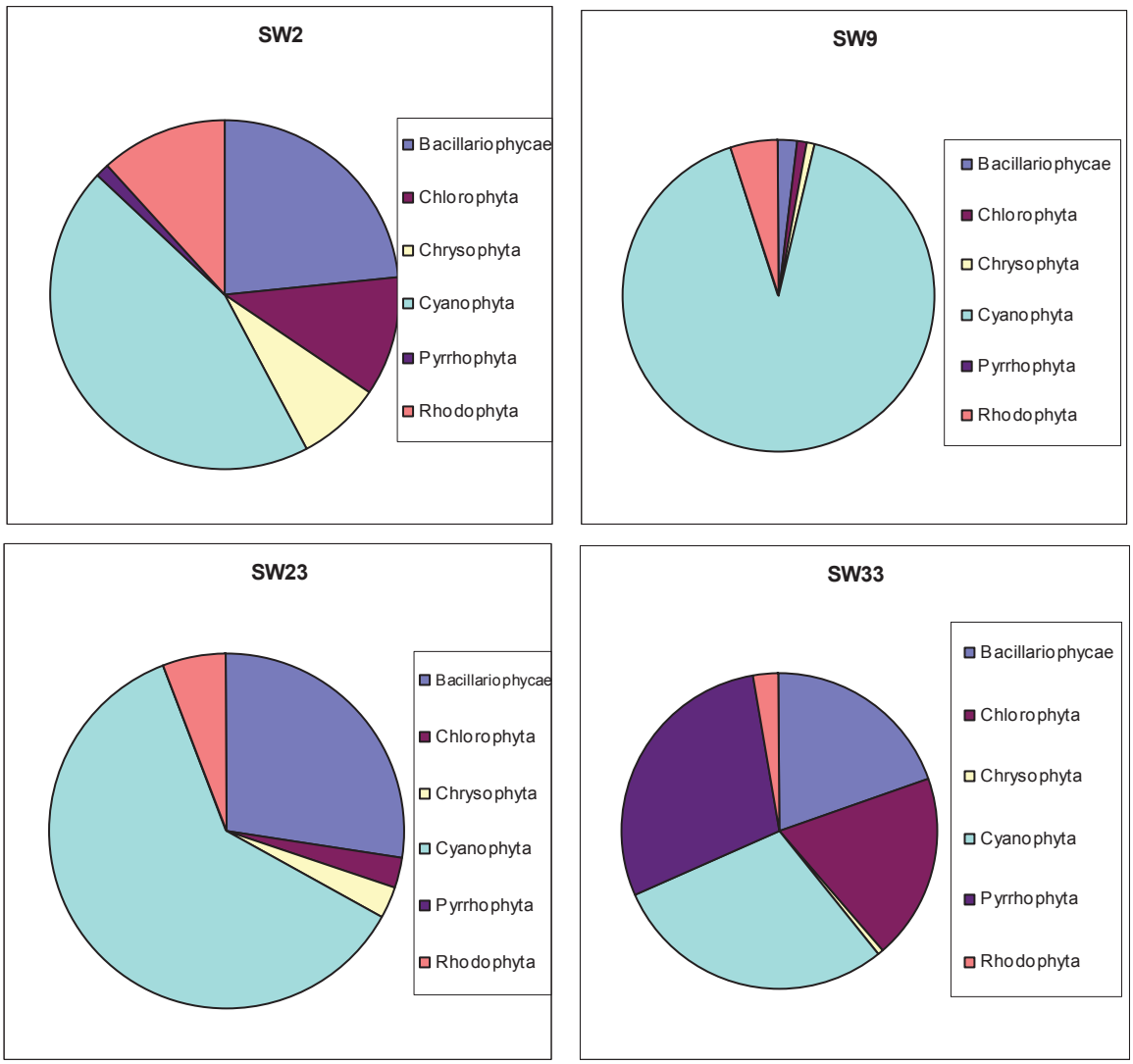
Other aquatic invertebrate zooplankton species were identified in abundance in some samples. The presence of these species in abundance indicates that there is a viable food source for resident fish populations such as the Arctic Grayling *(Thymallus arcticus)*.This is discussed in more detail in the following section.

4.5.4 Other Aquatic Invertebrates

The presences of several Crustacea species belonging to the Cladocera (Water Fleas), and Copepoda (*Cyclopoida* and *Calanoida*) Orders were identified in the benthic samples. These species are classified as zooplankton and although were inadvertently captured and further identified and enumerated by the taxonomist, the data was not included as part of the benthic invertebrate assessment. However, the presence of these species in abundance indicates that there is a viable food source for resident fish populations.

4.6 Periphyton Community

A total of six periphyton phyla were collected from the Cullaton Lake study area. These periphyton groups all belong to the algae family, and include Bacillariophycae (diatoms), Chlorophyta (green algae), Chrysophyta (yellow-green and golden-brown algae), Cyanophyta (blue-green algae), Pyrrhophyta (dinoflagellates), and Rhodophyta (red algae). A distribution of the Cullaton Lake periphyton community is presented in Figure 15. Full taxonomist results are provided in Appendix D. The most dominant group present at all stations sampled was the Cyanophyta (blue-green algae) with the following composition SW2 (45%), SW9 (91%), SW23 (61%), SW33 (29%), and SW34 (33%). This group is generally considered to be toxic under some conditions and may impact water quality (Mackie, 2004).



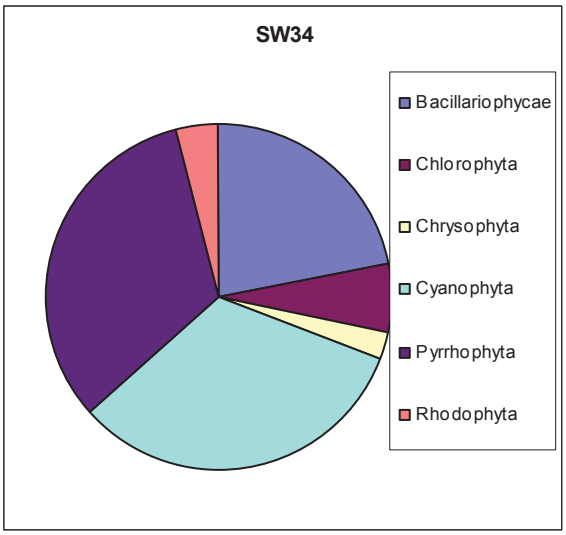


Figure 15 Cullaton Lake Periphyton Community Summary

4.7 Fisheries

The fisheries survey in this study was conducted to determine if fish were present in Shear Lake, and if so, to obtain a profile of the species, relative abundance and other biological information. Fish community assessments are a common method used in evaluating environmental stresses on aquatic environments. Sampling locations for aquatic field investigations are shown in Figure 1. A summary of survey locations is provided in Table 20.

Table 20 Summary of Fish Sampling Station Locations

Station	Location
SW2 to SW2b	Located on an unnamed creek between Shear Lake and an unnamed Lake
SW9	Shear Creek, downstream of Shear Lake
SW33 and edges of tailings pond #2	Tailings Pond #2 outlet
MT1, MT2, GO1 and GO2	Shear Lake

4.7.1 Fish Habitat

Shear Lake is a narrow shallow waterbody, with a surface area of 4,600 m^2, and a catchment area of approximately 2.5 km^2. It ranges in depth from 0.3-5 m at the deepest point. The habitat surrounding the lake is predominately marsh lands with the exception of the eastern shore that consists mostly of waste rock and bedrock outcroppings. Mid-way along the eastern shore, the waste rock is separated from bedrock outcropping by the outflow of Shear Lake into Shear Creek. A small bay forms the entrance to Shear Creek where the habitat consists of grasses and fine bed material. On the western shore there is a potential inflow into Shear Lake (SW32) which has very minimal flow and contains a deep pool just prior to the lake. At the

northern end of the lake, there is an inflow from an unnamed lake (SW2). This inflow consists of several braided channels running into Shear Lake. The stream between the unnamed lake (SW2) and the north end of Shear Lake (SW2b) is marsh lands, which consist of fine bed materials and several deep pools with instream vegetation. At the southern end of the lake, there is aquatic vegetation and the bed material consists of several boulders and fines.

In Shear Creek (SW9) the maximum water depths recorded were 0.05 m in the riffle and 0.20 m in the pool. The station length was 200 m long and the average wetted width was 2 m. Substrate conditions through this reach included 30% large gravel, 30% small cobble, 30% large cobble and 10% boulder. Important cover observed throughout the reach included 50% overstream vegetation, 20% instream vegetation, 5% boulder and 5% organic debris.

Stream reach SW2 to SW2b is located on an unnamed creek between Shear Lake and an unnamed lake. The maximum water depth in this reach is 5-10 cm in the riffle and 45 cm in the pool. This reach is also characterized as a marshy area. The station length was 130.5 m long and the average wetted width was 3 m. Substrate conditions through this reach were characterized as 100% fines. Important cover observed throughout the reach included 60% instream vegetation, 10% pool area.

SW33 and around the edges of tailings pond #2 is described as open with very little habitat cover. Substrates include gravel, cobble and some boulders.

Table 21 provides a summary of fish habitat conditions in Shear Lake.

Table 21 Summary of Fish Habitat Conditions at Stations Shear Creek (SW9) and SW2 to SW2b in 2008

Station No.	GPS Co-ordinates		Station Length (m)	Mean Wetted Width (m)	Depth (m)		Substrate Conditions	In-stream Cover (%)
	Easting	Northing			Max Riffle	Max Pool		
SW9 **Sept5, 2008**	526916	6796640	200	2.0	0.05	0.20	• large gravel (16-64 mm) 30% • small cobble (64-128 mm) 30% • large cobble (128-256 mm) 30% • boulder 10%	• overstream vegetation 50% • Instream vegetation 20% • Boulder 5% • Organic debris 5%
SW2 to SW2b **Sept 5, 2008**	526497	6796958	130.5	3.0	0.05-0.10	0.45	• small fines 100%	• instream vegetation 60% • deep pool 10%

4.7.2 Fish Community

Two fish species were captured during the gill netting surveys in Shear Lake in September 2008. These were: Lake Chub (*Couesius plumbeus*) and Arctic Grayling (*Thymallus arcticus*). Lake Chub was the only fish species captured in the minnow traps in Shear Lake in September 2008. Electrofishing surveys were conducted in Shear Creek, around the edges of Tailings Pond #2 and the inflow from an unnamed lake into Shear Lake. Three fish species were captured during the electrofishing survey in Shear Creek (SW9). Species captured were: Lake Chub, Ninespine Stickleback (*Pungitius pungitius)* and Arctic Grayling. Two species were captured from the inflow from the unnamed lake into Shear Lake: Ninespine Stickleback and Lake Chub. No fish were caught or observed in the Tailings Pond #2 (SW33) during the electrofishing survey. A summary of the fish community survey results are provided in Table 22 below.

Table 22 Fish Community Survey Results

Fish Species	Gillnets		Minnow traps		Electrofishing		
	G01	G02	MT1	MT2	SW9	SW2 to SW2b	SW33*
Lake Chub	16	1	16	20	19	4	0
Arctic Grayling	9	10	0	0	3	0	0
Ninespine Stickleback	0	0	0	0	9	32	0
Total # of Fish Captured	25	11	16	20	31	36	0
Total # of Species	2	2	1	1	3	2	0
Electrofisher Seconds	–	–	–	–	1541	743	1308
Gillnet and Trap Duration (hours)	3:10	4:43	16:55	16:48	–	–	–
Catch per unit Effort (CPUE)	8.06	2.48	0.97	1.21	1.21	2.91	0

**No fish were caught or observed at SW33*

All fish captured were counted and the majority were weighed and measured for fork and/or total length before being released alive.

Condition factors were compared against fish of the same species and captured using the same method (Table 23). The condition factor for Shear Lake indicates that both Lake Chub and Arctic Grayling are healthy and have normal length/weight relationships. Fish captured in Shear Creek and in the unnamed reach (SW2 to SW2b) have condition factors that were below 1, which may indicate undernourished/thin fish. The lower condition factor may be related to the size of the fish as they were much smaller than the fish captured in Shear Lake.

A summary of fork length, total length, weight and condition factor of the captured fish species are shown in Table 23 below.

Table 23 Fork Length, Total Length and Weight Ranges of Fish Species Captured at stations G01, G02, MT1, MT2, SW9 and SW2 to SW2b, September 2008.

Method	Station	Fish Species	Fork Length (mm)		Total Length (mm)		Weight (g)		Condition Factor	
			Min	Max	Min	Max	Min	Max	Min	Max
Gillnetting	Shear Lake GO1 and GO2	Lake Chub	-	-	107	153	9.8	29.7	0.8	1.1
		Arctic Grayling	157	>330	-	-	42.9	375.0	1.0	1.3
Minnow Trap	Shear Lake – MT1 and MT2	Lake Chub	-	-	44	135	0.7	20.9	0.7	1.1
Electrofisher	Shear Creek – SW9	Lake Chub	-	-	11	124	0.2	15.8	0.6	2.0
		Arctic Grayling	55	72	-	-	1.1	3.3	0.7	0.9
		Ninespine Stickleback	-	-	25	40	0.2	0.3	0.3	1.3
	Unnamed Reach - SW2 to SW2b	Lake Chub	-	-	74	116	2.6	13.4	0.6	0.9
		Ninespine Stickleback	-	-	20	40	<0.1	0.3	0.2	1.3

Scales were collected from 19 Arctic Grayling for age analysis. Growth rings are counted on the scales which can be used to estimate the age of a fish. Fish ages and fork lengths were used to compare Arctic Grayling sizes within Shear Lake. The largest fish captured was >330 mm long with a determined age of 8 years , while the smallest fish captured was 157 mm long with a determined age of 2 years. Figure 16 illustrates the age/length relationship of Arctic Grayling in Shear Lake.

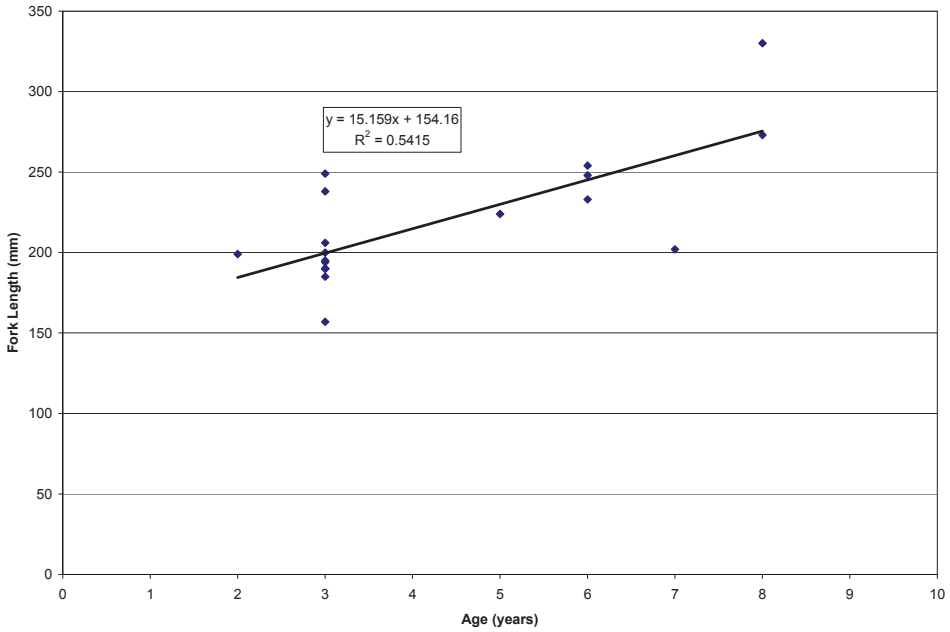


Figure 16 Arctic grayling length (mm) at age for fish captured in Shear Lake.

The fork length (mm)/weight (g) relationship of the Arctic Grayling captured in Shear Lake are presented in Figure 17.

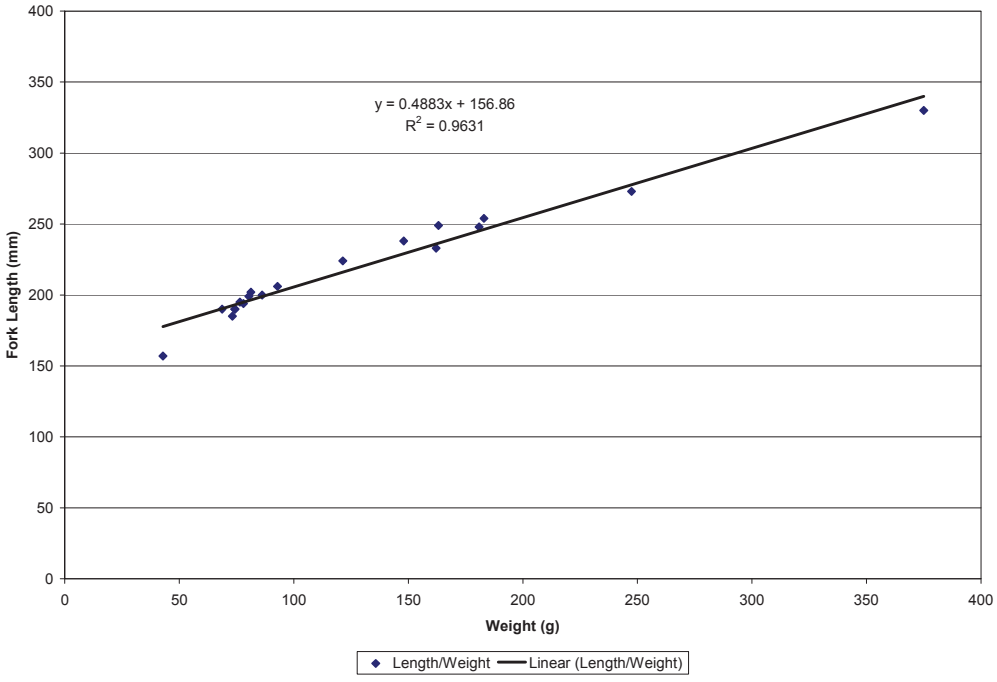


Figure 17 Fork length and weight relationship of Arctic grayling captured in Shear Lake.

Figure 18 shows the age frequency distribution of Grayling caught during the survey. Age 3 Grayling were the dominant age class captured. The results show that Grayling were captured over a wide rage of ages (2-8). Although based on limited sample size the results suggest that Shear Lake and area is able to support a reproducing Grayling population.

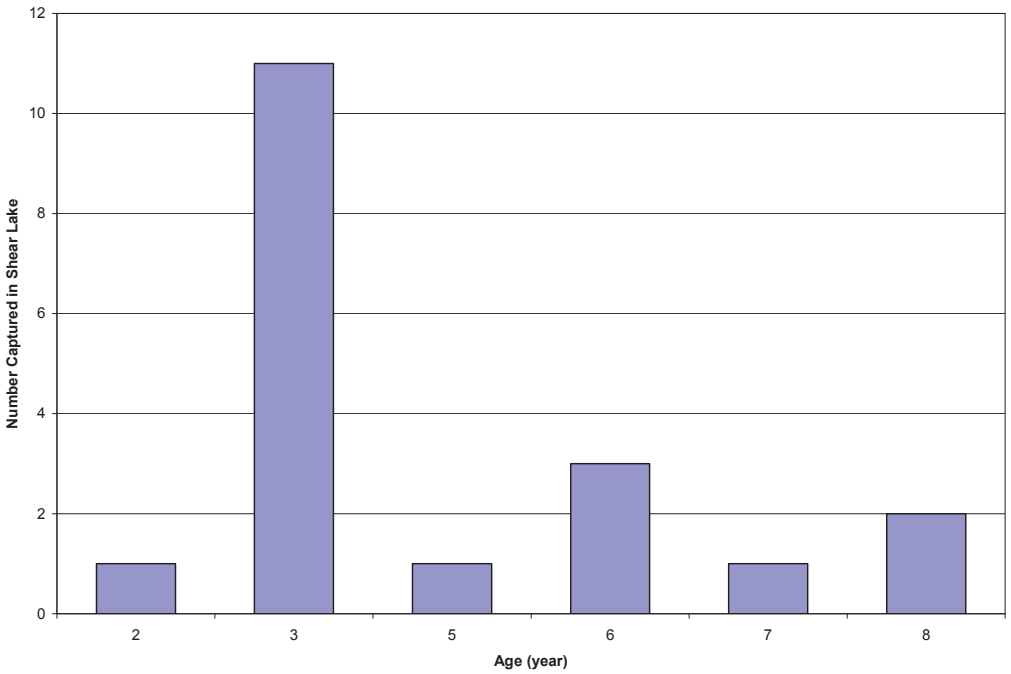


Figure 18 Frequency Distribution of Arctic grayling captured in Shear Lake

Two fish species were captured in Shear Lake: Lake Chub and Arctic Grayling. Three fish species were captured in Shear Creek: Lake Chub, Ninespine Stickleback and Arctic Grayling. Ninespine Stickleback and Lake Chub were the only fish species captured in the area between Shear Lake and the upper unnamed lake.

4.7.3 Fish Tissue Residues

Some of the fish sampled from Shear Lake in September 2008 were analyzed for total residues of 31 elements in the whole body for Lake Chub and Ninespine Stickleback, and in the mid-section (head, tail and internal organs removed) for the Arctic Grayling. The fish that were analyzed are summarized in Table 24.

Table 24 Summary of Fish Analyzed for Tissue Residues

Species	Location	Identifier	Fork Length (mm)	Total Length (mm)	Weight (g)
Lake Chub (whole body)	G01	LC-G01-1	–	116	13.9
		LC-G01 -2	–	108	13.6
		LC-G01 -3	–	126	17.7
		LC-G01 -4	–	124	16.6
		LC-G01 -5	–	153	29.7
		LC-G01 -6	–	–	–
		LC-G01 -7	–	–	–
	MT2	LC-MT2-1	–	134	20.9
		LC-MT2-2	–	102	10.3
		LC-MT2-3	–	114	12.7
		LC-MT2-4	–	102	10.7
		LC-MT2-5	–	122	14.5
Arctic Grayling (mid-section)	G01	AG-1[a]	190	–	68.7
	G02	AG-2[a]	206	–	92.9
		AG-3[a]	200	–	86.2
		AG-4[a]	224	–	121.4
		AG-5[a]	190	–	74.2
		AG-6[a]	273	–	247.4
Ninespine Stickleback (composite of 20 whole bodies)	SW2b to SW2	NS[b]	–	–	–

a Sampling mortality.

b Two ninespine stickleback were sampling mortalities. 18 additional individuals were randomly selected. All 20 individuals were composited into a single sample with adequate mass for the laboratory analysis.

Detectable concentrations of 21 elements were found in the fish. The concentration data in fish tissues are summarized in Table 25 by fish species. Full analytical results are provided in Appendix E. Guidelines for fish tissue residue for the protection of aquatic life are not available for comparison with the analytical data.

Table 25 Summary of Total Metal Concentrations (mg/kg) in Cullaton Lake Fish Tissues

	Lake Chub (n=12)			Arctic Grayling (n=6)			Ninespine Stickleback (n=1)
	Min.	Max.	Avg.	Min.	Max.	Avg.	
Aluminum (Al)	1.0	13	5.8	1.0	7.0	3.7	4.0
Antimony (Sb)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (As)	0.01	0.05	0.025	0.010	0.020	0.012	0.060
Barium (Ba)	3.3	7	4.3	0.70	1.0	0.83	3.6
Beryllium (Be)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bismuth (Bi)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Boron (B)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium (Cd)	0.020	0.15	0.065	0.010	0.010	0.010	0.020
Calcium (Ca)	7740	13300	9784	6000	8300	7238	10200
Chromium (Cr)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt (Co)	<0.10	0.30	0.14	<0.10	0.10	0.10	<0.10
Copper (Cu)	0.60	1.9	1.1	0.50	0.80	0.55	58
Iron (Fe)	24	110	58	10	30	18	97
Lead (Pb)	<0.010	0.020	0.012	<0.010	0.060	0.018	0.040
Magnesium (Mg)	291	547	358	318	355	332	295
Manganese (Mn)	5.7	16	10	1.7	2.3	1.9	33
Mercury (Hg)	0.080	0.23	0.16	0.060	0.29	0.13	0.050
Molybdenum (Mo)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel (Ni)	<0.10	<0.10	<0.10	<0.10	0.20	0.12	0.20
Phosphorus (P)	5460	9280	6824	5370	7050	6105	6140
Potassium (K)	2170	2650	2415	3380	3680	3577	1850
Selenium (Se)	0.23	0.41	0.32	0.17	0.26	0.22	0.20
Silver (Ag)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Sodium (Na)	597	1030	788	390	562	487	676
Strontium (Sr)	8.6	16	11	5.5	6.9	6.1	8.1
Thallium (Tl)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Tin (Sn)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	4.3
Titanium (Ti)	<1.0	1.0	1.0	<1.0	1.0	1.0	<1.0
Uranium (U)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Vanadium (V)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc (Zn)	25	46	35	16	21	18	33

Data for select metals from three other lakes are provided below for comparison with the Shear Lake fish tissue results. Data in Table 26 are for three fish species from Tadenac Lake, an undisturbed watershed on the Precambrian Shield in central Ontario near Parry Sound. Data in Table 27 are from Arctic Char (a relative of Grayling) from the High Lake area in Nunavut. Lastly, there are some fish tissue metal data from Ashigami Lake (Table 28), about 50 km northwest of Sudbury Ontario. Ashigami Lake is not considered to be impacted by the smelter emissions in Sudbury.

Table 26 Summary of Metal Concentrations (μg/g wet weight) in Fish Muscle from Tadenac Lake (Wren *et al.* 1983).

Metal	Bluntnose Minnow		Smallmouth Bass		Lake Char	
	Mean	Range	Mean	Range	Mean	Range
Mn	20.6	970-3630	0.7	0.3-1.1	1.2	0.1-2.1
Mg	570	312-545	795	552-1080	464	374-540
Zn	60.2	48.0-120.4	10.9	6.7-16.1	6.7	2.4-9.4
Cd	0.22	3.1-9.2	-	ND	-	ND
Pb	1.9	2.3-10.6	-	ND	-	ND
Cu	1.9	1.3-2.8	1.1	0.6-1.6	1.0	0.8-1.3
Ni	0.5	0.6-2.1	1.1	0.7-1.7	0.9	0.6-1.1
Hg	0.12	0.08-0.31	0.58	0.26-1.40	0.40	0.05-1.10

Notes: Reference: Wren et al., 1983
ND not detected

Table 27 Summary of Metal Concentrations (mg/kg wet weight) in Arctic Char Tissue from High Lake

Metal	N	Min	Max	Mean
As	3	0.010	0.016	0.013
Cd	3	0.003	0.014	0.008
Co	3	0.029	0.050	0.041
Cu	3	0.374	0.488	0.436
Mg	3	232.0	286.0	256.3
Hg	3	0.121	0.139	0.129
Ni	3	0.05	0.05	0.05
Sr	3	0.020	0.083	0.052
Zn	3	3.72	4.63	4.17

Notes: Reference: AECOM 2008, High Lake Project Volume 5, Section 4 (Appendix D, Table D 5.4-1)

Table 28 Summary of Metal Concentrations (μg/g wet weight) in Yellow Perch Tissue from Ashigami Lake

Metal	N	Min	Max	Mean
Ni	10	0.22	3.06	0.662
Cu	10	0.23	1.5	0.598
Co	10	0.019	0.126	0.046
As	10	0.04	0.206	0.081
Pb	10	0.0095	0.6	0.096
Se	10	2	2.83	2.391
Hg	10	0.0084	0.026	0.018
Cd	10	0.011	0.32	0.104

Notes: Reference: Sudbury Area Risk Assessment (SARA) 2008, (Appendix G of Volume II)

The metal levels in fish tissue from Shear Lake are comparable to the metal levels observed in fish from the three other water-bodies in mineralized areas. There are no obvious metals with elevated concentrations in fish tissue from Shear Lake that would suggest an impact on the usability of the fish tissue for wildlife or human consumption.

5. Aquatic Ecological Risk Assessment of Current Conditions

The CCME water and sediment quality guidelines are generic criteria conservatively set to protect all aquatic life. The guidelines do not take into account site-specific conditions that may influence the bioavailability and toxicity of contaminants to aquatic organisms. Therefore, exceedances of the guidelines do not necessarily imply risks to aquatic life. Rather, they serve as 'triggers' that indicate the need for further investigation which can include an ecological risk assessment. The measured exceedances of the CWQG-PAL for the Cullaton Lake Mine area have thus prompted the need for an Ecological Risk Assessment (ERA) to evaluate risks to freshwater biota from metal related impacts on surface water and sediment quality.

5.1 Problem Formulation

The initial problem formulation step in the ERA process is an information gathering and interpretation stage that focuses the approach of the study and lays the foundation for the ERA.

5.1.1 Site Characterization

Shear Lake is considered the primary study area for the purpose of the risk assessment portion of this study and provides fish habitat. A portion of the east shore of Shear Lake is made up of loose waste rock suspected of producing ARD. The tailings ponds contain water but are a waste disposal facility and not considered fish habitat.

5.1.2 Selection of Contaminants of Potential Concern (COPCs)

It is not necessary to conduct a detailed ERA for every chemical detected on a particular site, as not all chemicals necessarily represent a risk to valued ecosystem components (VECs) or to the environment. Therefore, screening criteria are generally employed to rule out those compounds that are not considered to pose potential risks. The remaining compounds are considered contaminants of potential concern (COPCs) for the risk assessment. The primary water and sediment quality guidelines that apply to the Cullaton Lake study area are the Canadian Council of Ministers of the Environment (CCME) *Water Quality Guidelines* (WQGs) and *Sediment Quality Guidelines* (SQGs) *for the Protection of Aquatic Life* (CCME 2007, 2002). These are generic guidelines conservatively set to protect all life stages of all aquatic biota in Canada. Other federal, provincial, or state jurisdictions have been consulted for guidelines where CCME criteria are lacking or where more recent scientific information has been used to set guidelines. Regardless of the jurisdiction, the generic and conservative nature of the guidelines remains the same. Guidelines do not take into account regional differences in geology, soil, or climate, nor do they account for site-specific factors that may influence bioavailability or toxicity. Generic guidelines are, therefore, not necessarily applicable to the Cullaton Lake study area. This is evidenced by the fact that concentrations of some water quality parameters at reference sites exceed guidelines. These exceedances are a reflection of the natural mineralized geology of the study area and do not indicate risks to resident biota.

The conservative nature of the guidelines makes them useful for ruling out potential risks. Thus, any parameter present at concentrations that do not exceed the guidelines is not considered a COPC for the study area. Any parameter that exceeds the guidelines and is also present in higher concentration at exposure sites than reference locations is considered a COPC.

As described previously in Section 4, six parameters exceed their respective CWQG in one or more samples from Shear Lake (Table 4). Based on exceedances of the CWQG in Shear Lake, as well as higher concentrations in Shear Lake compared to the reference sites, the following parameters are identified as COPCs:

- Aluminum,
- Cadmium,
- Cobalt,
- Copper,
- Iron, and
- Lead.

Metal concentrations in the two sediment samples collected from Shear Lake (Section 4.2) were in general low. The only parameters whose concentrations exceeded the CSQG-PAL in either sample were arsenic, chromium and copper; however, in all cases only the interim freshwater sediment quality guideline (ISQG) was exceeded (i.e., the probable effects level [PEL] was not exceeded in any sample). To this effect, these metals in sediment were excluded in the ecological risk assessment other than where they were addressed in surface waters.

5.1.3 Receptor Characterization

Receptor characterization involves identification of the ecological receptors that are most likely to be exposed to site COPCs, and selection of representative receptors for evaluation in the ERA.

It is generally not feasible to assess risks to all potential ecological receptors that inhabit a given site. Therefore, a representative subset of these receptors must be selected for evaluation. These representative receptors are known as *valued ecosystem components* (VECs). A VEC is an ecological species, population, or community that has social or economic importance to humans, is ecologically significant, and can serve as a baseline against which impacts of development can be evaluated (CCME, 1996). Selection of VECs is a critical step in the ERA process, as all relevant ecological groups in the study area must be represented. The following receptor characteristics were used as criteria in selecting aquatic VECs for the Cullaton Lake study area:

- Sensitivity (including vulnerable, threatened, or endangered species);
- Potential for high exposure to COPCs;
- Ecological significance (e.g., important predator or prey species);
- Identification by stakeholders as being important;
- Connection to human health (e.g., particular fish species);
- Availability of toxicity data for species of interest or closely related species; and
- Representation of a major feeding guild and trophic level.

Based on these criteria and the aquatic species present in the study area the Arctic Grayling was selected as the VEC for this assessment.

5.1.3.1 Arctic Grayling (Thymallus arcticus)

The Arctic Grayling (*Thymallus arcticus*) is a species of freshwater fish in the Salmonidae family. It occurs primarily in cold waters of mid-sized to large rivers and lakes, returning to rocky streams to breed (Scott and Crossman, 1998). The Arctic Grayling is native to the Nearctic and Palearctic ecozones and occurs in northern freshwater drainages from Hudson Bay west including all of Alaska, St. Lawrence Island, Bering Sea, to the Kara and Ob rivers of northern Eurasia. *T. a. arcticus*, the subspecies present in the region around Cullaton Lake, is widespread throughout the Arctic and Pacific drainages in Canada, Alaska, and Siberia, as well as the upper Missouri River drainage in Montana.

Grayling are trout-like in appearance, apart from their disproportionately large dorsal fin and smaller head and mouth. The body is elongate with a long oval cross section. They grow to an average length of 30 - 38 cm (maximum recorded length 76 cm). They are a striking coloured fish, prized by sport fisherman.

Grayling spawn during that period in which the ice is first breaking up in the smaller streams. This varies over their subarctic to arctic habitat from April to June. Adults migrate from ice-covered lakes and from larger rivers to small gravel- or rock-bottomed tributaries. After spawning, the adults return to the lakes and rivers. The females lay an average of 4,000-8,000 amber, demersal eggs which receive no parental care. Hatching takes place quickly (13 – 18 days). Some males and females reach sexual maturity at 4 years but often spawners are 6-9 years old.

Food of the young is mainly zooplankton with a gradual shift to immature insects, mainly caddisflies, and midges, with increase in size. The adults consume a broad assortment of invertebrates but mainly aquatic and terrestrial insects, including those mentioned at the juvenile stages, as well as bees, wasps, grasshoppers, ants and a variety of beetles. Other items eaten are small quantities of fishes (Grayling and Cisco), fish eggs, lemmings, and plankton. As a result of the large quantity of surface insects consumed by Arctic Grayling, they do not constitute a serious competition to other fish species.

Little is known about the predators of the Arctic Grayling but the small adults and juveniles are likely preyed upon by other fish, predatory birds such as ospreys, eagles, gulls, and mammals such as mink and otter.

Arctic Grayling are sensitive to poor water quality. A variety of factors such as their ease of capture, late maturity and slow growth, and need for cold, clear, unpolluted waters have endangered and extirpated the Grayling in some populous areas. In the past, Graylings have been taken in relatively large numbers by indigenous human populations, mainly to be feed to dogs, although they are sometimes consumed by humans as well.

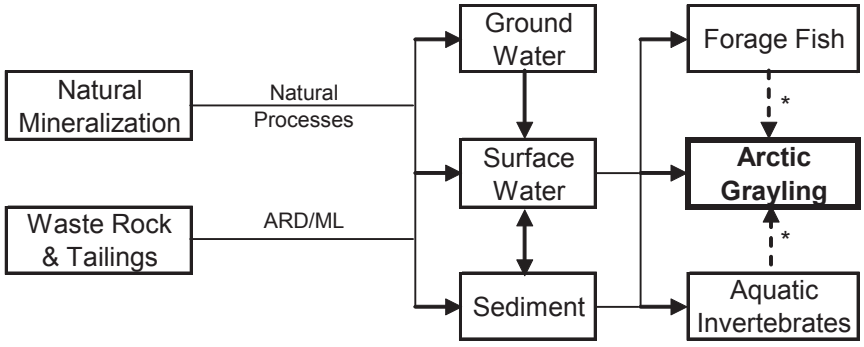
The Arctic Grayling was chosen as a VEC for a number of reasons. They are a sensitive species making them a sentinel of poor water quality in stressful environments. They are the highest trophic level fish species identified in this study. They are also recognized as having economic and social importance in northern Canada.

5.1.3.2 Vulnerable, Threatened, and Endangered Species

The Canadian Species at Risk Act (SARA) Public Registry (SARA, 2007) lists 23 scheduled species in Nunavut. Of these, only one is a freshwater aquatic species. The freshwater form of the Fourhorn Sculpin (*Myoxocephalus quadricornis*) is listed as *special concern* status under SARA, but is considered "data deficient" under Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Special concern indicates a potential to become threatened. Scott and Crossman (1998) noted that the freshwater distribution of the Fourhorn Sculpin is not completely understood. The estimated range of the Fourhorn Sculpin may potentially overlap with the study area. However, based on information on the depth preferences of this species, Shear Lake does not provide suitable habitat. The Fourhorn Sculpin has been found at depths of approximately 100 to 350 m. Shear Lake has a maximum depth of approximately 5 m. Furthermore, fisheries surveys conducted in 2008 did not identify the Fourhorn Sculpin as a species that was either present or expected in the study area.

5.1.4 Conceptual Site Model

The conceptual model identified the means by which VECs can come into contact with COPCs. The COPC sources, relevant environmental media, potential exposure pathways and receptors identified for the ERA are illustrated in Figure 19.



* Note that forage fish and aquatic invertebrates comprise only part of the typical diet of the Arctic Grayling. A significant portion of the diet of this species is terrestrially based. The terrestrial component of the Arctic Grayling diet is not assessed. The aquatic component of the Arctic Grayling diet is assessed indirectly as consideration of dietary exposure is implicit in the TRVs selected.

Figure 19 Conceptual Site Model

5.2 Exposure Assessment

The exposure point concentrations (EPCs) that will be used in this assessment to estimate exposure are the maximum measured water concentrations in Shear Lake of the COPCs (Table 29).

Table 29 Point concentrations to characterize exposure of Arctic Grayling

COPC	Exposure Point Concentration (EPC)	
	Total (µg/L)	Dissolved (µg/L)
Aluminum	360	310
Cadmium	0.22	0.22
Cobalt	7.6	7.6
Copper	9.0	9.0
Iron	13,000	11,000
Lead	4.7	2.0

Note: Total and dissolved EPCs are the maximum reported values, and are not necessarily from the same sample.

The concentrations of COPC from the seeps were not used in the exposure assessment as fish do not inhabit the seeps and the seep levels would not represent realistic exposure concentrations.

5.3 Hazard Assessment

Toxicological reference values (TRVs) were identified for this study by selecting the most appropriate toxicological endpoint for salmonid species from among those used to derive water quality criteria for the protection of aquatic life. In deriving water quality criteria, agencies conduct comprehensive searches of the literature, and screen the identified studies for data quality. Criteria derivation documents from CCME, US EPA and BC MOE were used to select TRVs. TRV selection of each COPC is described below, and the selected TRVs are summarized in Table 30.

Table 30 Summary of Selected TRVs

COPC	TRV	Reference
Aluminum	10 µg/L, total Al	Butcher, 1988
Cadmium	1.46 µg/L, total Cd	US EPA, 2001
Cobalt	38 µg/L, total Co	Birge et al., 1980
Copper	11.9 µg/L, dissolved Cu	US EPA, 2007
Iron	1,000 µg/L, total Fe	Gonzalez et al., 1990
Lead	3.0 µg/L. total Pb	Nagpal, 1987

5.3.1 Aluminum

In their review of the chronic toxicity of aluminum to fish, BC MOE (Butcher, 1988) identified a total aluminum concentrations of 10 µg/L as protective of sac fry and swim-up fry from chronic lethality in acidic water (pH < 5.5). Based on the limited data available at the time, BC MOEP (Butcher, 1988) also identified the higher concentration of 50 µg/L as protective of juvenile and adult fish in waters of pH less than 6.0. Based on BC

MOEP's review, the value of 10 µg/L total aluminum was selected as the TRV for the assessment of risk to arctic grayling from exposure to aluminum.

5.3.2 Cadmium

In the course of revising their aquatic life ambient freshwater quality criteria for copper, US EPA (2001) reviewed the available toxicological data from the literature in 1999, and also included several studies published in 2000. The data were screened against quality criteria, although the criteria were not specified. Chronic toxicological data for three salmonid genuses (*Oncohrynchus*, *Salmo* and *Salvelinus)* were available, and these were considered in selecting a TRV for the arctic grayling. The Coho Salmon (*O. kisutch*), Rainbow Trout (*O. mykiss*) and Chinook Salmon (*O. tshawytscha*) data were selected for the derivation of the TRV because it appears that these species are the most sensitive to cadmium at a given hardness. Four chronic values for the *Oncorhynchus* genus were used to derive the TRV by taking the geometric mean of the chronic values for each species (1.383 and 4.709 µg/L for Coho Salmon [*O. kisutch*], 0.78 µg/L for Rainbow Trout [*O. mykiss*] and 1.563 µg/L for Chinook Salmon [*O. tschawytscha*]. These provided a genus mean of 1.46 µg/L. Therefore, the TRV selected to evaluate risk from cadmium exposure to Arctic Grayling for this assessment is the *Oncohrynchus* genus mean of 1.46 µg/L total cadmium.

5.3.3 Cobalt

Mechanisms of Co toxicity in fish have not been investigated extensively. Chronic Co exposure has been noted to cause precipitation of Co with mucus secreted by fish and postulated that impaired respiration (caused by the physical clogging of the gill filaments) resulted in death by asphyxiation similar to the toxic mechanism caused by Zn or Al. Reported LC01, LC10 and LC50 values for Rainbow Trout (*Oncorhynchus mykiss*) exposed for 28 days were 38 µg/L 120 and 490 ug/l measured by Birge *et al.* (1980). A more recent study found a 6 day LC 50 and LC 20 of 520 and 228 µg/L respectively and incipient lethal levels (the lowest concentration to which fish may acclimate by still experience mortality) of an LC50 and LC20 of 346 and 145 µg/L respectively for *O. mykiss* (Marr *et al.* 1998). Behavioral avoidance to cobalt in water was observed at concentrations as low as 24 µg/L in Chinook Salmon (*Oncorhynchus tshawytscha)*, with a greater tolerance shown for *O. mykiss* at 180 µg/L (Hansen *et al.* 1999).

In general, qualitative TRVs such as behavioural effects in isolation are not typically used in risk assessment though they can be incorporated as part of a multiple lines of evidence approach. Ideally chronic mortality data is used to select ecological TRVs, however, these studies have not been conducted for cobalt on relevant fish species. Of the mortality studies the use of the 28-day study on *O. mykiss* is the most appropriate as it evaluated sub-chronic exposure (Birge *et al.* 1980). This study predicted an LC01, which is the concentration that increased mortality in *O. mykiss* by 1%. This is a highly conservative value as most ecotoxicological studies allow a minimum baseline mortality rate of at least approximately 10%. For the purposes of this risk assessment, however, this extremely protective TRV of 38 µg/L was applied to ensure a conservative evaluation of cobalt in surface water risk. This value also appears appropriate as it approaches the level where behavioural avoidance of cobalt impacted surface water observed in the Hansen *et al.* (1999) study.

5.3.4 Copper

In the course of revising their aquatic life ambient freshwater quality criteria for copper, US EPA (2007a) reviewed the available toxicological data from the literature. (The date range for the toxicological literature search conducted by US EPA (2007a) is not specified, but toxicological studies published as late as 2004 are referenced, and the tables and appendices of toxicological data were updated in March 2007.) The data were screened against quality criteria (related to the study methodology and reporting of water quality parameters). Chronic toxicological data for three salmonid genuses (*Oncohrynchus*, *Salmo* and *Salvelinus)* were available, and these were considered in selecting a TRV for the Arctic Grayling. The *Oncorhynchus* genus appears to be the most sensitive. Three chronic values for the *Oncorynchus* genus were used to derive the TRV for Lake Trout by taking geometric means of the chronic values for each species (27.77 and 20.32 µg/L for Rainbow Trout [*O. mykiss*] and 5.92 µg/L for Chinook Salmon [*O. tshawytscha*]. This provided a genus mean of 11.9 µg/L. Therefore, the TRV selected to evaluate risk from copper exposure to Arctic Grayling for this assessment is the *Oncorhynchus* genus mean of 11.9 µg/L of dissolved copper.

5.3.5 Iron

The lowest toxicological endpoint in salmonids identified by BC MOE in their review (Phippen *et al.*, 2008) is 5 µg/L dissolved iron, which had an unfavourable effect on Rainbow Trout (*Oncorhynchus mykiss*) spermatozoa when they were highly diluted with water (1%) (Billard and Roubaud, 1985). BC MOE (Phippen *et al.*, 2008) rejected this value as an outlier because the study method was experimental and not commonly adopted, and because the iron concentration at which adverse effects were observed is much lower than those from other studies. The next lowest value is 1,000 µg/L, which disrupts the sodium balance in Brook Char after 48 hours of exposure (Gonzalez *et al.*, 1990). This value was selected as the TRV for the assessment of risk to Arctic Grayling from exposure to iron.

5.3.6 Lead

The lowest chronic endpoint in salmonids exposed to lead that was identified by BC MOE in their review (Nagpal, 1987) is a maximum acceptable lead concentration for Rainbow Trout (*Oncorhynchus mykiss*) of 4.1 µg/L from a 19-month test (Davies et al., 1976). This value was used as the basis of BC's water quality criterion for the protection of freshwater aquatic life. BC MOE applied a relationship developed by US EPA (1985) to express their criterion as a function of water hardness:

$$Criterion = 3.31 + e^{(1.273*\ln(average\,hardness)-4.705)}$$

Davies et al. (1976) carried out their test in soft water, however, the water quality data obtained indicate that the water in Shear Lake is very soft at times (i.e, as low as ~10 mg/L as $CaCO_3$ in fall). Accordingly, the hardness relationship was used to calculate the equivalent lead concentration in very soft water of 3.0 µg/L. This value was selected as the TRV for the assessment of risk to arctic grayling from exposure to lead.

5.4 Risk Characterization

In ERA, the extent and nature of risk is characterized based on the information developed from the receptor characterization, exposure assessment and hazard assessment. For this assessment the quotient method was used, wherein an exposure ratio (ER) is calculated according to the following equation:

$$ER = \frac{EPC\,(\mu g / L)}{TRV\,(\mu g / L)}$$

Where the ER is less than or equal to 1.0, risk can be ruled out. Where the ER is greater than 1.0, the estimated exposure is greater than the exposure limit and risk cannot be ruled out. The ERs calculated for the assessment are presented in Table 31.

Table 31 Calculated Exposure Ratios (ERs)

COPC	Form	EPC (µg/L)	TRV (µg/L)	ER
Aluminum	Total	360	10	36
Cadmium	Total	0.22	1.46	0.15
Cobalt	Total	7.6	38	0.20
Copper	Dissolved	10	11.9	0.84
Iron	Total	13,000	1,000	13
Lead	Total	4.7	3.0	1.6

Based on the calculated ERs, risk can be ruled out for exposure of Arctic Grayling in Shear Lake to cadmium, cobalt and copper.

The ER for lead (1.6) is marginal. Given that the TRV is based on a 19-month test, it may be excessively conservative to the base the EPC on a one-time maximum concentration. The next highest measured total lead concentration in Shear Lake is 2.7 µg/L, which is below the TRV (ER = 0.90). The average total lead concentration of 0.80 µg/L is also below the TRV (ER = 0.27). Based on these considerations, risk is also ruled out for exposure of Arctic Grayling to lead.

Predicted risk cannot be ruled out for aluminum and iron based on toxicity data from the literature and field exposure concentrations. The maximum concentrations of these parameters are an order of magnitude higher than the TRV. Therefore, other information needs to be taken into consideration.

A fish community survey was undertaken which included observations of an Arctic Grayling population in Shear Lake (Section 4.4.2). Prior to this survey the only clear documentation of fish in Shear Lake was from the 1984 dewatering program which captured Lake Chub and Stickleback. The 2008 fisheries survey captured Arctic Grayling from a range of age classes (3 to 8 years) which includes both young and sexually mature fish. The calculated Condition Factor of the Grayling suggests the fish were healthy. Therefore, based on field observations the Grayling population in Shear Lake is not impacted by ambient water quality

Possibly reasons for the survival of Arctic Grayling in Shear Lake may include acclimation of the fish to local conditions of aluminum and iron concentrations. Both these metals are common elements that are abundant in the earth's crust. Also, there may be low bioavailability of the aluminum and iron levels that are present.

The concentrations of other metals in Shear Lake water were relatively low relative to toxicity values from the literature, and sediment metal concentrations were also generally low. Therefore, fish and fish habitat in Shear Lake does not appear to be significantly impacted under current conditions.

5.5 Uncertainty

All risk assessments include a discussion of areas of uncertainty and how these could possibly effect the conclusion of the assessment.

5.5.1 Field Data

Seeps emerging from the Shear Lake waste rock yard area were found to have poor water quality in terms of both pH and elevated metal concentrations. The seeps do not appear to be directly connected to Shear Lake or any other natural surface water feature. This, however, is not confirmed for the sub-surface water as no hydrogeological investigation or modelling was completed.

The sampling sessions were all completed in 2008 and though year to year variability in the production of metal leachate and impacts of the surrounding ecological systems is not expected to vary greatly, it should be noted that this investigation evaluates only the conditions at the time of the study.

5.5.2 Risk Assessment

A screening-level risk assessment is based primarily on data from the literature, existing site data and a reconnaissance visit to the site (CCME, 1996). These are desk-top assessments that rely heavily on simplifying assumptions and modelling. Thus, it is the nature of screening-level assessments to be conservative. Every effort is made to make conservative assumptions (i.e., the worst case is assumed so that although estimates are uncertain, risks are more likely to be overestimated than underestimated. The identified uncertainties associated with each step of the ERA are described below.

5.5.3 Problem Formulation

This aquatic ecological risk assessment was restricted in scope in that only one VEC was selected for assessment, and that VEC was assessed in only one water body. It is not possible to assess all species on site, and the use of only one VEC introduces uncertainty that the most sensitive or significant species was assessed. The highest trophic level fish was selected as the VEC to minimize uncertainty as much as possible. Risk was assessed only in Shear Lake. The conclusions of this assessment cannot be considered to apply to all aquatic life in the Cullaton Lake Mine area, rather, the conclusions of the risk assessment apply only to Arctic Grayling in Shear Lake.

5.5.4 Exposure Assessment

The exposure concentrations used in the assessment are associated with uncertainties from sampling and analysis. It was assumed that the data collected were representative of the site; however, sampling in surface water was limited and, therefore, the selected EPCs may not be representative of site conditions. The highest water concentrations selected to characterize exposure, which is conservative and increases certainty that exposure is not underestimated.

The exposure of the arctic grayling to COPCs in sediment or in aquatic food items was not explicitly considered in the exposure assessment; however, it was implicitly considered in the hazard assessment because the TRVs selected were estimated safe concentrations for salmonids to live and feed in natural water bodies. The exposure of arctic grayling to COPCs in terrestrial food items was not considered at all (i.e., it was assumed that the diet was entirely aquatic, which should over predict risk). It was also assumed that Arctic Grayling would live their entire lives in Shear Lake, which is also conservative.

5.5.5 Hazard Assessment

The risk characterization performed for this assessment considers direct effects (i.e., direct toxicity) of the COPCs on the VECs only and not indirect effects, such as those mediated via the food web. Although this is the traditional approach in risk assessment, it should be noted that indirect effects can exert population-level effects. For example, a contaminant may not be especially toxic to a particular VEC, but might be highly toxic to a staple dietary item of that VEC. Such a situation could result in a loss of dietary items, which could in turn result in decreased growth, reproduction, and/or survival of the VEC.

There is some uncertainty is associated with the TRVs selected to characterize hazard for this assessment. Although the toxicological data from which the TRVs were selected were complied and evaluated by reputable agencies (i.e., CCME, US EPA and BC MOE), the literature searches for some COPCs, particularly aluminum, chromium and lead, are quite old and exclude recent literature. Although the TRVs are uncertain, the uncertainty in the final conclusions of the risk assessment is limited by the availability of field data demonstrating that fish communities are present.

TRVs are not available for, and cannot be used to assess mixtures of contaminants. The nature of the interactions between the contaminations (additive, antagonistic or synergistic) is not known, and the effect of contaminant mixtures on the Arctic Grayling is a source of uncertainty. However, based on the field data, it is clear that Arctic Grayling are present in Shear Lake.

6. Comparison to Reference and Historical Conditions

As previously described in Section 5, six metals were identified as chemicals of potential concern (COPC) including aluminum, cadmium, cobalt, copper, iron and lead due to the exceedance of a surface water quality guideline by the CCME or Ontario Ministry of Environment. It is, however, recognized that the surface waters of the Shear Lake area are inherently different than those to which these standards were largely developed which is to protect the surface waters of Southern Canada. Also, mines tend to be located in highly mineralized areas that contain naturally elevated levels of many of the parameters. In this regard the metal concentrations found in Shear Lake, the focus area of the Screening Level Ecological Risk Assessment, were compared to samples collected from a nearby reference lake. The reference samples were collected by Indian and Northern Affairs Canada in 2006 from Cullaton Lake, a fresh water lake approximately 2 kilometers north of the Site but that was presumably not impacted by any historical Site activities. Surface water concentrations of cobalt, copper, iron and lead in Shear Lake were well within the range of natural variability found within Cullaton Lake (Figure 20). This is particularly important to note for iron as predicted risk could not be ruled out for iron based on toxicity data from the literature and field exposure concentrations. It is, however, likely that if these are the natural conditions then the local fish populations are acclimated to these elevated iron concentrations. Concentrations of aluminum and cadmium were found to be elevated in Shear Lake compared to the reference levels. Based on the risk characterization performed in Section 5.4 however it is anticipated that these elevated cadmium levels are unlikely to present a risk to Arctic Grayling populations in Shear Lake. The elevated levels of aluminum in Shear Lake above the reference levels supports the conclusion in Section 5.4 that predicted risk cannot be ruled out for aluminum on the local Arctic Grayling population.

As both aluminum and iron were found in the Risk Characterization (Section 5.4) to still pose the possibility of negative impacts to the Shear Lake fish populations, these two metals were evaluated temporally to evaluate if surface water concentrations are stable or in flux over time. Surface water samples collected from Shear Lake in April of 1984 by Cullaton Lake Gold Mines Limited prior to the draining of the lake for exploration purposes shows that aluminum and iron levels in the lake were quite low compared to more recent concentrations measured in 2000 and 2008 (Figure 21). Aluminum and iron concentrations were both lower in Shear Lake surface waters in 2008 than what was measured in 2000. The surface water samples collected in 2000 occurred before the waste rock was encapsulated, which may have contributed to the lower concentrations measured in the more recent, 2008, sampling survey. Regardless current levels of aluminum and iron both appear elevated compared to the historical levels, though this may be the result of improvements in sampling and analytical methodology, the seasonal timing of sample collection or actually due to Site activities.

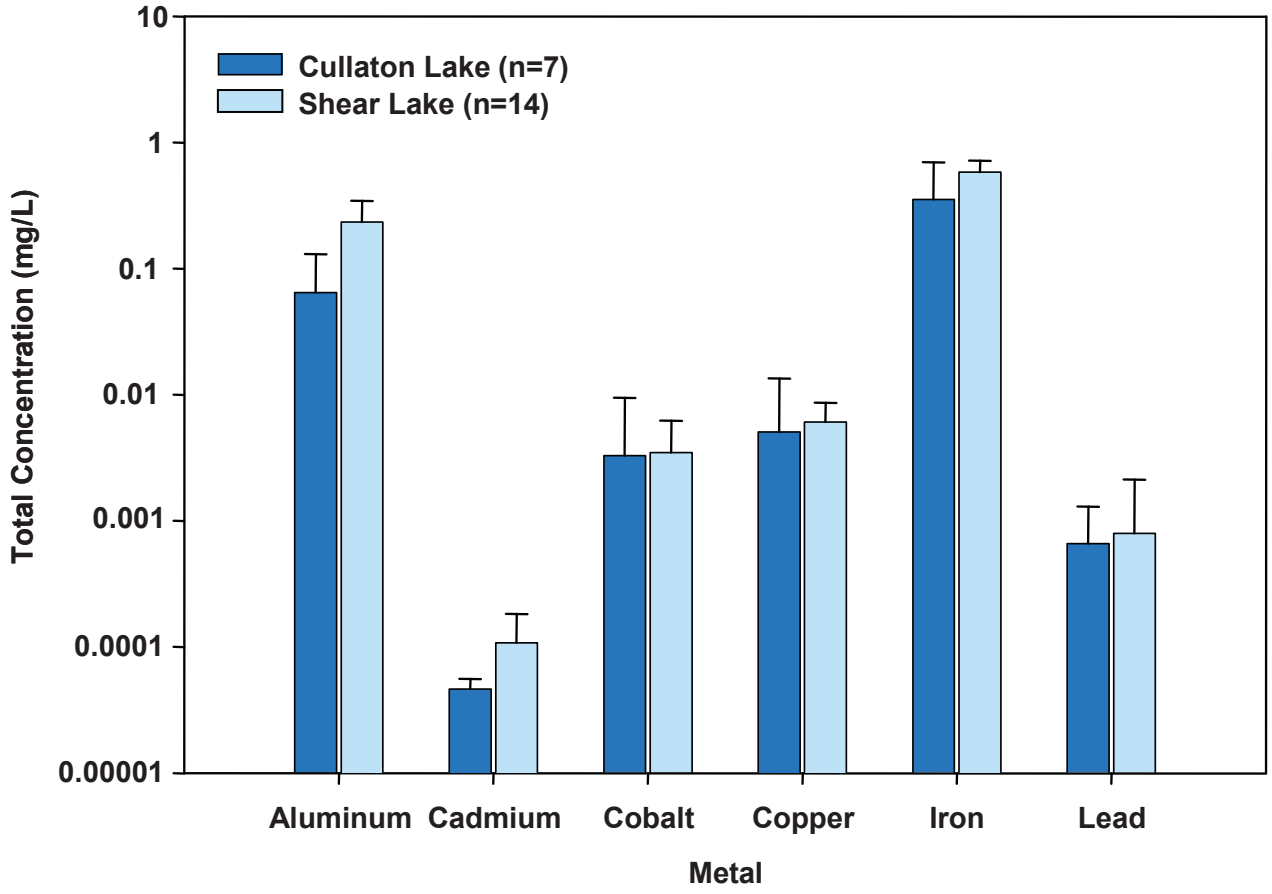


Figure 20 Selected Metal Concentrations (Mean +/- Standard Deviation) in Shear Lake and a Reference Lake (Cullaton Lake)

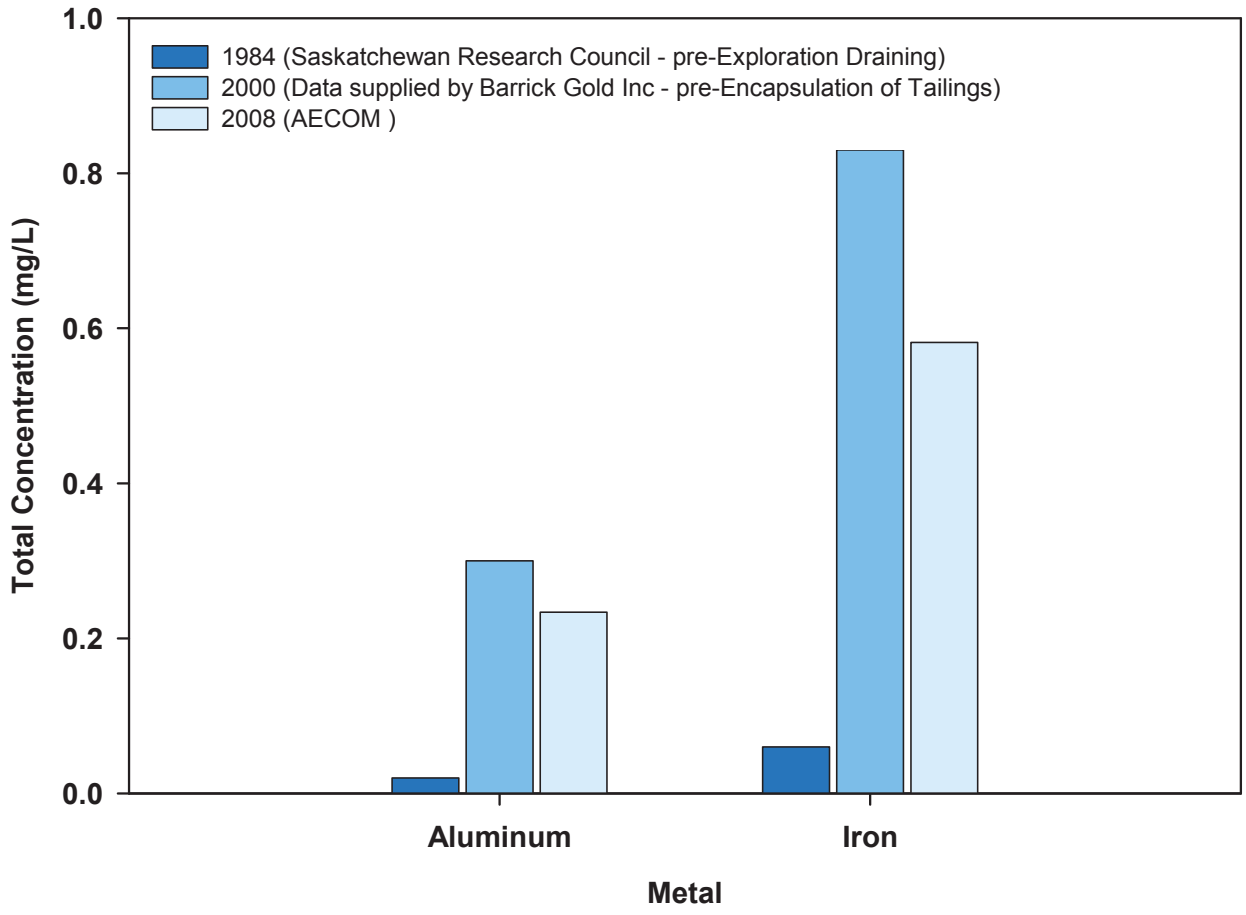


Figure 21 Historical Aluminum and Iron Concentrations in Shear Lake

7. Geochemical Loading

The predicted future loadings to Shear Lake were considered based on a water balance calculated for the Tailings Pond #1 and Shear lake by Northwest Hydraulic Consultants (Appendix F). In addition Lorax Environmental examined chemical loadings into the Tailings Pond #1 and Shear Lake due to the geochemical properties of the waste rock and tailings management strategies (Appendix G).

Results of the hydrological and hydrogeological investigations suggest that further loading of metals or acid generating material to the environment should be minimal and in equilibrium with the current water balance.

There is acid generating potential surrounding the Tailings Pond (TP) where oxygen penetration is occurring. These reports indicate that the loadings of metals as well as the water quality in the Tailings Area is affected by elevated porewater concentrations of cadmium, cobalt, nickel, selenium and uranium. These elevated porewater concentrations, however, are not resulting in any exceedances of the Water License limits for those parameters. It is, however, predicted that cobalt and uranium have the potential to continue to be in excess of a CCME or PWQO surface water guidelines, but these guidelines are for the protection of aquatic life and would not be normally applied to a tailings pond. The elevated levels of uranium in the pore water spaces did not appear to be impacting the local surface waters as uranium concentrations above CCME or PWQO guidelines were only determined at the seeps. The risk of cobalt loading was evaluated in the SLERA (Section 5) and is not anticipated to be at levels impacting the local fish community.

The water balance for the Tailings Pond (TP) indicates the TP should not overflow under typical climatic conditions (NHC 2008). However, visual observations suggest that water is discharged from the tailings pond on a regular basis.

The water balance does indicate that Shear Lake will fill and overflow into the downstream environment. However, our results show that there is no significantly elevated metal levels in Shear Lake, nor has the water chemistry changed significantly from 2000 to 2008 and loading is not expected to change (Lorax 2009). Therefore, water quality in Shear Lake is not expected to change into the future.

8. Summary and Conclusions

Detailed studies were conducted in 2008 at the Cullaton Lake mine site to document existing environmental conditions, and to assess potential ecological risks associated with the site now and in the future.

Water quality in Shear Lake met the Water License limits for all parameters with limits.

The concentration of metals were elevated in seeps when compared to other stations which can be attributed to metal leaching from the waste rock pile.

The maximum concentrations of Al, Cd, Co, Cu, Fe and Pb in Shear Lake did exceed their respective CCME guidelines in some samples.

Sediment quality in Shear Lake was generally good. The concentrations of some metals were higher than the most stringent federal guidelines but were below the upper CCME or similar Ontario MOE sediment quality guidelines.

Benthic invertebrate samples were collected from a number of stream locations within the study area. There was some variability among stations that can likely be attributed to extreme differences in flow regimes between the different sites. There were no obvious indications that the benthic community had been impacted in stations downstream of potential sources of contamination. The diversity of the benthic community in the Shear Lake samples was similar to results obtained at undisturbed sites in Nunavut from other studies.

Three different species of fish were captured in the study area including Arctic Char in Shear Lake itself. Given the nature of the existing fish habitat in this northern environment this species diversity would be expected in a non-impacted setting. The fisheries survey captured Arctic Grayling from a range of age classes (3 to 8 years) which includes both young and sexually mature fish. The calculated Condition Factor of the Grayling suggests the fish were healthy. Therefore, based on field observations the grayling population in Shear Lake is not impacted by ambient water quality

Migration of fish between Shear Lake and the Kognak River is possible under certain flow conditions at some times of the year. There is no indication that water quality is impairing movement or reproduction of this species in the study area.

The concentration of metals was measured in Arctic Grayling from Shear Lake. The concentrations were generally low. Mercury is the only parameter for which a tissue guideline exists for the protection of human health as well as for wildlife consumption. The concentration of mercury in Shear Lake fish (< 0.30 mg/kg) was well within the human consumption guideline of 0.5 mg/kg. The concentrations of other metals in Shear Lake fish tissues were comparable to metal levels in fish from other undisturbed northern lakes. There is no evidence that metals are accumulating in fish in the study area.

The Screening Level Risk Assessment (SLRA) ruled out potential risk to four metals identified as Chemicals of Potential Concern, namely, Cd, Co, Cu and Pb. Risk could not be ruled out for Al and Fe based on the observed concentrations in Shear Lake and literature toxicity values. However, the presence of a healthy Grayling population in Shear Lake provides empirical evidence that the literature values are not applicable to this species or the metals are not bio-available at the total concentrations measured.

Geochemical studies by Lorax (2009) did confirm that the thickness of the tailings cover was less (0.6 to 0.9 m) than prescribed in the closure plan (1.4m) and that oxidation of some zones is likely occurring with subsequent potential to be acid generating. Porewater of the tailings and waste rock contained elevated levels of several metals, but the levels were still below their respective Water License Limits for the site.

Water quality in the Tailings Pond did not exceed any of the Water License Limits. The concentration of several parameters in the Tailing Pond water did exceed CCME guidelines for the protection of freshwater life but it is questionable if these guidelines should be applied to a waste management facility.

In summary, impairment of porewater and water in contained seeps is apparent in some locations at the site. The overall surface waters of the site are not significantly impacted by the former mine operation or existing conditions. This is particularly true for Shear Lake, which appears to support a healthy Arctic Grayling population. Chemical conditions within the waste rock, tailings and surface waters appear to be in equilibrium and no further changes in water quality are expected.

9. References

Athersuch, J., Horne, D.J. & Whittaker, J.E.(1989): *Marine and brackish water ostracods.* Synopses of the British Fauna (New Series)

Billard R. and Roubaud P. 1983. The effect of metals and cyanide on fertilization in rainbow trout (*Salmo gairdneri*). Water Res 19: 209-214. Cited in: Phippen *et al.*, 2008.

Birge, W.J., Black, J.A., Westerman, A.G., Hudson, J.E., 1980. Aquatic toxicity tests on inorganic elements occurring in oil shale. In: Gale, C. Ed.), Oil Shale Symposium: Sampling, Analysis and Quality Assurance, March 1979, EPA-600:9-80-022. National Technical Information Service. Springfield, VA, pp. 519–534. in Marr *et al.*. 1998

Buchsbaum & Pearse, 1987: *Living Invertebrates*. Blackwell Scientific Publications.

Butcher G.A. 1988. Water Quality Criteria for Aluminum Technical Appendix. Water Quality Unit, Resource Quality Section, Water Management Branch, British Columbia Ministry of Environment and Parks.

Canadian Council of Ministers of the Environment. 2002. Canadian sediment quality guidelines for the protection of aquatic life: Summary tables. Updated 2002. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg, Manitoba, Canada.

Canadian Council of Ministers of the Environment. 2007. Canadian water quality guidelines for the protection of aquatic life: Summary table. Updated December, 2007. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg, Manitoba, Canada.

Davies P.H., Goettle J.P. Jr., Sinley J.R. and Smith N.F. 1976. Acute and chronic toxicity of lead to rainbow trout *Salmo gairdneri*, in hard and soft water. Water Res 10: 199-206. Cited in: Nagpal, 1987.

Gonzalez R.J., Grippo R.S. and Dunson W.A. 1990. The disruption of sodium balance in brook char, *Salvelinus fontinalis* (Mitchill), by manganese and iron. Journal of Fish Biology 37: 765-774. Cited in: Phippen *et al.*, 2008.

Hansen JA., Marr JCA, Lipton J, Cacela D, Bergman HL. 1999. Differences in neurobehavioural responses of Chinook Salmon (*Oncorhynchus tshawytscha*) and Rainbow Trout (*Oncorhynchus mykiss*) exposed to copper and cobalt: Behavioral avoidance. Environmental Toxicology and Chemistry. 18: 1972-1978.

Lorax Environmental. 2009. Geochemical considerations of Tailings and Waste Rock, Cullaton Lake Mine. Report to Barrick Gold Inc. and AECOM Canada Ltd. March 2009.

Mackie, 2004: *Applied Aquatic Ecosystem Concepts*. Kendal/Hunt Publishing Company.

Marr JCA, Hansen JA, Meyer JS, Cacela D, Podrabsky T., Lipton J., Bergman HL. 1998. Toxicity of cobalt and copper to rainbow trout: Application of a mechanistic model for predicting survival. Aquatic Toxicology. 43: 225-238.

Ministry of the Environment (Ontario). 1994. Water Management Policies and Guidelines: Provincial Water Quality Objectives. PIBS 3303E. Queens' Printer for Ontario.

Nagpal N.K. 1987. Water Quality Criteria for Lead Technical Appendix. Resource Quality Section, Water Management Branch, British Columbia Ministry of Environment and Parks.

Northwest Hydraulics Consultants. 2009. Cullaton Lake Mine Closure Water Balance, Tailings Pond No. 1 and Shear Lake. Memo to Rick Palmer, AECOM Canada Ltd. Feb 11, 2009.

Pawlisz A.V., Kent R.A., Schneider U.A. and Jefferson C. 1997. Canadian Water Quality Guidelines for Chromium. Environ Toxicol Water Qual 12: 185–193.

Phippen B., Horvath C., Nordin R. and Nagpal N. 2008. Ambient Water Quality Guidelines for Iron. Science and Information Branch, Water Stewardship Division, British Columbia Ministry of Environment.

Reynoldson, T.B., Logan, C., Pascoe, T. and Thompson, S.P. 2000. CABIN (Canadian Aquatic Biomonitoring Network) Invertebrate Biomonitoring Field and Laboratory Manual. National Water Research Institute, Environment Canada.

Scott, W.B. and E.J. Crossman. 1998. The Freshwater Fishes of Canada. Bulletin 184. Fisheries Research Board of Canada. Ottawa. 966 pp.

Soil & Water Conservation Society of Metro Halifax (SWCSMH), 2008:
http://www.chebucto.ns.ca/ccn/info/Science/SWCS/ZOOBENTH/BENTHOS/xiii.html

US EPA (Environmental Protection Agency). 1985. Ambient Water Quality Criteria for Lead – 1984. EPA 440/5-84-027. Washington, D.C. Cited in: Nagpal, 1987.

US EPA (United States Environmental Protection Agency). 2001. 2001 Update of Ambient Water Quality Criteria for Cadmium. Office of Water, Office of Science and Technology, Washington, D.C. EPA-822-R-01-001, April 2001. Available on-line:
http://www.epa.gov/waterscience/criteria/aqualife/cadmium/cad2001upd.pdf

US EPA (Environmental Protection Agency). 2007a. Aquatic Life Ambient Freshwater Quality Criteria – Copper. 2007 Revision. Office of Water, Office of Science and Technology: Washington, DC. EPA-822-R-07-001. Available at: www.epa.gov/waterscience/criteria/aqlife.html.

Appendix A

Photo Log

Photograph 1. Aerial view of Shear Lake ↑

Photograph 2. Aerial view of Shear Lake ↑

Photograph 3. Aerial view of the Tailings Impoundment ↑

Photograph 4. Aerial view of the Tailings Impoundment ↑

Photograph 5. Aerial view of the Tailings Impoundment ↑

Photograph 6. Benthic station SW2 looking upstream away from Shear Lake, September 2, 2008 ↑

Photograph 7. Benthic station SW2 looking downstream towards Shear Lake, September 2, 2008 ↑

Photograph 8. Benthic station SW23 Shear Creek outflow into Kognak River looking downstream, September 4, 2008 ↑

Photograph 9. Benthic station SW34 outflow of tailings pond #1 looking upstream, September 4, 2008 ↑

Photograph 10. Benthic station SW34 outflow of tailings pond #1 looking downstream, September 4, 2008 ↑

Photograph 11. Benthic station SW23 outflow of tailings pond #2 looking upstream, September 4, 2008 ↑

Photograph 12. Benthic station SW33 outflow of tailings pond #2 looking downstream, September 4, 2008 ↑

Photograph 13. Benthic station SW9 on Shear Creek looking upstream, June 27, 2008 ↑

AECOM

Appendix B

Water and Sediment Quality Analytical Results Summary Tables and Laboratory Reports

619666

LOT: Control Number

Environmental Sample Information Sheet

Note: Proper completion of this form is required in order to proceed with analysis

See reverse for your nearest Bodycote location and proper sampling protocol

lling Address:
mpany: Gartner Lee Limited
dress: Sperling Plaza, 6400 Roberts St. Suite 490 Burnaby BC V5G 4C9
ention: Jen Sarchuk
one: 604.299.4144
x: 604.299.1455
ll:
mail: jsarchuk@gartnerlee.com

QA/QC Report ☐

Report Result: Fax ☑ Mail ☑ Courier ☐ e-mail ☑ e-Service ☐

Copy of Report To:
Company:
Address: same as above

Copy of invoice: ☐
Mail invoice to this address for approval ☐

Report Result: Fax ☐ Mail ☐ Courier ☐ e-mail ☐ e-Service ☐

Attention:
Phone:
Fax:
Cell:
e-mail:

nformation to be included on eport and Invoice

roject ID: 70562
roject Name:
roject Location: Cullaton Lake
egal Location:
O#:
roj. Acct. Code:
greement ID: 84945

RUSH Please contact the laboratory to confirm rush dates and times before submitting samples.

Upon filling out this section, client accepts that surcharges will be attached to this analysis

RUSH required on: All Analysis ☐ or As indicated ☐

Date Required:
Signature:
Bodycote Authorization:

Sample Custody (Please Print)
Sampled by: JS
Company: Gartner Lee Signature: Jsarchuk
I authorize Bodycote to proceed with the work indicated on this form:
Date: May 16'08 Initial: JD.
Received by: AB Sample Temp.
Waybill #: Date: May 20/08
Company Time

FOR LAB USE ONLY
Condiftion of containers/coolers upon arrival at lab

☐ Check here if Bodycote is required to report results directly to a regulatory body (Please include contact information)

☐ Check here if you are testing POTABLE WATER for **HUMAN CONSUMPTION**

Special Instructions / Comments

Please indicate which regulations you are required to meet: CCME

	Sample Identification	Location	Depth IN CM M	Date/Time Sampled	Matrix	Sampling Method	Number of Containers	Metals	Nutrients	TC Metals	D. Metals	Cyanide	Routine	Enter tests above (✓ relevant samples below)
				MAY 15 '08	Water	Grab	6	X	X	X	X	X	X	
1	SW40			MAY 15'08	Water	Grab	6	X	X	X	X	X	X	
2	SW26-B			MAY 15'08	Water	Grab	6	X	X	X	X	X	X	
3	SW26-T			MAY 15'08	Water	Grab	6	X	X	X	X	X	X	
4	SW27			MAY 15'08	Water	Grab	6	X	X	X	X	X	X	
5	Travel blank			MAY 15'08	Water	Grab	6	X	X	X	X	X	X	
6	SW25-B3			MAY 15'08	Water	Grab	6	X	X	X	X	X	X	
7	SW25-B2			MAY 15'08	Water	Grab	6	X	X	X	X	X	X	
8	SW25-B1			MAY 15'08	Water	Grab	6	X	X	X	X	X	X	
9	SW25-T													
10														
11														
12														
13														
14														
15														

NOTE: All hazardous samples must be labelled according to WHIMIS guidelines.

Report Transmission Cover Page

Bill To:	Gartner Lee Limited	Project:	
Report To:	Gartner Lee Limited	ID:	70562
	6400 Roberts Street, Suite 490	Name:	
	Burnaby, BC, Canada	Location:	Cullaton Lake
	V5G 4C9	LSD:	
Attn:	Sharleen Hamm	P.O.:	
Sampled By:	JS	Acct code:	
Company:	Gartner Lee		

Lot ID:	**619666**
Approval Status:	Approved
Invoice Frequency:	by Lot
COD Status:	
Control Number:	
Date Received:	May 20, 2008
Date Reported:	May 27, 2008
Report Number:	1120676

Contact	Company	Address
Sharleen Hamm	Gartner Lee Limited	6400 Roberts Street, Suite 490 Burnaby, BC V5G 4C9 Phone: (604) 299-4144 Fax: (604) 299-1455 Email: shamm@gartnerlee.com

	Copies	Delivery	Format
M	1	Post	
	1	Email - Single Report	PDF

Contact	Company	Address
Jennifer Sarchuk	Gartner Lee Limited	6400 Roberts Stree,Suite 490 Burnaby, BC V5G 4C9 Phone: (604) 299-4144 Fax: (604) 299-1455 Email: jsarchuk@gartnerlee.com

Copies	Delivery	Format
1	Email - Single Report	PDF

_____ PAGES IN THIS TRANSMISSION

Notes To Clients:

- Upon receipt, samples had exceeded recommended holding time for analysis.
- Some Trace total metal results were less than dissolved metal results for samples 619666 (1-9). The results were verified and are within expected measurement uncertainty.
- Some MS total metal results were less than dissolved metal results for sample 619666-1 to 9. The results were verified. Total water was run from the routine bottle and dissolved from the field filtered bottle.
- Sample 619666-1; 2709842 Sample 619666-1There was insufficient sample volume to reach a detection limit of 1 mg/L for TSS analysis. The detection limit was adjusted accordingly.
- Sample 619666-2; 2709849 Sample 619666-2 There was insufficient sample volume to reach a detection limit of 1 mg/L for TSS analysis. The detection limit was adjusted accordingly.
- Sample 619666-4; 2709851 The ion balance was outside the range 90 - 110% for sample 619666-4. The ion balance can be variable in samples with TDS less than 100 mg/L.
- Sample 619666-5; 2709852 Sample 619666-5 There was insufficient sample volume to reach a detection limit of 1 mg/L for TSS analysis. The detection limit was adjusted accordingly.
- Sample 619666-6; 2709853 Sample 619666-6 There was insufficient sample volume to reach a detection limit of 1 mg/L for TSS analysis. The detection limit was adjusted accordingly.
- Sample 619666-7; 2709854 Sample 619666-7 There was insufficient sample volume to reach a detection limit of 1 mg/L for TSS analysis. The detection limit was adjusted accordingly.
- Sample 619666-8; 2709855 Sample 619666-8 There was insufficient sample volume to reach a detection limit of 1 mg/L for TSS analysis. The detection limit was adjusted accordingly.

Reports associated with this Lot

Id/Format/Report Date	Id/Format/Report Date	Id/Format/Report Date

Bodycote TESTING GROUP

Sample Custody

Bill To:	Gartner Lee Limited	Project:	
Report To:	Gartner Lee Limited	ID:	70562
	6400 Roberts Street, Suite 490	Name:	
	Burnaby, BC, Canada	Location:	Cullaton Lake
	V5G 4C9	LSD:	
Attn:	Sharleen Hamm	P.O.:	
Sampled By:	JS	Acct code:	
Company:	Gartner Lee		

Lot ID:	**619666**
Control Number:	
Date Received:	May 20, 2008
Date Reported:	May 27, 2008
Report Number:	1120676

Sample Disposal Date: June 26, 2008

All samples will be stored until this date unless other instructions are received. Please indicate other requirements below and return this form to the address or fax number on the bottom of this page.

☐ Extend Sample Storage Until _____ (MM/DD/YY)

The following charges apply to extended sample storage:

Storage for 1 to 5 samples per month	$ 10.00
Storage for 6 to 20 samples per month	$ 15.00
Storage for 21 to 50 samples per month	$ 30.00
Storage for 51 to 200 samples per month	$ 60.00
Storage for more than 200 samples per month	$ 110.00

☐ Return Sample, collect, to the address below via:

- ☐ Greyhound
- ☐ Loomis
- ☐ Purolator
- ☐ Other (specify) _____

Name _____

Company _____

Address _____

_____

Phone _____

Fax _____

Signature _____

Bodycote TESTING GROUP

Analytical Report

Bill To:	Gartner Lee Limited	Project:	
Report To:	Gartner Lee Limited	ID:	70562
	6400 Roberts Street, Suite 490	Name:	
	Burnaby, BC, Canada	Location:	Cullaton Lake
	V5G 4C9	LSD:	
Attn:	Sharleen Hamm	P.O.:	
Sampled By:	JS	Acct code:	
Company:	Gartner Lee		

Lot ID:	**619666**
Control Number:	
Date Received:	May 20, 2008
Date Reported:	May 27, 2008
Report Number:	1120676

		Reference Number	619666-1	619666-2	619666-3	
		Sample Date	May 15, 2008	May 15, 2008	May 15, 2008	
		Sample Location				
		Sample Description	SW40	SW26-B	SW26-T	
		Matrix	Water	Water	Water	
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Inorganic Nonmetallic Parameters						
Ammonium - N		mg/L	<0.05	<0.05	<0.05	0.05
Kjeldahl Nitrogen	Total	mg/L	0.09	0.61	0.61	0.06
Phosphorus	Total	mg/L	<0.05	<0.05	<0.05	0.05
Orthophosphate-P	Dissolved	mg/L	<0.01	0.06	0.06	0.01
Organic Carbon	Total Nonpurgeable	mg/L	<0.5	16.2	15.8	0.5
Organic Carbon	Dissolved Nonpurgeable	mg/L	<0.5	14.4	14.5	0.5
Cyanide	Total	mg/L	0.001	0.001	0.001	0.001
Metals Dissolved						
Silicon	Dissolved	mg/L	<0.05	4.69	4.68	0.05
Sulfur	Dissolved	mg/L	<0.3	14.8	15.0	0.3
Mercury	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Aluminum	Dissolved	mg/L	0.005	0.222	0.224	0.005
Antimony	Dissolved	mg/L	0.0004	0.0007	0.0005	0.0002
Arsenic	Dissolved	mg/L	<0.0002	0.0006	0.0006	0.0002
Barium	Dissolved	mg/L	<0.001	0.054	0.052	0.001
Beryllium	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bismuth	Dissolved	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Boron	Dissolved	mg/L	<0.002	0.002	0.002	0.002
Cadmium	Dissolved	mg/L	<0.00001	0.00016	0.00018	0.00001
Chromium	Dissolved	mg/L	<0.0005	0.0012	0.0011	0.0005
Cobalt	Dissolved	mg/L	<0.0001	0.0053	0.0053	0.0001
Copper	Dissolved	mg/L	<0.001	0.008	0.007	0.001
Lead	Dissolved	mg/L	<0.0001	0.0009	0.0020	0.0001
Lithium	Dissolved	mg/L	<0.001	0.002	0.002	0.001
Molybdenum	Dissolved	mg/L	<0.001	<0.001	<0.001	0.001
Nickel	Dissolved	mg/L	<0.0005	0.0115	0.0117	0.0005
Selenium	Dissolved	mg/L	<0.0002	<0.0002	<0.0002	0.0002
Silver	Dissolved	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Strontium	Dissolved	mg/L	0.001	0.062	0.062	0.001
Thallium	Dissolved	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Tin	Dissolved	mg/L	<0.001	<0.001	<0.001	0.001
Titanium	Dissolved	mg/L	<0.0005	0.0021	0.0017	0.0005
Uranium	Dissolved	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium	Dissolved	mg/L	<0.0001	0.0002	0.0002	0.0001
Zinc	Dissolved	mg/L	0.002	0.016	0.016	0.001
Metals Total						
Calcium	Total	mg/L	<0.4	17.7	18	0.2
Iron	Total	mg/L	<0.2	0.6	0.6	0.1

Bodycote TESTING GROUP

Analytical Report

Bill To:	Gartner Lee Limited	Project:	
Report To:	Gartner Lee Limited	ID:	70562
	6400 Roberts Street, Suite 490	Name:	
	Burnaby, BC, Canada	Location:	Cullaton Lake
	V5G 4C9	LSD:	
Attn:	Sharleen Hamm	P.O.:	
Sampled By:	JS	Acct code:	
Company:	Gartner Lee		

Lot ID:	**619666**
Control Number:	
Date Received:	May 20, 2008
Date Reported:	May 27, 2008
Report Number:	1120676

		Reference Number	619666-1	619666-2	619666-3	
		Sample Date	May 15, 2008	May 15, 2008	May 15, 2008	
		Sample Location				
		Sample Description	SW40	SW26-B	SW26-T	
		Matrix	Water	Water	Water	
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Metals Total - Continued						
Magnesium	Total	mg/L	<0.2	4.5	4.6	0.1
Manganese	Total	mg/L	<0.01	0.310	0.297	0.005
Potassium	Total	mg/L	<0.8	2.4	2.4	0.4
Silicon	Total	mg/L	0.1	4.67	4.69	0.05
Sodium	Total	mg/L	<0.8	2.6	2.6	0.4
Sulfur	Total	mg/L	<0.6	15.6	15	0.3
Mercury	Total	ug/L	<0.01	<0.01	<0.01	0.01
Aluminum	Total	mg/L	<0.01	0.258	0.270	0.005
Antimony	Total	mg/L	<0.0004	<0.0002	<0.0004	0.0002
Arsenic	Total	mg/L	<0.0004	0.0005	0.0006	0.0002
Barium	Total	mg/L	<0.002	0.055	0.053	0.001
Beryllium	Total	mg/L	<0.0002	<0.0001	<0.0002	0.0001
Bismuth	Total	mg/L	<0.001	<0.0005	<0.001	0.0005
Boron	Total	mg/L	0.004	0.003	<0.004	0.002
Cadmium	Total	mg/L	<0.00002	0.00014	0.0002	0.00001
Chromium	Total	mg/L	<0.001	0.0008	<0.001	0.0005
Cobalt	Total	mg/L	<0.0002	0.0054	0.0052	0.0001
Copper	Total	mg/L	0.003	0.007	0.007	0.001
Lead	Total	mg/L	<0.0002	0.0047	0.0027	0.0001
Lithium	Total	mg/L	<0.002	0.003	0.002	0.001
Molybdenum	Total	mg/L	<0.002	<0.001	<0.002	0.001
Nickel	Total	mg/L	<0.001	0.0113	0.011	0.0005
Selenium	Total	mg/L	<0.0004	0.0002	<0.0004	0.0002
Silver	Total	mg/L	<0.00002	0.00001	<0.00002	0.00001
Strontium	Total	mg/L	<0.002	0.060	0.060	0.001
Thallium	Total	mg/L	<0.0001	<0.00005	<0.0001	0.00005
Tin	Total	mg/L	<0.002	<0.001	<0.002	0.001
Titanium	Total	mg/L	<0.001	0.0020	0.0021	0.0005
Uranium	Total	mg/L	<0.001	<0.0005	<0.001	0.0005
Vanadium	Total	mg/L	<0.0002	0.0002	<0.0002	0.0001
Zinc	Total	mg/L	0.002	0.010	0.01	0.001
Zirconium	Total	mg/L	<0.002	<0.001	<0.002	0.001
Physical and Aggregate Properties						
Turbidity		NTU	1.3	4.6	4.4	0.1
Solids	Total Suspended	mg/L	<2	<2	5	1
Routine Water						
pH			6.47	6.69	6.71	
Temperature of observed		°C	19.0	19.2	19.0	

Bodycote TESTING GROUP

Analytical Report

Bill To:	Gartner Lee Limited	Project:		Lot ID:	**619666**
Report To:	Gartner Lee Limited	ID:	70562	Control Number:	
	6400 Roberts Street, Suite 490	Name:		Date Received:	May 20, 2008
	Burnaby, BC, Canada	Location:	Cullaton Lake	Date Reported:	May 27, 2008
	V5G 4C9	LSD:		Report Number:	1120676
Attn:	Sharleen Hamm	P.O.:			
Sampled By:	JS	Acct code:			
Company:	Gartner Lee				

			Reference Number	619666-1	619666-2	619666-3	
			Sample Date	May 15, 2008	May 15, 2008	May 15, 2008	
			Sample Location				
			Sample Description	SW40	SW26-B	SW26-T	
			Matrix	Water	Water	Water	
Analyte		**Units**		**Results**	**Results**	**Results**	Nominal Detection Limit
Routine Water - Continued							
pH							
Electrical Conductivity		µS/cm at 25 C		1	150	148	1
Calcium	Dissolved	mg/L		<0.2	17.1	16.8	0.2
Magnesium	Dissolved	mg/L		<0.2	4.6	4.6	0.2
Sodium	Dissolved	mg/L		<0.4	2.8	2.9	0.4
Potassium	Dissolved	mg/L		<0.4	2.2	2.2	0.4
Iron	Dissolved	mg/L		<0.01	0.29	0.31	0.01
Manganese	Dissolved	mg/L		<0.005	0.292	0.289	0.005
Chloride	Dissolved	mg/L		<0.4	0.9	1.7	0.4
Nitrate - N		mg/L		<0.01	0.03	0.03	0.01
Nitrite - N		mg/L		<0.005	<0.005	<0.005	0.005
Nitrate and Nitrite - N		mg/L		<0.01	0.03	0.03	0.01
Sulfate (SO4)	Dissolved	mg/L		<0.9	44.5	45.0	0.9
Hydroxide		mg/L		<5	<5	<5	5
Carbonate		mg/L		<6	<6	<6	6
Bicarbonate		mg/L		<5	24	25	5
P-Alkalinity	as CaCO3	mg/L		<5	<5	<5	5
T-Alkalinity	as CaCO3	mg/L		<5	20	21	5
Total Dissolved Solids	Calculated	mg/L		<6	84	86	1
Hardness	Dissolved as CaCO3	mg/L		<1	62	61	
Ionic Balance	Dissolved	%		NA	100	100	

Bodycote TESTING GROUP

Analytical Report

Bill To:	Gartner Lee Limited	Project:	
Report To:	Gartner Lee Limited	ID:	70562
	6400 Roberts Street, Suite 490	Name:	
	Burnaby, BC, Canada	Location:	Cullaton Lake
	V5G 4C9	LSD:	
Attn:	Sharleen Hamm	P.O.:	
Sampled By:	JS	Acct code:	
Company:	Gartner Lee		

Lot ID:	**619666**
Control Number:	
Date Received:	May 20, 2008
Date Reported:	May 27, 2008
Report Number:	1120676

		Reference Number	619666-4	619666-5	619666-6	
		Sample Date	May 15, 2008	May 15, 2008	May 15, 2008	
		Sample Location				
		Sample Description	SW27	Travel Blank	SW25-B3	
		Matrix	Water	Water	Water	
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Inorganic Nonmetallic Parameters						
Ammonium - N		mg/L	0.61	<0.05	0.05	0.05
Kjeldahl Nitrogen	Total	mg/L	2.02	<0.06	0.65	0.06
Phosphorus	Total	mg/L	0.09	<0.05	<0.05	0.05
Orthophosphate-P	Dissolved	mg/L	0.08	<0.01	0.06	0.01
Organic Carbon	Total Nonpurgeable	mg/L	39.2	0.5	18.1	0.5
Organic Carbon	Dissolved Nonpurgeable	mg/L	30.0	<0.5	15.9	0.5
Cyanide	Total	mg/L	0.002	0.001	0.001	0.001
Metals Dissolved						
Silicon	Dissolved	mg/L	6.91	<0.05	5.56	0.05
Sulfur	Dissolved	mg/L	4.8	<0.3	17.2	0.3
Mercury	Dissolved	mg/L	0.0001	<0.0001	<0.0001	0.0001
Aluminum	Dissolved	mg/L	0.305	<0.005	0.296	0.005
Antimony	Dissolved	mg/L	0.0005	0.0006	0.0004	0.0002
Arsenic	Dissolved	mg/L	0.0028	<0.0002	0.0007	0.0002
Barium	Dissolved	mg/L	0.088	<0.001	0.055	0.001
Beryllium	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bismuth	Dissolved	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Boron	Dissolved	mg/L	<0.002	<0.002	0.002	0.002
Cadmium	Dissolved	mg/L	0.00003	<0.00001	0.00016	0.00001
Chromium	Dissolved	mg/L	0.0024	<0.0005	0.0011	0.0005
Cobalt	Dissolved	mg/L	0.0069	<0.0001	0.0086	0.0001
Copper	Dissolved	mg/L	0.004	<0.001	0.01	0.001
Lead	Dissolved	mg/L	0.0004	<0.0001	0.0003	0.0001
Lithium	Dissolved	mg/L	0.002	<0.001	0.003	0.001
Molybdenum	Dissolved	mg/L	<0.001	<0.001	<0.001	0.001
Nickel	Dissolved	mg/L	0.0128	<0.0005	0.0151	0.0005
Selenium	Dissolved	mg/L	<0.0002	<0.0002	<0.0002	0.0002
Silver	Dissolved	mg/L	0.00001	<0.00001	<0.00001	0.00001
Strontium	Dissolved	mg/L	0.078	0.001	0.068	0.001
Thallium	Dissolved	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Tin	Dissolved	mg/L	<0.001	<0.001	<0.001	0.001
Titanium	Dissolved	mg/L	0.0033	<0.0005	0.0019	0.0005
Uranium	Dissolved	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium	Dissolved	mg/L	0.0008	<0.0001	0.0002	0.0001
Zinc	Dissolved	mg/L	0.005	<0.001	0.017	0.001
Metals Total						
Calcium	Total	mg/L	20.8	<0.2	19.4	0.2
Iron	Total	mg/L	13	<0.1	0.6	0.1

Bodycote TESTING GROUP

Analytical Report

Bill To:	Gartner Lee Limited	Project:	
Report To:	Gartner Lee Limited	ID:	70562
	6400 Roberts Street, Suite 490	Name:	
	Burnaby, BC, Canada	Location:	Cullaton Lake
	V5G 4C9	LSD:	
Attn:	Sharleen Hamm	P.O.:	
Sampled By:	JS	Acct code:	
Company:	Gartner Lee		

Lot ID: **619666**
Control Number:
Date Received: May 20, 2008
Date Reported: May 27, 2008
Report Number: 1120676

	Reference Number	619666-4	619666-5	619666-6	
	Sample Date	May 15, 2008	May 15, 2008	May 15, 2008	
	Sample Location				
	Sample Description	SW27	Travel Blank	SW25-B3	
	Matrix	Water	Water	Water	
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Metals Total - Continued						
Magnesium	Total	mg/L	5.1	<0.1	5.0	0.1
Manganese	Total	mg/L	2.04	<0.005	0.318	0.005
Potassium	Total	mg/L	2.8	<0.4	2.6	0.4
Silicon	Total	mg/L	6.93	<0.05	5.30	0.05
Sodium	Total	mg/L	3.3	<0.4	2.8	0.4
Sulfur	Total	mg/L	5.2	<0.3	17.5	0.3
Mercury	Total	ug/L	<0.01	<0.01	<0.01	0.01
Aluminum	Total	mg/L	0.359	<0.005	0.351	0.005
Antimony	Total	mg/L	<0.0004	<0.0002	<0.0002	0.0002
Arsenic	Total	mg/L	0.0027	<0.0002	0.0006	0.0002
Barium	Total	mg/L	0.090	<0.001	0.058	0.001
Beryllium	Total	mg/L	<0.0002	<0.0001	<0.0001	0.0001
Bismuth	Total	mg/L	<0.001	<0.0005	<0.0005	0.0005
Boron	Total	mg/L	<0.004	<0.002	0.002	0.002
Cadmium	Total	mg/L	0.00003	<0.00001	0.00016	0.00001
Chromium	Total	mg/L	0.0020	<0.0005	0.001	0.0005
Cobalt	Total	mg/L	0.0072	<0.0001	0.0076	0.0001
Copper	Total	mg/L	0.004	<0.001	0.009	0.001
Lead	Total	mg/L	<0.0002	<0.0001	0.0004	0.0001
Lithium	Total	mg/L	0.002	<0.001	0.003	0.001
Molybdenum	Total	mg/L	<0.002	<0.001	<0.001	0.001
Nickel	Total	mg/L	0.013	<0.0005	0.0138	0.0005
Selenium	Total	mg/L	<0.0004	<0.0002	<0.0002	0.0002
Silver	Total	mg/L	0.00002	<0.00001	<0.00001	0.00001
Strontium	Total	mg/L	0.080	<0.001	0.067	0.001
Thallium	Total	mg/L	<0.0001	<0.00005	<0.00005	0.00005
Tin	Total	mg/L	<0.002	<0.001	<0.001	0.001
Titanium	Total	mg/L	0.0039	<0.0005	0.0020	0.0005
Uranium	Total	mg/L	<0.001	<0.0005	<0.0005	0.0005
Vanadium	Total	mg/L	0.0008	<0.0001	0.0002	0.0001
Zinc	Total	mg/L	0.004	<0.001	0.013	0.001
Zirconium	Total	mg/L	<0.002	<0.001	<0.001	0.001
Physical and Aggregate Properties						
Turbidity		NTU	17.6	0.6	2.4	0.1
Solids	Total Suspended	mg/L	33	<2	<2	1
Routine Water						
pH			6.96	5.75	6.59	
Temperature of observed		°C	18.9	19.0	19.2	

Bodycote TESTING GROUP

Analytical Report

Bill To:	Gartner Lee Limited	Project:		Lot ID:	**619666**
Report To:	Gartner Lee Limited	ID:	70562	Control Number:	
	6400 Roberts Street, Suite 490	Name:		Date Received:	May 20, 2008
	Burnaby, BC, Canada	Location:	Cullaton Lake	Date Reported:	May 27, 2008
	V5G 4C9	LSD:		Report Number:	1120676
Attn:	Sharleen Hamm	P.O.:			
Sampled By:	JS	Acct code:			
Company:	Gartner Lee				

			Reference Number	619666-4	619666-5	619666-6	
			Sample Date	May 15, 2008	May 15, 2008	May 15, 2008	
			Sample Location				
			Sample Description	SW27	Travel Blank	SW25-B3	
			Matrix	Water	Water	Water	
Analyte		**Units**		**Results**	**Results**	**Results**	Nominal Detection Limit
Routine Water - Continued							
pH							
Electrical Conductivity		µS/cm at 25 C		154	1	167	1
Calcium	Dissolved	mg/L		20.1	<0.2	19.0	0.2
Magnesium	Dissolved	mg/L		5.2	<0.2	5.3	0.2
Sodium	Dissolved	mg/L		3.5	<0.4	3.2	0.4
Potassium	Dissolved	mg/L		2.4	<0.4	2.5	0.4
Iron	Dissolved	mg/L		10.9	0.02	0.48	0.01
Manganese	Dissolved	mg/L		1.97	<0.005	0.297	0.005
Chloride	Dissolved	mg/L		1.0	<0.4	7.1	0.4
Nitrate - N		mg/L		0.01	<0.01	0.10	0.01
Nitrite - N		mg/L		<0.005	<0.005	<0.005	0.005
Nitrate and Nitrite - N		mg/L		0.01	<0.01	0.10	0.01
Sulfate (SO4)	Dissolved	mg/L		14	<0.9	51.8	0.9
Hydroxide		mg/L		<5	<5	<5	5
Carbonate		mg/L		<6	<6	<6	6
Bicarbonate		mg/L		73	<5	26	5
P-Alkalinity	as CaCO3	mg/L		<5	<5	<5	5
T-Alkalinity	as CaCO3	mg/L		60	<5	22	5
Total Dissolved Solids	Calculated	mg/L		83	<6	102	1
Hardness	Dissolved as CaCO3	mg/L		72	<1	69	
Ionic Balance	Dissolved	%		111	NA	92	

Bodycote TESTING GROUP

Analytical Report

Bill To:	Gartner Lee Limited	Project:	
Report To:	Gartner Lee Limited	ID:	70562
	6400 Roberts Street, Suite 490	Name:	
	Burnaby, BC, Canada	Location:	Cullaton Lake
	V5G 4C9	LSD:	
Attn:	Sharleen Hamm	P.O.:	
Sampled By:	JS	Acct code:	
Company:	Gartner Lee		

Lot ID: **619666**
Control Number:
Date Received: May 20, 2008
Date Reported: May 27, 2008
Report Number: 1120676

		Reference Number	619666-7	619666-8	619666-9	
		Sample Date	May 15, 2008	May 15, 2008	May 15, 2008	
		Sample Location				
		Sample Description	SW25-B2	SW25-B1	SW25-T	
		Matrix	Water	Water	Water	
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Inorganic Nonmetallic Parameters						
Ammonium - N		mg/L	<0.05	0.06	<0.05	0.05
Kjeldahl Nitrogen	Total	mg/L	0.70	0.57	0.64	0.06
Phosphorus	Total	mg/L	<0.05	<0.05	<0.05	0.05
Orthophosphate-P	Dissolved	mg/L	0.06	0.06	0.05	0.01
Organic Carbon	Total Nonpurgeable	mg/L	18.0	17.5	17.4	0.5
Organic Carbon	Dissolved Nonpurgeable	mg/L	15.8	16.2	15.2	0.5
Cyanide	Total	mg/L	0.001	0.001	0.001	0.001
Metals Dissolved						
Silicon	Dissolved	mg/L	5.49	5.45	5.28	0.05
Sulfur	Dissolved	mg/L	16.9	16.8	15.6	0.3
Mercury	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Aluminum	Dissolved	mg/L	0.299	0.303	0.277	0.005
Antimony	Dissolved	mg/L	0.0005	0.0004	0.0005	0.0002
Arsenic	Dissolved	mg/L	0.0007	0.0008	0.0007	0.0002
Barium	Dissolved	mg/L	0.055	0.056	0.055	0.001
Beryllium	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Bismuth	Dissolved	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Boron	Dissolved	mg/L	0.002	0.002	0.003	0.002
Cadmium	Dissolved	mg/L	0.00017	0.00017	0.00022	0.00001
Chromium	Dissolved	mg/L	0.0012	0.0012	0.0012	0.0005
Cobalt	Dissolved	mg/L	0.0074	0.0071	0.0056	0.0001
Copper	Dissolved	mg/L	0.009	0.009	0.008	0.001
Lead	Dissolved	mg/L	0.0006	0.0006	0.0013	0.0001
Lithium	Dissolved	mg/L	0.003	0.003	0.003	0.001
Molybdenum	Dissolved	mg/L	<0.001	<0.001	<0.001	0.001
Nickel	Dissolved	mg/L	0.0144	0.0142	0.0132	0.0005
Selenium	Dissolved	mg/L	<0.0002	<0.0002	<0.0002	0.0002
Silver	Dissolved	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Strontium	Dissolved	mg/L	0.070	0.068	0.067	0.001
Thallium	Dissolved	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Tin	Dissolved	mg/L	<0.001	<0.001	<0.001	0.001
Titanium	Dissolved	mg/L	0.0019	0.0019	0.0019	0.0005
Uranium	Dissolved	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium	Dissolved	mg/L	0.0002	0.0002	0.0002	0.0001
Zinc	Dissolved	mg/L	0.016	0.017	0.018	0.001
Metals Total						
Calcium	Total	mg/L	19.2	19.2	18.5	0.2
Iron	Total	mg/L	0.6	0.6	0.6	0.1

Bodycote TESTING GROUP

Analytical Report

Bill To:	Gartner Lee Limited	Project:		Lot ID:	**619666**
Report To:	Gartner Lee Limited	ID:	70562	Control Number:	
	6400 Roberts Street, Suite 490	Name:		Date Received:	May 20, 2008
	Burnaby, BC, Canada	Location:	Cullaton Lake	Date Reported:	May 27, 2008
	V5G 4C9	LSD:		Report Number:	1120676
Attn:	Sharleen Hamm	P.O.:			
Sampled By:	JS	Acct code:			
Company:	Gartner Lee				

			Reference Number	619666-7	619666-8	619666-9	
			Sample Date	May 15, 2008	May 15, 2008	May 15, 2008	
			Sample Location				
			Sample Description	SW25-B2	SW25-B1	SW25-T	
			Matrix	Water	Water	Water	
Analyte		**Units**		**Results**	**Results**	**Results**	Nominal Detection Limit
Metals Total - Continued							
Magnesium	Total	mg/L		5.0	5.0	4.7	0.1
Manganese	Total	mg/L		0.302	0.304	0.261	0.005
Potassium	Total	mg/L		2.6	2.6	2.5	0.4
Silicon	Total	mg/L		4.86	5.41	5.18	0.05
Sodium	Total	mg/L		2.7	2.7	2.6	0.4
Sulfur	Total	mg/L		17.3	17.5	16.3	0.3
Mercury	Total	ug/L		<0.01	<0.01	<0.01	0.01
Aluminum	Total	mg/L		0.329	0.344	0.334	0.005
Antimony	Total	mg/L		<0.0002	<0.0002	<0.0002	0.0002
Arsenic	Total	mg/L		0.0006	0.0007	0.0007	0.0002
Barium	Total	mg/L		0.055	0.057	0.055	0.001
Beryllium	Total	mg/L		<0.0001	<0.0001	<0.0001	0.0001
Bismuth	Total	mg/L		<0.0005	<0.0005	<0.0005	0.0005
Boron	Total	mg/L		0.003	0.003	0.003	0.002
Cadmium	Total	mg/L		0.00016	0.00016	0.00022	0.00001
Chromium	Total	mg/L		0.0010	0.001	0.001	0.0005
Cobalt	Total	mg/L		0.0067	0.0069	0.0055	0.0001
Copper	Total	mg/L		0.009	0.009	0.008	0.001
Lead	Total	mg/L		0.0006	0.0003	0.0013	0.0001
Lithium	Total	mg/L		0.003	0.003	0.003	0.001
Molybdenum	Total	mg/L		<0.001	<0.001	<0.001	0.001
Nickel	Total	mg/L		0.0133	0.0135	0.0128	0.0005
Selenium	Total	mg/L		<0.0002	<0.0002	<0.0002	0.0002
Silver	Total	mg/L		<0.00001	<0.00001	<0.00001	0.00001
Strontium	Total	mg/L		0.066	0.066	0.065	0.001
Thallium	Total	mg/L		<0.00005	<0.00005	<0.00005	0.00005
Tin	Total	mg/L		<0.001	<0.001	<0.001	0.001
Titanium	Total	mg/L		0.0021	0.0022	0.0025	0.0005
Uranium	Total	mg/L		<0.0005	<0.0005	<0.0005	0.0005
Vanadium	Total	mg/L		0.0002	0.0002	0.0002	0.0001
Zinc	Total	mg/L		0.012	0.012	0.014	0.001
Zirconium	Total	mg/L		<0.001	<0.001	<0.001	0.001
Physical and Aggregate Properties							
Turbidity		NTU		1.5	1.6	2.2	0.1
Solids	Total Suspended	mg/L		<2	<2	2	1
Routine Water							
pH				6.60	6.62	6.70	
Temperature of observed		°C		19.4	19.6	20.1	

Bodycote TESTING GROUP

Analytical Report

Bill To:	Gartner Lee Limited	Project:		Lot ID:	**619666**
Report To:	Gartner Lee Limited	ID:	70562	Control Number:	
	6400 Roberts Street, Suite 490	Name:		Date Received:	May 20, 2008
	Burnaby, BC, Canada	Location:	Cullaton Lake	Date Reported:	May 27, 2008
	V5G 4C9	LSD:		Report Number:	1120676
Attn:	Sharleen Hamm	P.O.:			
Sampled By:	JS	Acct code:			
Company:	Gartner Lee				

			Reference Number	619666-7	619666-8	619666-9	
			Sample Date	May 15, 2008	May 15, 2008	May 15, 2008	
			Sample Location				
			Sample Description	SW25-B2	SW25-B1	SW25-T	
			Matrix	Water	Water	Water	
Analyte		**Units**		**Results**	**Results**	**Results**	Nominal Detection Limit
Routine Water - Continued							
pH							
Electrical Conductivity		µS/cm at 25 C		163	164	158	1
Calcium	Dissolved	mg/L		18.7	18.4	18.0	0.2
Magnesium	Dissolved	mg/L		5.2	5.2	4.9	0.2
Sodium	Dissolved	mg/L		3.1	3.1	3.1	0.4
Potassium	Dissolved	mg/L		2.4	2.5	2.4	0.4
Iron	Dissolved	mg/L		0.41	0.42	0.37	0.01
Manganese	Dissolved	mg/L		0.312	0.302	0.258	0.005
Chloride	Dissolved	mg/L		1.3	5.0	1.2	0.4
Nitrate - N		mg/L		0.04	0.11	0.03	0.01
Nitrite - N		mg/L		<0.005	0.005	<0.005	0.005
Nitrate and Nitrite - N		mg/L		0.04	0.11	0.03	0.01
Sulfate (SO4)	Dissolved	mg/L		50.6	50.4	46.7	0.9
Hydroxide		mg/L		<5	<5	<5	5
Carbonate		mg/L		<6	<6	<6	6
Bicarbonate		mg/L		24	23	25	5
P-Alkalinity	as CaCO3	mg/L		<5	<5	<5	5
T-Alkalinity	as CaCO3	mg/L		20	19	21	5
Total Dissolved Solids	Calculated	mg/L		93	96	89	1
Hardness	Dissolved as CaCO3	mg/L		68	67	65	
Ionic Balance	Dissolved	%		100	98	100	

Approved by:

Patrick Visser
Operations Manager

Bodycote TESTING GROUP

Methodology and Notes

Bill To:	Gartner Lee Limited	Project:	
Report To:	Gartner Lee Limited	ID:	70562
	6400 Roberts Street, Suite 490	Name:	
	Burnaby, BC, Canada	Location:	Cullaton Lake
	V5G 4C9	LSD:	
Attn:	Sharleen Hamm	P.O.:	
Sampled By:	JS	Acct code:	
Company:	Gartner Lee		

Lot ID:	**619666**
Control Number:	
Date Received:	May 20, 2008
Date Reported:	May 27, 2008
Report Number:	1120676

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	*	Conductivity, 2510	22-May-08	BTG Edmonton
Alkalinity, pH, and EC in water	APHA	*	Electrometric Method, 4500-H+ B	22-May-08	BTG Edmonton
Alkalinity, pH, and EC in water	APHA	*	Titration Method, 2320 B	22-May-08	BTG Edmonton
Ammonium-N in Water	APHA	*	Automated Phenate Method, 4500-NH3 G	23-May-08	BTG Edmonton
Anions (Routine) by Ion Chromatography	APHA	*	Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	22-May-08	BTG Edmonton
Approval-Edmonton	APHA		Checking Correctness of Analyses, 1030 E	21-May-08	BTG Edmonton
Carbon Organic (Dissolved) in water (DOC)	APHA		High-Temperature Combustion Method, 5310 B	22-May-08	BTG Edmonton
Carbon Organic (Total) in water (TOC)	APHA		High-Temperature Combustion Method, 5310 B	22-May-08	BTG Edmonton
Chloride in Water	APHA	*	Automated Ferricyanide Method, 4500-Cl- E	22-May-08	BTG Edmonton
Cyanide (Total) in water	US EPA	*	US EPA method, 335.3	22-May-08	BTG Edmonton
Kjeldahl Nitrogen & Phosphorus (Total) in Water	APHA	*	Automated Ascorbic Acid Reduction Method, 4500-P F	21-May-08	BTG Edmonton
Mercury (Dissolved) in water	APHA	*	Cold Vapour Atomic Absorption Spectrometric Method, 3112 B	22-May-08	BTG Edmonton
Mercury (Dissolved) in water	APHA	*	Cold Vapour Atomic Absorption Spectrometric Method, 3112 B	23-May-08	BTG Edmonton
Mercury Low Level (Total) in water	EPA	*	Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	22-May-08	BTG Surrey
Metals ICP-MS (Dissolved) in water	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	21-May-08	BTG Edmonton
Metals ICP-MS (Total) in water	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	21-May-08	BTG Edmonton
Metals Trace (Dissolved) in water	APHA		Hardness by Calculation, 2340 B	21-May-08	BTG Edmonton
Metals Trace (Dissolved) in water	APHA	*	Inductively Coupled Plasma (ICP) Method, 3120 B	21-May-08	BTG Edmonton
Metals Trace (Total) in water	APHA	*	Inductively Coupled Plasma (ICP) Method, 3120 B	21-May-08	BTG Edmonton
Orthophosphate-P in Water	APHA	*	Automated Ascorbic Acid Reduction Method, 4500-P F	23-May-08	BTG Edmonton
Solids Suspended (Total, Fixed and Volatile)	APHA	*	Total Suspended Solids Dried at 103-105'C, 2540 D	21-May-08	BTG Edmonton
Total and Kjeldahl Nitrogen (Total) in Water	ISO	*	Water Quality - Determination of nitrogen, ISO/TR 11905-2	22-May-08	BTG Edmonton
Turbidity in Water	APHA	*	Nephelometric Method, 2130 B	21-May-08	BTG Edmonton

** Bodycote method(s) based on reference method*

Bodycote TESTING GROUP

Methodology and Notes

Bill To:	Gartner Lee Limited	Project:	
Report To:	Gartner Lee Limited	ID:	70562
	6400 Roberts Street, Suite 490	Name:	
	Burnaby, BC, Canada	Location:	Cullaton Lake
	V5G 4C9	LSD:	
Attn:	Sharleen Hamm	P.O.:	
Sampled By:	JS	Acct code:	
Company:	Gartner Lee		

Lot ID:	**619666**
Control Number:	
Date Received:	May 20, 2008
Date Reported:	May 27, 2008
Report Number:	1120676

References

APHA	Standard Methods for the Examination of Water and Wastewater
EPA	Environmental Protection Agency Test Methods - US
ISO	International Organization for Standardization
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Upon receipt, samples had exceeded recommended holding time for analysis.
- Some Trace total metal results were less than dissolved metal results for samples 619666 (1-9). The results were verified and are within expected measurement uncertainty.
- Some MS total metal results were less than dissolved metal results for sample 619666-1 to 9. The results were verified. Total water was run from the routine bottle and dissolved from the field filtered bottle.
- Sample 619666-1; 2709842 Sample 619666-1There was insufficient sample volume to reach a detection limit of 1 mg/L for TSS analysis. The detection limit was adjusted accordingly.
- Sample 619666-2; 2709849 Sample 619666-2 There was insufficient sample volume to reach a detection limit of 1 mg/L for TSS analysis. The detection limit was adjusted accordingly.
- Sample 619666-4; 2709851 The ion balance was outside the range 90 - 110% for sample 619666-4. The ion balance can be variable in samples with TDS less than 100 mg/L.
- Sample 619666-5; 2709852 Sample 619666-5 There was insufficient sample volume to reach a detection limit of 1 mg/L for TSS analysis. The detection limit was adjusted accordingly.
- Sample 619666-6; 2709853 Sample 619666-6 There was insufficient sample volume to reach a detection limit of 1 mg/L for TSS analysis. The detection limit was adjusted accordingly.
- Sample 619666-7; 2709854 Sample 619666-7 There was insufficient sample volume to reach a detection limit of 1 mg/L for TSS analysis. The detection limit was adjusted accordingly.
- Sample 619666-8; 2709855 Sample 619666-8 There was insufficient sample volume to reach a detection limit of 1 mg/L for TSS analysis. The detection limit was adjusted accordingly.

Your P.O. #: 70562
Your Project #: CULLATON LAKE
Your C.O.C. #: 28853-03, 28853-02, 28853-01

Attention: Kai Woloshyn
GARTNER LEE LTD.
2251 - 2nd AVENUE
WHITEHORSE, YT
CANADA Y1A 5W1

Report Date: 2008/07/16

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A832513
Received: 2008/07/03, 09:15

Sample Matrix: Water
Samples Received: 21

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Acidity pH 4.5 & pH 8.3 (1)	21	N/A	2008/07/09	BRN SOP-00281 R1.0	Based on SM-2310
Alkalinity - Water	21	2008/07/06	2008/07/06	BRN SOP-00264 R2.0	Based on SM2320B
Chloride by Automated Colourimetry	21	N/A	2008/07/07	BRN-SOP 00234 R1.0	Based on EPA 325.2
Cyanide (Total)	20	N/A	2008/07/09	BRN SOP-00226 R1.0	Based on EPA 9012AR1
Carbon (DOC)	19	N/A	2008/07/08	BRN SOP-00224 R3.0	Based on SM-5310C
Conductance - water	21	N/A	2008/07/06	BRN SOP-00264 R2.0	Based on SM-2510B
Hardness Total (calculated as CaCO3)	6	N/A	2008/07/10		
Hardness Total (calculated as CaCO3)	15	N/A	2008/07/11		
Hardness (calculated as CaCO3)	19	N/A	2008/07/11		
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	19	N/A	2008/10/07	BRN SOP-00204	Based on EPA 200.8
Elements by ICPMS Low Level (dissolved) (1)	19	N/A	2008/10/07	BRN SOP-00204	Based on EPA 200.8
Elements by ICPMS Low Level (total) (1)	6	2008/07/09	2008/07/09	BRN SOP-00204	Based on EPA 200.8
Elements by ICPMS Low Level (total) (1)	10	2008/07/09	2008/10/07	BRN SOP-00204	Based on EPA 200.8
Elements by ICPMS Low Level (total) (1)	5	2008/07/09	2008/11/07	BRN SOP-00204	Based on EPA 200.8
Na, K, Ca, Mg, S by CRC ICPMS (total)	6	2008/07/09	2008/07/09	BRN SOP-00204	Based on EPA 200.8
Na, K, Ca, Mg, S by CRC ICPMS (total)	10	2008/07/09	2008/10/07	BRN SOP-00204	Based on EPA 200.8
Na, K, Ca, Mg, S by CRC ICPMS (total)	5	2008/07/09	2008/11/07	BRN SOP-00204	Based on EPA 200.8
Nitrogen (Total)	20	2008/07/08	2008/07/09	BRN SOP-00242 R2.0	Based on SM-4500N C
Ammonia-N	20	N/A	2008/07/09	BRN SOP-00232 R3.0	SM-4500 NH3 G
Ammonia (N)	1	N/A	2008/07/09	BRN SOP-00221 R3.0	Based on SM-4500MH3G
Nitrate+Nitrite (N) (low level	21	N/A	2008/07/07	BRN SOP-00233 R1.0	Based on EPA 353.2
Nitrite (N) (low level)	21	N/A	2008/07/07	BRN SOP-00233 R1.0	EPA 353.2
Nitrogen - Nitrate (as N)	20	N/A	2008/07/09		
Nitrogen - Nitrate (as N)	1	N/A	2008/07/10		
Filter and HNO3 Preserve for Metals	19	N/A	2008/07/08	BRN WI-00006 R1.0	Based on EPA 200.2
pH Water	21	N/A	2008/07/06	BRN SOP-00264 R2.0	Based on SM-4500H+B
Orthophosphate by Konelab (1)	21	N/A	2008/07/08	BRN SOP-00235 R3.0	SM 4500 PF
Sulphate by Automated Colourimetry	21	N/A	2008/07/07	BRN-SOP 00243 R1.0	Based on EPA 375.4
Total Dissolved Solids (Filt. Residue)	21	N/A	2008/07/07	BRN-00276 R2.0	APHA 2540
TKN (Calc. TN, N/N) total	20	N/A	2008/07/10		
Carbon (Total Organic)	14	N/A	2008/07/07	BRN SOP-00224 R3.0	Based on SM-5310C
Carbon (Total Organic)	6	N/A	2008/07/08	BRN SOP-00224 R3.0	Based on SM-5310C
Total Suspended Solids	21	N/A	2008/07/07	BRN SOP-00277 R2.0	Based on SM-2540 D
Turbidity	21	N/A	2008/07/07	BRN SOP-00265 R3.0	SM - 2130B

* Results relate only to the items tested.

(1) SCC/CAEAL

../2

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

Encryption Key

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

ROB MACARTHUR, BBY Customer Service
Email: rob.macarthur@maxxamanalytics.com
Phone# (604) 444-4808 Ext:253

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CAEAL have approved this reporting process and electronic report format.

Burnaby: 8577 Commerce Court V5A 4N5 Telephone(604) 444-4808 Fax(604) 444-4511

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		K53113		K53115	K53116	K53117	K53118	K53119	K53120	K53121		
		2008/06/27		2008/06/27	2008/06/27	2008/06/27	2008/06/27	2008/06/27	2008/06/28	2008/06/28		
	Units	**SW7**	**QC Batch**	**SW40**	**SW41**	**SW9**	**SW32**	**SW8**	**SW2B**	**SW16D**	**RDL**	**QC Batch**
CONVENTIONALS												
Cyanide + Thiocyanate	mg/L	0.0008	2421190	<0.0005	0.0006	0.0006	0.0008	0.0006	0.0007	0.0010	0.0005	2421190
Misc. Inorganics												
Acidity (pH 4.5)	mg/L	<0.5	2420289	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	2420289
Acidity (pH 8.3)	mg/L	2.7	2420289	1.6	3.0	3.2	3.2	2.9	3.5	2.2	0.5	2420289
Preparation												
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	N/A	ONSITE
Calculated Parameters												
Nitrate (N)	mg/L	0.008	2408830	0.013	0.002	0.007	<0.002	0.003	<0.002	0.005	0.002	2408830
Misc. Inorganics												
Dissolved Organic Carbon (C)	mg/L	7.1	2416807	<0.5	7.5	7.3	9.0	7.4	8.3	8.5	0.5	2416807
Alkalinity (Total as CaCO3)	mg/L	1.3	2411985	<0.5	0.9	1.1	4.1	1.1	3.2	15	0.5	2411985
Total Organic Carbon (C)	mg/L	7.9	2413945	<0.5	7.2	6.6	8.6	8.1	8.1	8.5	0.5	2413945
Alkalinity (PP as CaCO3)	mg/L	<0.5	2411985	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	2411985
Bicarbonate (HCO3)	mg/L	1.6	2411985	<0.5	1.0	1.4	5.1	1.4	3.9	18	0.5	2411985
Carbonate (CO3)	mg/L	<0.5	2411985	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	2411985
Hydroxide (OH)	mg/L	<0.5	2411985	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	2411985
Anions												
Orthophosphate (P)	mg/L	0.002	2413835	0.002	0.003	0.004	0.002	0.002	0.002	0.009	0.001	2413835
Dissolved Sulphate (SO4)	mg/L	3.7	2413063	<0.5	4.5	8.5	<0.5	3.8	0.9	<0.5	0.5	2413063
Dissolved Chloride (Cl)	mg/L	<0.5	2413066	<0.5	1.2	37	5.3	1.7	0.9	0.7	0.5	2413066
Nutrients												
Ammonia (N)	mg/L	0.05	2435217	<0.01	<0.01	0.22	<0.01	0.07	<0.01	0.02	0.01	2419609
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.23	2408977	0.08	0.23	0.21	0.24	0.25	0.26	0.24	0.02	2408977
Nitrate plus Nitrite (N)	mg/L	0.008	2414706	0.013	0.002	0.015	0.003	0.003	<0.002	0.005	0.002	2414706
Nitrite (N)	mg/L	<0.002	2414743	<0.002	<0.002	0.008	0.003	<0.002	<0.002	<0.002	0.002	2414743
Total Nitrogen (N)	mg/L	0.23	2419692	0.09	0.23	0.22	0.24	0.25	0.26	0.25	0.02	2419692
Physical Properties												
Conductivity	uS/cm	27	2411983	1	28	26	24	26	25	47	1	2411983
pH	pH Units	6.3	2411975	4.4	6.1	6.2	6.6	6.2	6.5	7.2		2411975
Physical Properties												
Total Suspended Solids	mg/L	2	2412781	<1	2	2	<1	2	<1	<1	1	2412781
Total Dissolved Solids	mg/L	26	2413064	<1	26	24	20	24	24	46	1	2413064
Turbidity	NTU	1.2	2413048	0.1	1.5	1.5	0.3	1.3	0.6	0.4	0.1	2413048

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		K53122	K53123	K53124	K53125	K53126	K53127		K53128	K53129		
		2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28		2008/06/28	2008/06/28		
	Units	**SW16U**	**SW13U**	**SW13D**	**SW2**	**SW24**	**TRIP BLANK**	**QC Batch**	**SW21-1**	**SW21-2**	**RDL**	**QC Batch**
CONVENTIONALS												
Cyanide + Thiocyanate	mg/L	0.0010	0.0015	0.0012	0.0009	<0.0005	<0.0005	2421190	0.0008	0.0010	0.0005	2421190
Misc. Inorganics												
Acidity (pH 4.5)	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2420289	<0.5	<0.5	0.5	2420289
Acidity (pH 8.3)	mg/L	2.2	2.7	3.0	2.6	1.8	1.6	2420289	2.0	1.7	0.5	2420289
Preparation												
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	ONSITE	FIELD	FIELD	N/A	ONSITE
Calculated Parameters												
Nitrate (N)	mg/L	0.003	<0.002	<0.002	0.002	0.010	0.002	2408830	0.004	0.004	0.002	2408830
Misc. Inorganics												
Dissolved Organic Carbon (C)	mg/L	8.2	12.3	12.6	8.6	3.8	0.7	2416807	6.8	6.2	0.5	2416807
Alkalinity (Total as CaCO3)	mg/L	15	6.6	5.7	3.4	3.0	<0.5	2411985	28	26	0.5	2411985
Total Organic Carbon (C)	mg/L	8.6	13.1	13.5	8.7	4.0	<0.5	2413945	7.2	8.1	0.5	2416822
Alkalinity (PP as CaCO3)	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2411985	<0.5	<0.5	0.5	2411985
Bicarbonate (HCO3)	mg/L	19	8.1	7.0	4.2	3.6	<0.5	2411985	35	32	0.5	2411985
Carbonate (CO3)	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2411985	<0.5	<0.5	0.5	2411985
Hydroxide (OH)	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2411985	<0.5	<0.5	0.5	2411985
Anions												
Orthophosphate (P)	mg/L	0.002	0.002	0.003	0.002	0.002	0.002	2413835	0.001	0.002	0.001	2413835
Dissolved Sulphate (SO4)	mg/L	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	2413063	1.5	1.3	0.5	2413063
Dissolved Chloride (Cl)	mg/L	0.7	0.8	2.1	0.8	4.2	0.9	2413066	0.7	0.8	0.5	2413066
Nutrients												
Ammonia (N)	mg/L	<0.01	0.05	<0.01	0.02	0.19	<0.01	2419609	0.02	0.04	0.01	2419609
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.25	0.28	0.31	0.25	0.16	<0.02	2408977	0.22	0.22	0.02	2408977
Nitrate plus Nitrite (N)	mg/L	0.003	<0.002	<0.002	0.002	0.010	0.002	2414706	0.004	0.004	0.002	2414706
Nitrite (N)	mg/L	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	2414743	<0.002	<0.002	0.002	2414743
Total Nitrogen (N)	mg/L	0.25	0.28	0.31	0.25	0.17	<0.02	2419692	0.22	0.22	0.02	2419692
Physical Properties												
Conductivity	uS/cm	47	32	33	23	18	1	2411983	73	67	1	2411983
pH	pH Units	7.2	6.8	6.8	6.5	6.7	4.4	2411975	7.5	7.4		2411975
Physical Properties												
Total Suspended Solids	mg/L	<1	<1	<1	1	<1	<1	2412781	1	<1	1	2412781
Total Dissolved Solids	mg/L	44	30	32	22	16	<1	2413064	48	48	1	2413064
Turbidity	NTU	0.5	0.5	0.5	0.9	0.5	<0.1	2413048	0.7	0.6	0.1	2413048

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		K53130			K53132			K53133		K53134	K53135		
		2008/06/28			2008/06/28			2008/06/28		2008/06/28	2008/06/28		
	Units	**SW21-3**	**RDL**	**QC Batch**	**SW38**	**RDL**	**QC Batch**	**SW37**	**RDL**	**SW18U**	**SW18D**	**RDL**	**QC Batch**
CONVENTIONALS													
Cyanide + Thiocyanate	mg/L	0.0008	0.0005	2421190	<0.0005	0.0005	2421190			0.0015	0.0014	0.0005	2421190
Misc. Inorganics													
Acidity (pH 4.5)	mg/L	<0.5	0.5	2420289	17.3	0.5	2420289	172	0.5	<0.5	<0.5	0.5	2420289
Acidity (pH 8.3)	mg/L	1.8	0.5	2420289	62.0	0.5	2420289	248	0.5	4.2	2.8	0.5	2420289
Preparation													
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE						FIELD	FIELD	N/A	ONSITE
Calculated Parameters													
Nitrate (N)	mg/L	0.003	0.002	2408830	0.007	0.002	2413179	0.792	0.002	<0.002	0.002	0.002	2408830
Misc. Inorganics													
Dissolved Organic Carbon (C)	mg/L	6.7	0.5	2416807						10.8	10.6	0.5	2416807
Alkalinity (Total as CaCO3)	mg/L	29	0.5	2411985	<0.5	0.5	2411985	<0.5	0.5	36	40	0.5	2411985
Total Organic Carbon (C)	mg/L	6.8	0.5	2416822				<0.5	0.5	10.9	10.7	0.5	2416822
Alkalinity (PP as CaCO3)	mg/L	<0.5	0.5	2411985	<0.5	0.5	2411985	<0.5	0.5	<0.5	<0.5	0.5	2411985
Bicarbonate (HCO3)	mg/L	35	0.5	2411985	<0.5	0.5	2411985	<0.5	0.5	44	48	0.5	2411985
Carbonate (CO3)	mg/L	<0.5	0.5	2411985	<0.5	0.5	2411985	<0.5	0.5	<0.5	<0.5	0.5	2411985
Hydroxide (OH)	mg/L	<0.5	0.5	2411985	<0.5	0.5	2411985	<0.5	0.5	<0.5	<0.5	0.5	2411985
Anions													
Orthophosphate (P)	mg/L	0.002	0.001	2413835	0.002	0.001	2413835	0.004	0.001	0.001	0.001	0.001	2413835
Dissolved Sulphate (SO4)	mg/L	1.1	0.5	2413063	160	5	2413063	350	5	6.2	11	0.5	2413063
Dissolved Chloride (Cl)	mg/L	<0.5	0.5	2413066	0.7	0.5	2413066	<0.5	0.5	<0.5	0.7	0.5	2413066
Nutrients													
Ammonia (N)	mg/L	0.04	0.01	2419609	<0.005	0.005	2419497	0.5	0.1	0.12	0.02	0.01	2419609
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.24	0.02	2408977				0.81	0.02	0.33	0.31	0.02	2408977
Nitrate plus Nitrite (N)	mg/L	0.003	0.002	2414706	0.007	0.002	2414706	0.792	0.002	<0.002	0.002	0.002	2414706
Nitrite (N)	mg/L	<0.002	0.002	2414743	<0.002	0.002	2414743	<0.002	0.002	<0.002	<0.002	0.002	2414743
Total Nitrogen (N)	mg/L	0.24	0.02	2419692				1.60	0.02	0.33	0.31	0.02	2419692
Physical Properties													
Conductivity	uS/cm	73	1	2411983	440	1	2411983	1300	1	99	110	1	2411983
pH	pH Units	7.5		2411975	3.7(1)		2411975	2.7(1)		7.4	7.5		2411975
Physical Properties													
Total Suspended Solids	mg/L	<1	1	2412781	<1	1	2412781	3	1	<1	<1	1	2412781
Total Dissolved Solids	mg/L	58	1	2413064	300	1	2413064	720	1	88	94	1	2413064
Turbidity	NTU	0.3	0.1	2413048	0.4	0.1	2413048	0.4	0.1	0.6	0.5	0.1	2413048

N/A = Not Applicable
RDL = Reportable Detection Limit
(1) - pH result is lower than the lowest standard (4 pH Units).

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		K53113	K53115	K53116	K53117	K53118	K53119	K53120	K53121	K53122		
		2008/06/27	2008/06/27	2008/06/27	2008/06/27	2008/06/27	2008/06/27	2008/06/28	2008/06/28	2008/06/28		
	Units	**SW7**	**SW40**	**SW41**	**SW9**	**SW32**	**SW8**	**SW2B**	**SW16D**	**SW16U**	**RDL**	**QC Batch**
Misc. Inorganics												
Dissolved Hardness (CaCO3)	mg/L	10.7	<0.5	11.1	10.9	11.7	10.4	10.9	23.3	24.4	0.5	2408829

RDL = Reportable Detection Limit

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		K53113	K53115	K53116	K53117	K53118	K53119	K53120	K53121	K53122		
		2008/06/27	2008/06/27	2008/06/27	2008/06/27	2008/06/27	2008/06/27	2008/06/28	2008/06/28	2008/06/28		
	Units	SW7	SW40	SW41	SW9	SW32	SW8	SW2B	SW16D	SW16U	RDL	QC Batch
Dissolved Metals by ICPMS												
Dissolved Aluminum (Al)	mg/L	0.120	0.0008	0.138	0.124	0.109	0.121	0.0918	0.0557	0.0567	0.0002	2420167
Dissolved Antimony (Sb)	mg/L	0.00002	<0.00002	0.00002	0.00002	0.00003	0.00003	0.00002	0.00004	0.00004	0.00002	2420167
Dissolved Arsenic (As)	mg/L	0.00031	<0.00002	0.00028	0.00031	0.00033	0.00029	0.00036	0.00052	0.00053	0.00002	2420167
Dissolved Barium (Ba)	mg/L	0.0119	<0.00002	0.0104	0.0103	0.0115	0.0101	0.0114	0.00860	0.00877	0.00002	2420167
Dissolved Beryllium (Be)	mg/L	0.00002	<0.00001	0.00002	0.00002	<0.00001	0.00002	0.00001	<0.00001	<0.00001	0.00001	2420167
Dissolved Bismuth (Bi)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2420167
Dissolved Boron (B)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2420167
Dissolved Cadmium (Cd)	mg/L	0.000028(1)	0.000010	0.000025	0.000017	0.000010	0.000020	0.000029	0.000314(1)	0.000008	0.000005	2420167
Dissolved Chromium (Cr)	mg/L	0.0003	<0.0001	0.0004	0.0003	0.0005	0.0003	0.0003	0.0002	0.0003	0.0001	2420167
Dissolved Cobalt (Co)	mg/L	0.00116	<0.000005	0.00136	0.00110	0.000077	0.00118	0.000150	0.000042	0.000047	0.000005	2420167
Dissolved Copper (Cu)	mg/L	0.00278	<0.00005	0.00262	0.00255	0.00209	0.00251	0.00172	0.00192	0.00186	0.00005	2420167
Dissolved Iron (Fe)	mg/L	0.119	<0.001	0.135	0.131	0.095	0.132	0.182	0.051	0.053	0.001	2420167
Dissolved Lead (Pb)	mg/L	0.000061	<0.000005	0.000027	0.000031	0.000018	0.000031	0.000029	0.000071(1)	0.000020	0.000005	2420167
Dissolved Lithium (Li)	mg/L	<0.0005	<0.0005	0.0006	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	2420167
Dissolved Manganese (Mn)	mg/L	0.0311	<0.00005	0.0384	0.0301	0.00088	0.0316	0.00964	0.00552	0.00564	0.00005	2420167
Dissolved Mercury (Hg)	mg/L	0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2420167
Dissolved Molybdenum (Mo)	mg/L	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00005	2420167
Dissolved Nickel (Ni)	mg/L	0.00315	<0.00002	0.00337	0.00313	0.00280	0.00307	0.00250	0.00206	0.00211	0.00002	2420167
Dissolved Phosphorus (P)	mg/L	0.127(1)	<0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.002	2420167
Dissolved Selenium (Se)	mg/L	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00004	2420167
Dissolved Silicon (Si)	mg/L	0.5	<0.1	0.6	0.5	1.0	0.6	0.5	0.7	0.7	0.1	2420167
Dissolved Silver (Ag)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2420167
Dissolved Strontium (Sr)	mg/L	0.0108	0.00005	0.0109	0.0108	0.0109	0.0104	0.0112	0.0228	0.0227	0.00005	2420167
Dissolved Thallium (Tl)	mg/L	<0.000002	<0.000002	<0.000002	<0.000002	<0.000002	<0.000002	<0.000002	<0.000002	<0.000002	0.000002	2420167
Dissolved Tin (Sn)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2420167
Dissolved Titanium (Ti)	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	2420167
Dissolved Uranium (U)	mg/L	0.000132	<0.000002	0.000139	0.000133	0.000064	0.000131	0.000065	0.000062	0.000067	0.000002	2420167
Dissolved Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	2420167
Dissolved Zinc (Zn)	mg/L	0.0037(1)	0.0002	0.0025	0.0027(1)	0.0009	0.0021	0.0009	0.0041(1)	0.0008	0.0001	2420167
Dissolved Zirconium (Zr)	mg/L	0.0002	<0.0001	0.0002	0.0002	0.0004	0.0002	0.0002	0.0001	0.0001	0.0001	2420167
Dissolved Calcium (Ca)	mg/L	2.97	<0.05	3.07	3.06	3.45	2.90	3.04	6.91	7.26	0.05	2422758
Dissolved Magnesium (Mg)	mg/L	0.79	<0.05	0.83	0.79	0.74	0.77	0.79	1.48	1.53	0.05	2422758
Dissolved Potassium (K)	mg/L	0.77(1)	<0.05	0.63	0.63	0.62	0.60	0.60	0.71	0.73	0.05	2422758
Dissolved Sodium (Na)	mg/L	0.53	<0.05	0.51	0.51	0.65	0.49	0.54	0.55	0.54	0.05	2422758

RDL = Reportable Detection Limit
(1) - dissolved > total Metals, reanalyzed & confirmed. Possible trace level of field-filtered contamination on dissolved metal bottle or there is a discrepancy between samples taken.

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		K53113	K53115	K53116	K53117	K53118	K53119	K53120	K53121	K53122		
		2008/06/27	2008/06/27	2008/06/27	2008/06/27	2008/06/27	2008/06/27	2008/06/28	2008/06/28	2008/06/28		
	Units	**SW7**	**SW40**	**SW41**	**SW9**	**SW32**	**SW8**	**SW2B**	**SW16D**	**SW16U**	**RDL**	**QC Batch**
Dissolved Sulphur (S)	mg/L	<3	<3	<3	<3	<3	<3	<3	<3	<3	3	2422758

RDL = Reportable Detection Limit

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		K53123	K53124	K53125	K53126	K53127	K53128	K53129	K53130	K53134		
		2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28		
	Units	**SW13U**	**SW13D**	**SW2**	**SW24**	**TRIP BLANK**	**SW21-1**	**SW21-2**	**SW21-3**	**SW18U**	**RDL**	**QC Batch**
Misc. Inorganics												
Dissolved Hardness (CaCO3)	mg/L	16.1	15.8	9.7	7.4	<0.5	38.4	38.9	40.0	50.6	0.5	2408829

RDL = Reportable Detection Limit

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		K53123	K53124	K53125	K53126	K53127	K53128	K53129	K53130	K53134		
		2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28		
	Units	**SW13U**	**SW13D**	**SW2**	**SW24**	**TRIP BLANK**	**SW21-1**	**SW21-2**	**SW21-3**	**SW18U**	**RDL**	**QC Batch**
Dissolved Metals by ICPMS												
Dissolved Aluminum (Al)	mg/L	0.165	0.168	0.0994	0.0105	0.0033(1)	0.0154	0.0156	0.0158	0.0156	0.0002	2420167
Dissolved Antimony (Sb)	mg/L	0.00004	0.00003	0.00002	<0.00002	<0.00002	0.00003	0.00003	0.00004	0.00004	0.00002	2420167
Dissolved Arsenic (As)	mg/L	0.00057	0.00052	0.00040	0.00007	<0.00002	0.00082	0.00084	0.00085	0.00190	0.00002	2420167
Dissolved Barium (Ba)	mg/L	0.0135	0.0144	0.00957	0.00727	0.00011(1)	0.0102	0.0105	0.0104	0.0134	0.00002	2420167
Dissolved Beryllium (Be)	mg/L	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2420167
Dissolved Bismuth (Bi)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2420167
Dissolved Boron (B)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2420167
Dissolved Cadmium (Cd)	mg/L	0.000267	0.000038	0.000075	0.000023	0.000173(1)	0.000013	0.000014	0.000009	0.000012	0.000005	2420167
Dissolved Chromium (Cr)	mg/L	0.0006	0.0006	0.0003	<0.0001	<0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	2420167
Dissolved Cobalt (Co)	mg/L	0.000103	0.000272	0.000128	0.000009	0.000008	0.000036	0.000035	0.000040	0.000137	0.000005	2420167
Dissolved Copper (Cu)	mg/L	0.00284	0.00262	0.00171	0.00034	0.00042(1)	0.00120	0.00124	0.00131	0.00087	0.00005	2420167
Dissolved Iron (Fe)	mg/L	0.079	0.111	0.111	0.008	0.003	0.043	0.044	0.045	0.116	0.001	2420167
Dissolved Lead (Pb)	mg/L	0.000164(1)	0.000022	0.000027	0.000018	0.000066(1)	0.000012	0.000014	0.000027	0.000013	0.000005	2420167
Dissolved Lithium (Li)	mg/L	<0.0005	0.0005	<0.0005	0.0006	<0.0005	0.0005	0.0006	0.0006	0.0007	0.0005	2420167
Dissolved Manganese (Mn)	mg/L	0.00189(1)	0.00872	0.0180	0.00085	0.00046(1)	0.00341	0.00344	0.00372	0.0331	0.00005	2420167
Dissolved Mercury (Hg)	mg/L	0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2420167
Dissolved Molybdenum (Mo)	mg/L	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00005	0.00008	0.00005	2420167
Dissolved Nickel (Ni)	mg/L	0.00402	0.00408	0.00233	0.00024	0.00005	0.00142	0.00144	0.00161	0.00233	0.00002	2420167
Dissolved Phosphorus (P)	mg/L	0.005	0.003	0.004	<0.002	<0.002	0.002	<0.002	<0.002	0.003	0.002	2420167
Dissolved Selenium (Se)	mg/L	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00004	2420167
Dissolved Silicon (Si)	mg/L	1.8	1.9	0.6	0.2	<0.1	0.6	0.6	0.6	1.2	0.1	2420167
Dissolved Silver (Ag)	mg/L	0.000012	0.000008	0.000006	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2420167
Dissolved Strontium (Sr)	mg/L	0.0144	0.0146	0.0103	0.0100	0.00021	0.0386	0.0396	0.0395	0.0619	0.00005	2420167
Dissolved Thallium (Tl)	mg/L	0.000006	0.000005	0.000003	<0.000002	<0.000002	<0.000002	<0.000002	<0.000002	<0.000002	0.000002	2420167
Dissolved Tin (Sn)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2420167
Dissolved Titanium (Ti)	mg/L	0.0014	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	2420167
Dissolved Uranium (U)	mg/L	0.000128	0.000123	0.000072	0.000049	<0.000002	0.000053	0.000054	0.000055	0.000078	0.000002	2420167
Dissolved Vanadium (V)	mg/L	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	2420167
Dissolved Zinc (Zn)	mg/L	0.0058(1)	0.0016	0.0014(1)	0.0007	0.0015(1)	0.0008(1)	0.0007(1)	0.0012(1)	0.0012	0.0001	2420167
Dissolved Zirconium (Zr)	mg/L	0.0004	0.0004	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0001	2420167
Dissolved Calcium (Ca)	mg/L	4.85	4.65	2.70	1.77	0.13	10.1	10.3	10.5	15.0	0.05	2422758
Dissolved Magnesium (Mg)	mg/L	0.97	1.00	0.73	0.73	<0.05	3.19	3.22	3.33	3.20	0.05	2422758
Dissolved Potassium (K)	mg/L	0.77	0.75	0.58	0.40	<0.05	0.65	0.65	0.69	0.64	0.05	2422758
Dissolved Sodium (Na)	mg/L	0.80	0.75	0.52	0.48	<0.05	0.65	0.66	0.69	0.99	0.05	2422758

RDL = Reportable Detection Limit
(1) - dissolved > total Metals, reanalyzed & confirmed. Possible trace level of field-filtered contamination on dissolved metal bottle or there is a discrepancy between samples taken.

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		K53123	K53124	K53125	K53126	K53127	K53128	K53129	K53130	K53134		
		2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28		
	Units	**SW13U**	**SW13D**	**SW2**	**SW24**	**TRIP BLANK**	**SW21-1**	**SW21-2**	**SW21-3**	**SW18U**	**RDL**	**QC Batch**
Dissolved Sulphur (S)	mg/L	<3	<3	<3	<3	<3	<3	<3	<3	<3	3	2422758

RDL = Reportable Detection Limit

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		K53135		
		2008/06/28		
	Units	**SW18D**	**RDL**	**QC Batch**
Misc. Inorganics				
Dissolved Hardness (CaCO3)	mg/L	58.7	0.5	2408829

RDL = Reportable Detection Limit

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		K53135		
		2008/06/28		
	Units	SW18D	RDL	QC Batch
Dissolved Metals by ICPMS				
Dissolved Aluminum (Al)	mg/L	0.0178	0.0002	2420167
Dissolved Antimony (Sb)	mg/L	0.00005	0.00002	2420167
Dissolved Arsenic (As)	mg/L	0.00171	0.00002	2420167
Dissolved Barium (Ba)	mg/L	0.0145	0.00002	2420167
Dissolved Beryllium (Be)	mg/L	<0.00001	0.00001	2420167
Dissolved Bismuth (Bi)	mg/L	<0.000005	0.000005	2420167
Dissolved Boron (B)	mg/L	<0.05	0.05	2420167
Dissolved Cadmium (Cd)	mg/L	0.000181(1)	0.000005	2420167
Dissolved Chromium (Cr)	mg/L	0.0002	0.0001	2420167
Dissolved Cobalt (Co)	mg/L	0.000119	0.000005	2420167
Dissolved Copper (Cu)	mg/L	0.00149(1)	0.00005	2420167
Dissolved Iron (Fe)	mg/L	0.102	0.001	2420167
Dissolved Lead (Pb)	mg/L	0.000075(1)	0.000005	2420167
Dissolved Lithium (Li)	mg/L	0.0007	0.0005	2420167
Dissolved Manganese (Mn)	mg/L	0.0207	0.00005	2420167
Dissolved Mercury (Hg)	mg/L	<0.00001	0.00001	2420167
Dissolved Molybdenum (Mo)	mg/L	0.00009	0.00005	2420167
Dissolved Nickel (Ni)	mg/L	0.00274(1)	0.00002	2420167
Dissolved Phosphorus (P)	mg/L	0.015(1)	0.002	2420167
Dissolved Selenium (Se)	mg/L	<0.00004	0.00004	2420167
Dissolved Silicon (Si)	mg/L	1.2	0.1	2420167
Dissolved Silver (Ag)	mg/L	<0.000005	0.000005	2420167
Dissolved Strontium (Sr)	mg/L	0.0738	0.00005	2420167
Dissolved Thallium (Tl)	mg/L	<0.000002	0.000002	2420167
Dissolved Tin (Sn)	mg/L	<0.00001	0.00001	2420167
Dissolved Titanium (Ti)	mg/L	<0.0005	0.0005	2420167
Dissolved Uranium (U)	mg/L	0.000093	0.000002	2420167
Dissolved Vanadium (V)	mg/L	<0.0002	0.0002	2420167
Dissolved Zinc (Zn)	mg/L	0.0039(1)	0.0001	2420167
Dissolved Zirconium (Zr)	mg/L	<0.0001	0.0001	2420167
Dissolved Calcium (Ca)	mg/L	17.5	0.05	2422758
Dissolved Magnesium (Mg)	mg/L	3.66	0.05	2422758
Dissolved Potassium (K)	mg/L	0.70	0.05	2422758
Dissolved Sodium (Na)	mg/L	1.16	0.05	2422758

RDL = Reportable Detection Limit
(1) - dissolved > total Metals, reanalyzed & confirmed. Possible trace level of field-filtered contamination on dissolved metal bottle or there is a discrepancy between samples taken.

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		K53135		
		2008/06/28		
	Units	SW18D	RDL	QC Batch
Dissolved Sulphur (S)	mg/L	4	3	2422758

RDL = Reportable Detection Limit

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		K53113	K53115	K53116	K53117	K53118	K53119		K53120	K53121	K53122		
		2008/06/27	2008/06/27	2008/06/27	2008/06/27	2008/06/27	2008/06/27		2008/06/28	2008/06/28	2008/06/28		
	Units	**SW7**	**SW40**	**SW41**	**SW9**	**SW32**	**SW8**	**QC Batch**	**SW2B**	**SW16D**	**SW16U**	**RDL**	**QC Batch**
Calculated Parameters													
Total Hardness (CaCO3)	mg/L	10.4	<0.5	10.8	10.7	11.2	10.3	2408828	10.7	23.4	23.6	0.5	2408828

RDL = Reportable Detection Limit

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		K53113	K53115	K53116	K53117	K53118	K53119		K53120	K53121	K53122		
		2008/06/27	2008/06/27	2008/06/27	2008/06/27	2008/06/27	2008/06/27		2008/06/28	2008/06/28	2008/06/28		
	Units	**SW7**	**SW40**	**SW41**	**SW9**	**SW32**	**SW8**	**QC Batch**	**SW2B**	**SW16D**	**SW16U**	**RDL**	**QC Batch**
Total Metals by ICPMS													
Total Aluminum (Al)	mg/L	0.154	0.0025	0.179	0.152	0.112	0.152	2420160	0.0961	0.0562	0.0571	0.0002	2420165
Total Antimony (Sb)	mg/L	<0.00002	<0.00002	0.00002	0.00002	0.00003	0.00002	2420160	0.00002	0.00004	0.00005	0.00002	2420165
Total Arsenic (As)	mg/L	0.00032	<0.00002	0.00032	0.00032	0.00036	0.00033	2420160	0.00036	0.00051	0.00055	0.00002	2420165
Total Barium (Ba)	mg/L	0.0109	<0.00002	0.0109	0.0110	0.0120	0.0109	2420160	0.0116	0.00858	0.00863	0.00002	2420165
Total Beryllium (Be)	mg/L	0.00002	<0.00001	0.00003	0.00002	<0.00001	0.00002	2420160	0.00001	<0.00001	<0.00001	0.00001	2420165
Total Bismuth (Bi)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	2420160	<0.000005	<0.000005	<0.000005	0.000005	2420165
Total Boron (B)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	2420160	<0.05	<0.05	<0.05	0.05	2420165
Total Cadmium (Cd)	mg/L	0.000018	0.000017	0.000074	0.000033	0.000036	0.000024	2420160	0.000039	<0.000005	0.000027	0.000005	2420165
Total Chromium (Cr)	mg/L	0.0004	<0.0001	0.0004	0.0004	0.0005	0.0004	2420160	0.0003	0.0002	0.0002	0.0001	2420165
Total Cobalt (Co)	mg/L	0.00123	<0.000005	0.00177	0.00122	0.000078	0.00130	2420160	0.000175	0.000050	0.000043	0.000005	2420165
Total Copper (Cu)	mg/L	0.00264	<0.00005	0.00291	0.00260	0.00196	0.00261	2420160	0.00180	0.00181	0.00188	0.00005	2420165
Total Iron (Fe)	mg/L	0.321	<0.001	0.376	0.327	0.104	0.317	2420160	0.204	0.061	0.061	0.001	2420165
Total Lead (Pb)	mg/L	0.000069	0.000006	0.000086	0.000050	0.000032	0.000048	2420160	0.000030	0.000011	0.000031	0.000005	2420165
Total Lithium (Li)	mg/L	0.0005	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	2420160	<0.0005	<0.0005	<0.0005	0.0005	2420165
Total Manganese (Mn)	mg/L	0.0316	0.00006	0.0505	0.0340	0.00100	0.0352	2420160	0.0107	0.00611	0.00646	0.00005	2420165
Total Mercury (Hg)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	2420160	<0.00001	<0.00001	<0.00001	0.00001	2420165
Total Molybdenum (Mo)	mg/L	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	2420160	0.00008	0.00011	0.00009	0.00005	2420165
Total Nickel (Ni)	mg/L	0.00308	<0.00002	0.00355	0.00320	0.00264	0.00310	2420160	0.00268	0.00206	0.00208	0.00002	2420165
Total Phosphorus (P)	mg/L	0.005	<0.002	0.007	0.005	0.007	0.005	2420160	0.004	0.004	0.003	0.002	2420165
Total Selenium (Se)	mg/L	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	2420160	<0.00004	<0.00004	<0.00004	0.00004	2420165
Total Silicon (Si)	mg/L	0.6	<0.1	0.6	0.6	1.0	0.6	2420160	0.5	0.7	0.7	0.1	2420165
Total Silver (Ag)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	2420160	<0.000005	<0.000005	<0.000005	0.000005	2420165
Total Strontium (Sr)	mg/L	0.0103	<0.00005	0.0105	0.0103	0.0111	0.0102	2420160	0.0112	0.0223	0.0221	0.00005	2420165
Total Thallium (Tl)	mg/L	0.000003	<0.000002	0.000003	0.000003	<0.000002	0.000003	2420160	<0.000002	<0.000002	<0.000002	0.000002	2420165
Total Tin (Sn)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	2420160	<0.00001	<0.00001	<0.00001	0.00001	2420165
Total Titanium (Ti)	mg/L	0.0009	<0.0005	0.0014	0.0010	0.0006	0.0007	2420160	<0.0005	<0.0005	<0.0005	0.0005	2420165
Total Uranium (U)	mg/L	0.000148	0.000006	0.000148	0.000139	0.000064	0.000141	2420160	0.000067	0.000067	0.000065	0.000002	2420165
Total Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	2420160	<0.0002	<0.0002	<0.0002	0.0002	2420165
Total Zinc (Zn)	mg/L	0.0018	0.0001	0.0046	0.0020	0.0015	0.0018	2420160	0.0013	0.0005	0.0013	0.0001	2420165
Total Zirconium (Zr)	mg/L	0.0003	<0.0001	0.0003	0.0002	0.0003	0.0002	2420160	0.0002	0.0001	0.0001	0.0001	2420165
Total Calcium (Ca)	mg/L	2.92	<0.05	3.03	3.01	3.32	2.90	2421623	2.97	6.91	6.97	0.05	2425872
Total Magnesium (Mg)	mg/L	0.76	<0.05	0.79	0.77	0.72	0.75	2421623	0.80	1.49	1.49	0.05	2425872
Total Potassium (K)	mg/L	0.61	<0.05	0.65	0.62	0.60	0.61	2421623	0.60	0.70	0.70	0.05	2425872
Total Sodium (Na)	mg/L	0.49	<0.05	0.57	0.49	0.63	0.48	2421623	0.55	0.51	0.68	0.05	2425872
Total Sulphur (S)	mg/L	<3	<3	<3	<3	<3	<3	2421623	<3	<3	<3	3	2425872

RDL = Reportable Detection Limit

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		K53123	K53124	K53125	K53126	K53127	K53128	K53129	K53130	K53132	K53133		
		2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28		
	Units	**SW13U**	**SW13D**	**SW2**	**SW24**	**TRIP BLANK**	**SW21-1**	**SW21-2**	**SW21-3**	**SW38**	**SW37**	**RDL**	**QC Batch**
Calculated Parameters													
Total Hardness (CaCO3)	mg/L	15.7	15.9	9.9	7.4	<0.5	41.5	38.4	36.5	119	170	0.5	2408828

RDL = Reportable Detection Limit

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		K53123	K53124	K53125	K53126	K53127	K53128	K53129	K53130	K53132	K53133		
		2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28		
	Units	SW13U	SW13D	SW2	SW24	TRIP BLANK	SW21-1	SW21-2	SW21-3	SW38	SW37	RDL	QC Batch
Total Metals by ICPMS													
Total Aluminum (Al)	mg/L	0.166	0.172	0.110	0.0131	0.0009	0.0178	0.0170	0.0177	6.90	15.2	0.0002	2420165
Total Antimony (Sb)	mg/L	0.00004	0.00004	0.00002	<0.00002	<0.00002	0.00003	0.00003	0.00004	<0.00002	<0.00002	0.00002	2420165
Total Arsenic (As)	mg/L	0.00055	0.00053	0.00043	0.00007	<0.00002	0.00091	0.00086	0.00083	0.00066	0.00095	0.00002	2420165
Total Barium (Ba)	mg/L	0.0135	0.0137	0.00965	0.00741	<0.00002	0.0108	0.0105	0.0104	0.0309	0.0104	0.00002	2420165
Total Beryllium (Be)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00142	0.00197	0.00001	2420165
Total Bismuth (Bi)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2420165
Total Boron (B)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2420165
Total Cadmium (Cd)	mg/L	0.000060	0.000121	0.000098	<0.000005	<0.000005	0.000025	0.000006	0.000028	0.00199	0.00288	0.000005	2420165
Total Chromium (Cr)	mg/L	0.0006	0.0006	0.0003	<0.0001	<0.0001	0.0001	0.0001	0.0001	0.0023	0.0210	0.0001	2420165
Total Cobalt (Co)	mg/L	0.000086	0.000301	0.000140	0.000016	<0.000005	0.000044	0.000040	0.000033	0.138	0.268	0.000005	2420165
Total Copper (Cu)	mg/L	0.00267	0.00271	0.00175	0.00037	0.00014	0.00129	0.00122	0.00128	0.0437	0.196	0.00005	2420165
Total Iron (Fe)	mg/L	0.085	0.131	0.164	0.022	<0.001	0.051	0.050	0.054	0.994	16.7	0.001	2420165
Total Lead (Pb)	mg/L	0.000031	0.000061	0.000074	0.000007	0.000030	0.000012	0.000012	0.000024	0.00377	0.00229	0.000005	2420165
Total Lithium (Li)	mg/L	<0.0005	<0.0005	<0.0005	0.0005	<0.0005	0.0006	0.0007	0.0006	0.0121	0.0279	0.0005	2420165
Total Manganese (Mn)	mg/L	0.00082	0.00953	0.0213	0.00509	0.00006	0.00371	0.00400	0.00414	5.34	6.18	0.00005	2420165
Total Mercury (Hg)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	0.00001	<0.00001	<0.00001	0.00001	2420165
Total Molybdenum (Mo)	mg/L	0.00008	0.00007	0.00006	0.00006	<0.00005	0.00009	0.00005	<0.00005	<0.00005	<0.00005	0.00005	2420165
Total Nickel (Ni)	mg/L	0.00409	0.00423	0.00231	0.00023	<0.00002	0.00163	0.00147	0.00148	0.118	0.178	0.00002	2420165
Total Phosphorus (P)	mg/L	0.004	0.005	0.005	<0.002	<0.002	0.002	0.002	0.003	0.004	<0.002	0.002	2420165
Total Selenium (Se)	mg/L	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00005	0.00006	0.00033	0.00043	0.00004	2420165
Total Silicon (Si)	mg/L	1.8	1.9	0.5	0.2	<0.1	0.7	0.6	0.6	6.8	11.6	0.1	2420165
Total Silver (Ag)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000006	0.000005	<0.000005	0.000040	0.000005	2420165
Total Strontium (Sr)	mg/L	0.0139	0.0139	0.0102	0.00985	0.00008	0.0412	0.0383	0.0366	0.128	0.135	0.00005	2420165
Total Thallium (Tl)	mg/L	<0.000002	<0.000002	<0.000002	<0.000002	<0.000002	<0.000002	0.000009	0.000005	0.000032	0.000111	0.000002	2420165
Total Tin (Sn)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	<0.00001	0.00001	2420165
Total Titanium (Ti)	mg/L	0.0012	0.0011	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	0.0008	<0.0005	0.0012	0.0005	2420165
Total Uranium (U)	mg/L	0.000121	0.000114	0.000071	0.000050	<0.000002	0.000060	0.000068	0.000064	0.00306	0.0174	0.000002	2420165
Total Vanadium (V)	mg/L	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	2420165
Total Zinc (Zn)	mg/L	0.0012	0.0025	0.0008	0.0009	0.0007	0.0004	0.0004	0.0008	0.117	0.226	0.0001	2420165
Total Zirconium (Zr)	mg/L	0.0004	0.0004	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0001	2420165
Total Calcium (Ca)	mg/L	4.70	4.69	2.75	1.72	<0.05	10.9	10.1	9.61	30.3	39.1	0.05	2425872
Total Magnesium (Mg)	mg/L	0.97	1.02	0.74	0.75	<0.05	3.45	3.19	3.05	10.6	17.6	0.05	2425872
Total Potassium (K)	mg/L	0.77	0.75	0.57	0.40	<0.05	0.68	0.64	0.64	0.89	1.40	0.05	2425872
Total Sodium (Na)	mg/L	0.77	0.80	0.51	0.49	<0.05	0.70	0.65	0.64	1.55	1.48	0.05	2425872

RDL = Reportable Detection Limit

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		K53123	K53124	K53125	K53126	K53127	K53128	K53129	K53130	K53132	K53133		
		2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28	2008/06/28		
	Units	**SW13U**	**SW13D**	**SW2**	**SW24**	**TRIP BLANK**	**SW21-1**	**SW21-2**	**SW21-3**	**SW38**	**SW37**	**RDL**	**QC Batch**
Total Sulphur (S)	mg/L	<3	<3	<3	<3	<3	<3	<3	<3	64	143	3	2425872

RDL = Reportable Detection Limit

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		K53134	K53135		
		2008/06/28	2008/06/28		
	Units	**SW18U**	**SW18D**	**RDL**	**QC Batch**
Calculated Parameters					
Total Hardness (CaCO3)	mg/L	49.0	57.2	0.5	2408828

RDL = Reportable Detection Limit

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		K53134	K53135		
		2008/06/28	2008/06/28		
	Units	SW18U	SW18D	RDL	QC Batch
Total Metals by ICPMS					
Total Aluminum (Al)	mg/L	0.0163	0.0159	0.0002	2420165
Total Antimony (Sb)	mg/L	0.00004	0.00004	0.00002	2420165
Total Arsenic (As)	mg/L	0.00198	0.00175	0.00002	2420165
Total Barium (Ba)	mg/L	0.0135	0.0139	0.00002	2420165
Total Beryllium (Be)	mg/L	<0.00001	<0.00001	0.00001	2420165
Total Bismuth (Bi)	mg/L	<0.000005	<0.000005	0.000005	2420165
Total Boron (B)	mg/L	<0.05	<0.05	0.05	2420165
Total Cadmium (Cd)	mg/L	0.000016	0.000042	0.000005	2420165
Total Chromium (Cr)	mg/L	0.0002	0.0001	0.0001	2420165
Total Cobalt (Co)	mg/L	0.000149	0.000120	0.000005	2420165
Total Copper (Cu)	mg/L	0.00093	0.00090	0.00005	2420165
Total Iron (Fe)	mg/L	0.148	0.134	0.001	2420165
Total Lead (Pb)	mg/L	0.000031	0.000027	0.000005	2420165
Total Lithium (Li)	mg/L	0.0007	0.0006	0.0005	2420165
Total Manganese (Mn)	mg/L	0.0307	0.0233	0.00005	2420165
Total Mercury (Hg)	mg/L	0.00001	0.00001	0.00001	2420165
Total Molybdenum (Mo)	mg/L	0.00007	0.00008	0.00005	2420165
Total Nickel (Ni)	mg/L	0.00236	0.00219	0.00002	2420165
Total Phosphorus (P)	mg/L	0.005	0.004	0.002	2420165
Total Selenium (Se)	mg/L	0.00005	<0.00004	0.00004	2420165
Total Silicon (Si)	mg/L	1.1	1.1	0.1	2420165
Total Silver (Ag)	mg/L	<0.000005	<0.000005	0.000005	2420165
Total Strontium (Sr)	mg/L	0.0595	0.0729	0.00005	2420165
Total Thallium (Tl)	mg/L	<0.000002	<0.000002	0.000002	2420165
Total Tin (Sn)	mg/L	<0.00001	<0.00001	0.00001	2420165
Total Titanium (Ti)	mg/L	<0.0005	<0.0005	0.0005	2420165
Total Uranium (U)	mg/L	0.000091	0.000099	0.000002	2420165
Total Vanadium (V)	mg/L	<0.0002	<0.0002	0.0002	2420165
Total Zinc (Zn)	mg/L	0.0406	0.0020	0.0001	2420165
Total Zirconium (Zr)	mg/L	0.0001	0.0001	0.0001	2420165
Total Calcium (Ca)	mg/L	14.5	17.0	0.05	2425872
Total Magnesium (Mg)	mg/L	3.09	3.57	0.05	2425872
Total Potassium (K)	mg/L	0.62	0.66	0.05	2425872
Total Sodium (Na)	mg/L	0.94	1.08	0.05	2425872
Total Sulphur (S)	mg/L	3	4	3	2425872

RDL = Reportable Detection Limit

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

RESULTS OF CHEMICAL ANALYSES OF WATER Comments

BLANK Total Dissolved Solids (Filt. Residue): 250 mL was used for analysis

Sample K53127-01 Total Dissolved Solids (Filt. Residue): 250 mL was used for analysis

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2411983	Conductivity	2008/07/06			102	80 - 120	<1	uS/cm	1.9	25
2411985	Alkalinity (Total as CaCO3)	2008/07/06	NC	80 - 120	89	80 - 120	<0.5	mg/L	1.7	25
2411985	Alkalinity (PP as CaCO3)	2008/07/06					<0.5	mg/L	NC	25
2411985	Bicarbonate (HCO3)	2008/07/06							1.7	25
2411985	Carbonate (CO3)	2008/07/06							NC	25
2411985	Hydroxide (OH)	2008/07/06							NC	25
2412781	Total Suspended Solids	2008/07/07			103	N/A	<1	mg/L		
2413048	Turbidity	2008/07/07			101	80 - 120	<0.1	NTU	0.6	25
2413063	Dissolved Sulphate (SO4)	2008/07/07	NC	75 - 125	91	80 - 120	<0.5	mg/L	NC	20
2413064	Total Dissolved Solids	2008/07/07	102	80 - 120	100	80 - 120	<1	mg/L	14.6	25
2413066	Dissolved Chloride (Cl)	2008/07/07	NC	80 - 120	96	80 - 120	<0.5	mg/L	NC	20
2413835	Orthophosphate (P)	2008/07/08	92	80 - 120	113	80 - 120	<0.001	mg/L	NC	20
2413945	Total Organic Carbon (C)	2008/07/07	104	80 - 120	112	80 - 120	<0.5	mg/L	NC	20
2414706	Nitrate plus Nitrite (N)	2008/07/07	101	80 - 120	96	80 - 120	<0.002	mg/L	NC	25
2414743	Nitrite (N)	2008/07/07	102	80 - 120	99	80 - 120	<0.002	mg/L	NC	25
2416807	Dissolved Organic Carbon (C)	2008/07/08	103	80 - 120	108	80 - 120	<0.5	mg/L	1.8	20
2416822	Total Organic Carbon (C)	2008/07/08	110	80 - 120	107	80 - 120	<0.5	mg/L	1.3	20
2419497	Ammonia (N)	2008/07/09	106	80 - 120	88	80 - 120	<0.005	mg/L	NC	25
2419609	Ammonia (N)	2008/07/09	94	80 - 120	88	80 - 120	<0.01	mg/L	1.0	25
2419692	Total Nitrogen (N)	2008/07/09	91	80 - 120	95	80 - 120	<0.02	mg/L	NC	25
2420160	Total Arsenic (As)	2008/07/09	94	75 - 125	97	75 - 125	<0.02	ug/L	2.9	25
2420160	Total Beryllium (Be)	2008/07/09	101	75 - 125	98	75 - 125	<0.01	ug/L	NC	25
2420160	Total Cadmium (Cd)	2008/07/09	102	75 - 125	99	75 - 125	<0.005	ug/L	NC	25
2420160	Total Chromium (Cr)	2008/07/09	94	75 - 125	97	75 - 125	<0.1	ug/L	NC	25
2420160	Total Cobalt (Co)	2008/07/09	93	75 - 125	98	75 - 125	<0.005	ug/L	12.7	25
2420160	Total Copper (Cu)	2008/07/09	94	75 - 125	98	75 - 125	<0.05	ug/L	5.7	25
2420160	Total Lead (Pb)	2008/07/09	99	75 - 125	103	75 - 125	<0.005	ug/L	6.7	25
2420160	Total Lithium (Li)	2008/07/09	100	75 - 125	100	75 - 125	<0.5	ug/L	NC	25
2420160	Total Nickel (Ni)	2008/07/09	93	75 - 125	100	75 - 125	<0.02	ug/L	3.7	25
2420160	Total Selenium (Se)	2008/07/09	100	75 - 125	98	75 - 125	<0.04	ug/L	NC	25
2420160	Total Uranium (U)	2008/07/09	95	75 - 125	98	75 - 125	<0.002	ug/L	0.6	25
2420160	Total Vanadium (V)	2008/07/09	96	75 - 125	97	75 - 125	<0.2	ug/L	NC	25
2420160	Total Zinc (Zn)	2008/07/09	NC	75 - 125	99	75 - 125	<0.1	ug/L	8.3	25
2420160	Total Aluminum (Al)	2008/07/09					<0.2	ug/L	0.9	25
2420160	Total Antimony (Sb)	2008/07/09					<0.02	ug/L	NC	25
2420160	Total Barium (Ba)	2008/07/09					<0.02	ug/L	5.6	25
2420160	Total Bismuth (Bi)	2008/07/09					<0.005	ug/L	NC	25
2420160	Total Boron (B)	2008/07/09					<50	ug/L	NC	25

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2420160	Total Iron (Fe)	2008/07/09					<1	ug/L	12.2	25
2420160	Total Manganese (Mn)	2008/07/09					<0.05	ug/L	3.2	25
2420160	Total Mercury (Hg)	2008/07/09					<0.01	ug/L	NC	25
2420160	Total Molybdenum (Mo)	2008/07/09					<0.05	ug/L	NC	25
2420160	Total Phosphorus (P)	2008/07/09					<2	ug/L	NC	25
2420160	Total Silicon (Si)	2008/07/09					<100	ug/L	NC	25
2420160	Total Silver (Ag)	2008/07/09					<0.005	ug/L	NC	25
2420160	Total Strontium (Sr)	2008/07/09					<0.05	ug/L	0.9	25
2420160	Total Thallium (Tl)	2008/07/09					<0.002	ug/L	NC	25
2420160	Total Tin (Sn)	2008/07/09					<0.01	ug/L	NC	25
2420160	Total Titanium (Ti)	2008/07/09					<0.5	ug/L	NC	25
2420160	Total Zirconium (Zr)	2008/07/09					<0.1	ug/L	NC	25
2420165	Total Arsenic (As)	2008/10/07	99	75 - 125	98	75 - 125	<0.02	ug/L	4.5	25
2420165	Total Beryllium (Be)	2008/10/07	102	75 - 125	101	75 - 125	<0.01	ug/L	NC	25
2420165	Total Cadmium (Cd)	2008/10/07	104	75 - 125	98	75 - 125	<0.005	ug/L	13.1	25
2420165	Total Chromium (Cr)	2008/10/07	100	75 - 125	98	75 - 125	<0.1	ug/L	NC	25
2420165	Total Cobalt (Co)	2008/10/07	99	75 - 125	100	75 - 125	<0.005	ug/L	3.1	25
2420165	Total Copper (Cu)	2008/10/07	99	75 - 125	100	75 - 125	<0.05	ug/L	2.9	25
2420165	Total Lead (Pb)	2008/10/07	100	75 - 125	101	75 - 125	<0.005	ug/L	NC	25
2420165	Total Lithium (Li)	2008/10/07	101	75 - 125	104	75 - 125	<0.5	ug/L	NC	25
2420165	Total Nickel (Ni)	2008/10/07	98	75 - 125	100	75 - 125	<0.02	ug/L	0.4	25
2420165	Total Selenium (Se)	2008/10/07	102	75 - 125	99	75 - 125	<0.04	ug/L	NC	25
2420165	Total Uranium (U)	2008/10/07	101	75 - 125	101	75 - 125	<0.002	ug/L	0.7	25
2420165	Total Vanadium (V)	2008/10/07	100	75 - 125	98	75 - 125	<0.2	ug/L	NC	25
2420165	Total Zinc (Zn)	2008/10/07	107	75 - 125	99	75 - 125	<0.1	ug/L	2.1	25
2420165	Total Aluminum (Al)	2008/10/07					<0.2	ug/L	2.2	25
2420165	Total Antimony (Sb)	2008/10/07					<0.02	ug/L	NC	25
2420165	Total Barium (Ba)	2008/10/07					<0.02	ug/L	1.3	25
2420165	Total Bismuth (Bi)	2008/10/07					<0.005	ug/L	NC	25
2420165	Total Boron (B)	2008/10/07					<50	ug/L	NC	25
2420165	Total Iron (Fe)	2008/10/07					<1	ug/L	4.2	25
2420165	Total Manganese (Mn)	2008/10/07					<0.05	ug/L	2.3	25
2420165	Total Mercury (Hg)	2008/10/07					0.01, RDL=0.01	ug/L	NC	25
2420165	Total Molybdenum (Mo)	2008/10/07					<0.05	ug/L	NC	25
2420165	Total Phosphorus (P)	2008/10/07					<2	ug/L	NC	25
2420165	Total Silicon (Si)	2008/10/07					<100	ug/L	4.8	25
2420165	Total Silver (Ag)	2008/10/07					<0.005	ug/L	NC	25
2420165	Total Strontium (Sr)	2008/10/07					<0.05	ug/L	0.6	25

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2420165	Total Thallium (Tl)	2008/10/07					<0.002	ug/L	NC	25
2420165	Total Tin (Sn)	2008/10/07					<0.01	ug/L	NC	25
2420165	Total Titanium (Ti)	2008/10/07					<0.5	ug/L	NC	25
2420165	Total Zirconium (Zr)	2008/10/07					<0.1	ug/L	NC	25
2420167	Dissolved Arsenic (As)	2008/10/07	94	75 - 125	98	75 - 125	<0.02	ug/L	1.9	25
2420167	Dissolved Beryllium (Be)	2008/10/07	103	75 - 125	103	75 - 125	<0.01	ug/L	NC	25
2420167	Dissolved Cadmium (Cd)	2008/10/07	112	75 - 125	101	75 - 125	<0.005	ug/L	2.0	25
2420167	Dissolved Chromium (Cr)	2008/10/07	95	75 - 125	99	75 - 125	<0.1	ug/L	NC	25
2420167	Dissolved Cobalt (Co)	2008/10/07	94	75 - 125	100	75 - 125	<0.005	ug/L	5.3	25
2420167	Dissolved Copper (Cu)	2008/10/07	95	75 - 125	100	75 - 125	<0.05	ug/L	3.1	25
2420167	Dissolved Lead (Pb)	2008/10/07	100	75 - 125	105	75 - 125	<0.005	ug/L	4.6	25
2420167	Dissolved Lithium (Li)	2008/10/07	101	75 - 125	106	75 - 125	<0.5	ug/L	NC	25
2420167	Dissolved Nickel (Ni)	2008/10/07	93	75 - 125	98	75 - 125	<0.02	ug/L	4.9	25
2420167	Dissolved Selenium (Se)	2008/10/07	94	75 - 125	103	75 - 125	<0.04	ug/L	NC	25
2420167	Dissolved Uranium (U)	2008/10/07	99	75 - 125	104	75 - 125	<0.002	ug/L	1.6	25
2420167	Dissolved Vanadium (V)	2008/10/07	95	75 - 125	100	75 - 125	<0.2	ug/L	NC	25
2420167	Dissolved Zinc (Zn)	2008/10/07	100	75 - 125	98	75 - 125	<0.1	ug/L	9.4	25
2420167	Dissolved Aluminum (Al)	2008/10/07					<0.2	ug/L	4.7	25
2420167	Dissolved Antimony (Sb)	2008/10/07					<0.02	ug/L	NC	25
2420167	Dissolved Barium (Ba)	2008/10/07					<0.02	ug/L	0.6	25
2420167	Dissolved Bismuth (Bi)	2008/10/07					<0.005	ug/L	NC	25
2420167	Dissolved Boron (B)	2008/10/07					<50	ug/L	NC	25
2420167	Dissolved Iron (Fe)	2008/10/07					<1	ug/L	0.9	25
2420167	Dissolved Manganese (Mn)	2008/10/07					<0.05	ug/L	1.8	25
2420167	Dissolved Mercury (Hg)	2008/10/07					0.02, RDL=0.01	ug/L	NC	25
2420167	Dissolved Molybdenum (Mo)	2008/10/07					<0.05	ug/L	NC	25
2420167	Dissolved Phosphorus (P)	2008/10/07					<2	ug/L	12.4	25
2420167	Dissolved Silicon (Si)	2008/10/07					<100	ug/L	2.3	25
2420167	Dissolved Silver (Ag)	2008/10/07					<0.005	ug/L	NC	25
2420167	Dissolved Strontium (Sr)	2008/10/07					<0.05	ug/L	1.7	25
2420167	Dissolved Thallium (Tl)	2008/10/07					<0.002	ug/L	NC	25
2420167	Dissolved Tin (Sn)	2008/10/07					<0.01	ug/L	NC	25
2420167	Dissolved Titanium (Ti)	2008/10/07					<0.5	ug/L	NC	25
2420167	Dissolved Zirconium (Zr)	2008/10/07					<0.1	ug/L	NC	25
2420289	Acidity (pH 8.3)	2008/07/09			100	80 - 120			3.5	20
2420289	Acidity (pH 4.5)	2008/07/09							NC	20
2421190	Cyanide + Thiocyanate	2008/07/09	105	80 - 120	99	80 - 120	<0.0005	mg/L	NC	35
2421623	Total Calcium (Ca)	2008/07/09					<0.05	mg/L	1.2	25

Maxxam Job #: A832513
Report Date: 2008/07/16

GARTNER LEE LTD.
Client Project #: CULLATON LAKE

Your P.O. #: 70562

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2421623	Total Magnesium (Mg)	2008/07/09					<0.05	mg/L	1.5	25
2421623	Total Potassium (K)	2008/07/09					<0.05	mg/L	2.2	25
2421623	Total Sodium (Na)	2008/07/09					<0.05	mg/L	2.2	25
2421623	Total Sulphur (S)	2008/07/09					<3	mg/L	NC	25
2422758	Dissolved Calcium (Ca)	2008/10/07					<0.05	mg/L	1.5	25
2422758	Dissolved Magnesium (Mg)	2008/10/07					<0.05	mg/L	2.4	25
2422758	Dissolved Potassium (K)	2008/10/07					<0.05	mg/L	2.5	25
2422758	Dissolved Sodium (Na)	2008/10/07					<0.05	mg/L	2.3	25
2422758	Dissolved Sulphur (S)	2008/10/07					<3	mg/L	NC	25
2425872	Total Calcium (Ca)	2008/10/07					<0.05	mg/L	0.6	25
2425872	Total Magnesium (Mg)	2008/10/07					<0.05	mg/L	0.3	25
2425872	Total Potassium (K)	2008/10/07					<0.05	mg/L	0.06	25
2425872	Total Sodium (Na)	2008/10/07					<0.05	mg/L	0.3	25
2425872	Total Sulphur (S)	2008/10/07					<3	mg/L	NC	25
2435217	Ammonia (N)	2008/07/15	91	80 - 120	92	80 - 120	<0.01	mg/L	1.9	25

N/A = Not Applicable
NC = Non-calculable
RDL = Reportable Detection Limit
RPD = Relative Percent Difference

Maxxam Analytics Inc. 8577 Commerce Court, Burnaby, British Columbia Canada V5A 4N5
Tel (604) 444-4808 Toll-free (800) 440-4808 Fax (604) 444-4811 www.maxxamanalytics.com

REC'D IN WINNIPEG

CHAIN OF CUSTODY RECORD

INVOICE INFORMATION:
Company Name: #2448 GARTNER LEE LTD.
Contact Name: Kai Woloshyn
Address: 2251 - 2nd AVENUE, WHITEHORSE YT Y1A 5W1
Phone: (867)633-6474 Fax: (867)633-6321
Email: kwoloshyn@gartnerlee.com

REPORT INFORMATION (if differs from Invoice):
Company Name: #6042 GARTNER LEE LTD.
Contact Name: Jennifer Sarchuck
Address: 5400 ROBERTS STREET, BURNABY BC V5G 4L9
Phone: (604)299-4144 Fax: (604)299-1455
Email: kwoloshyn@gartnerlee.com, jsarchuk@gartnerlee

PROJECT INFORMATION:
Quotation #: A80110
P.O. #: 70562
Project #: THOMPSON MANITOBA BOTTLES
Project Name: Cullaton Lake
Site Location:
Sampled By:

Laboratory Use Only:
MAXXAM JOB #: A832513
BOTTLE ORDER #: 28053
CHAIN OF CUSTODY #: C#28853-03-01
PROJECT MANAGER: ROB MACARTHUR

REGULATORY CRITERIA:
If Questions call Rob MacArthur 604-444-4808

SPECIAL INSTRUCTIONS
Metals to be lab filtered
Please send to Vancouver Lab for Analysis

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

ANALYSIS REQUESTED (Please be specific):

TURNAROUND TIME (TAT) REQUIRED:
Regular (Standard) TAT: (will be applied if Rush TAT is not specified) ☒
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: Time Required:
Rush Confirmation Number: (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	Total Metals	Dissolved Metals	Total Nutrients	Dissolved Nutrients	Cyanide	TSS	Corrosion	# of Bottles	Comments
1		SW7	June 27, 2008	Water		Y	X	X	X	X	X	X	X	7	
2		SW40					X	X	X	X	X	X	X	7	
3		SW41					X	X	X	X	X	X	X	7	
4		~~SW26~~												2	
5		SW9					X	X	X	X	X	X	X	7	
6		SW32					X	X	X	X	X	X	X	7	
7		SW8	↓				X	X	X	X	X	X	X	7	
8		SW26	June 28, 2008				X	X	X	X	X	X	X	7	
9															
10															

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	Time Sensitive
K. Woloshyn	08/06/29	14:00	H Sealey / Angelyne Sarmiento	08/07/02 July 3/08	2:55pm 09:15 am	☐

Laboratory Use Only: Temperature (°C) on Receipt: 1,1,2 @ WPG; 08/4 1,1,1 1,2,1 1,1,1 1,1,1 1,2,1 1,1,1 1,1,1 1,1,1 1,1,1 | Condition of Sample on Receipt: ☑ OK ☐ SIF | Custody Seal Intact on Cooler?: ☑ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

Maxxam Analytics Inc
8577 Commerce Court Burnaby British Columbia Canada V5A 4N5
Tel (604) 444-4808 Toll-free (800) 440-4808 Fax (604) 444-4811 www.maxxamanalytics.com

REC'D IN WINNIPEG

CHAIN OF CUSTODY RECORD

INVOICE INFORMATION:

Company Name: #2448 GARTNER LEE LTD.
Contact Name: Kai Woloshyn
Address: 2251 - 2nd AVENUE
WHITEHORSE YT Y1A 5W1
Phone: (867)633-8474 Fax: (867)633-6321
Email: kwoloshyn@gartnerlee.com

REPORT INFORMATION (if differs from invoice):

Company Name: #6042 GARTNER LEE LTD.
Contact Name: Jennifer Sarchuck
Address: 6400 ROBERTS STREET
BURNABY BC V5G 4L9
Phone: (604)299-4144 Fax: (604)299-1455
Email: kwoloshyn@gartnerlee.com, jsarchuk@gartnerlee

PROJECT INFORMATION:

Quotation #: A80110
P.O. #: ~~A67052~~
Project #: THOMPSON MANITOBA BOTTLES
Project Name: Cullaton Lake
Site Location:
Sampled By:

Laboratory Use Only:

MAXXAM JOB #:
BOTTLE ORDER #: 26853
CHAIN OF CUSTODY #: C#26853-02-01
PROJECT MANAGER: ROB MACARTHUR

REGULATORY CRITERIA:
If Questions, call Rob macarthur 604-444-4808

SPECIAL INSTRUCTIONS:
ultra low Level metals please send to Vancouver lab for Analysis

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

ANALYSIS REQUESTED (Please be specific):

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Total Metals	Dissolved Metals	Total Nutrients	Dissolved Nutrients	Cyanide	TSS	Gen Chem	# of Bottles	Comments
1		SW16d	Jun 28, 2008	Water		N	X	X	X	X	X	X	X	7	
2		SW16u					X	X	X	X	X	X	X	7	
3		SW13u					X	X	X	X	X	X	X	7	
4		SW13d					X	X	X	X	X	X	X	7	
5		SW2					X	X	X	X	X	X	X	7	
6		SW24					X	X	X	X	X	X	X	7	
7		Trip Blank					X	X	X	X	X	X	X	8	
8		940-3A					*	X	X	X				3	
9		SW34 (940-18A)						X	X	X				3	
10															

TURNAROUND TIME (TAT) REQUIRED:

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: Time Required:
Rush Confirmation Number: (call lab for #)

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:
K. Woloshyn	08/06/29	1400	A Searley / A Sorminto	08/07/02	2:55pm
				July 3/08	09:15 am

Time Sensitive ☐

Laboratory Use Only
Temperature (°C) on Receipt: 1, 2, 3 @ WPG
Condition of Sample on Receipt: ☑ OK ☐ SIF
Custody Seal Intact on Cooler? ☑ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

MaxXam Analytics Inc. 8577 Commerce Court, Burnaby, British Columbia Canada V5A 4N5
Tel (604) 444-4808 Toll-free (800) 440-4808 Fax (604) 444-4811 www.maxxamanalytics.com

REC'D IN WINNIPEG

CHAIN OF CUSTODY RECORD

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#2448 GARTNER LEE LTD.	Company Name:	#6042 GARTNER LEE LTD.	Quotation #:	A80110	MAXXAM JOB #:	BOTTLE ORDER #:
Contact Name:	Kal Woloshyn	Contact Name:	Jennifer Sarchuck	P.O. #:	76583		28853
Address:	2251 - 2nd AVENUE	Address:	6400 ROBERTS STREET	Project #:	THOMPSON MANITOBA BOTTLES	CHAIN OF CUSTODY #:	PROJECT MANAGER:
	WHITEHORSE YT Y1A 5W1		BURNABY BC V5G 4L9	Project Name:	Cullaton Lake	C#26853-01-01	ROB MACARTHUR
Phone:	(867)633-6474 Fax: (867)633-6321	Phone:	(604)299-4144 Fax: (604)299-1455	Site Location:			
Email:	kwoloshyn@gartnerlee.com	Email:	kwoloshyn@gartnerlee.com, jsarchuk@gartnerlee	Sampled By:			

REGULATORY CRITERIA:
If Questions Call Rob Macarthur 604-444-4804

SPECIAL INSTRUCTIONS
Please send to Vancouver Lab for Analysis

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

ANALYSIS REQUESTED (Please be specific):

TURNAROUND TIME (TAT) REQUIRED:

Regular (Standard) TAT:
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____
Rush Confirmation Number: _____ (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	total nutrients	Diss. nutrients	total metals	Diss. metals	Cyanide	TSS	General Chem.	# of Bottles	Comments
1		SW38	June 28/08	Water		Y	X	X	X	X	X	X	X		
2		SW21-1	June 28/08				X	X	X	X	X	X	X	7	
3		SW21-2					X	X	X	X	X	X	X	7	
4		SW21-3					X	X	X	X	X	X	X	7	
5		SW39							X		X	X	X	4	
6		SW37					X		X			X	X	4	
7		SW18U					X	X	X	X	X	X	X	7	
8		SW18D					X	X	X	X	X	X	X	7	
9															
10															

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:
K. Wiley	08/06/29	14:00	M. Sealey	08/07/02	2:55pm
			A. Sarmiento	July 3/08	09:15am

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Condition of Sample on Receipt	Custody Seal Intact on Cooler?
☐	3.2.3 @ WPG	☑ OK ☐ SIF	☑ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

1,1,1 1,2,1 1,1,1
1,2,1 1,1,1 1,1,1
1,1,1 1,1,1

Your P.O. #: CULLATON LAKE
Your Project #: 70562
Site: CULLATON LAKE
Your C.O.C. #: 29678-03, 29678-01, 29678-02

Attention: Kai Woloshyn
GARTNER LEE LTD.
2251 - 2nd AVENUE
WHITEHORSE, YT
CANADA Y1A 5W1

Report Date: 2008/08/15

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A839798
Received: 2008/08/07, 11:40

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Elements by ICPMS (total)	2	2008/08/08	2008/08/12	BRN SOP-00203	Based on EPA 200.8
Moisture	2	N/A	2008/08/10	BRN SOP-00321 R3.0	Ont MOE -E 3139
pH (2:1 DI Water Extract) (1)	2	2008/08/08	2008/08/11	BRN SOP-00266 R1.0	Carter, SSMA 16.2

Sample Matrix: Water
Samples Received: 17

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	17	2008/08/09	2008/08/10	BRN SOP-00264 R2.0	Based on SM2320B
Chloride by Automated Colourimetry	17	N/A	2008/08/09	BRN-SOP 00234 R1.0	Based on EPA 325.2
Cyanide (Total)	17	N/A	2008/08/11	BRN SOP-00226 R1.0	Based on EPA 9012AR1
Cyanide WAD (weak acid dissociable)	14	N/A	2008/08/11	BRN SOP-00227 R1.0	Based on SM-4500CN I
Cyanide WAD (weak acid dissociable)	3	N/A	2008/08/14	BRN SOP-00227 R1.0	Based on SM-4500CN I
Carbon (DOC)	17	N/A	2008/08/11	BRN SOP-00224 R3.0	Based on SM-5310C
Conductance - water	17	N/A	2008/08/10	BRN SOP-00264 R2.0	Based on SM-2510B
Hardness Total (calculated as CaCO3)	17	N/A	2008/08/13		
Hardness (calculated as CaCO3)	17	N/A	2008/08/13		
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	17	N/A	2008/12/08	BRN SOP-00206	Based on EPA 200.8
Elements by ICPMS Low Level (dissolved) (1)	17	N/A	2008/12/08	BRN SOP-00206	Based on EPA 200.8
Elements by ICPMS Low Level (total) (1)	17	2008/08/08	2008/08/12	BRN SOP-00206	Based on EPA 200.8
Na, K, Ca, Mg, S by CRC ICPMS (total)	17	2008/08/08	2008/08/12	BRN SOP-00206	Based on EPA 200.8
Nitrogen (Total)	17	2008/08/08	2008/08/20	BRN SOP-00242 R2.0	Based on SM-4500N C
Ammonia-N	17	N/A	2008/08/12	BRN SOP-00232 R3.0	SM-4500 NH3 G
Nitrate+Nitrite (N) (low level	17	N/A	2008/08/13	BRN SOP-00233 R1.0	Based on EPA 353.2
Nitrite (N) (low level)	17	N/A	2008/08/13	BRN SOP-00233 R1.0	EPA 353.2
Nitrogen - Nitrate (as N)	17	N/A	2008/08/13		
Filter and HNO3 Preserve for Metals	11	N/A	2008/08/08	BRN WI-00006 R1.0	Based on EPA 200.2
Filter and HNO3 Preserve for Metals	6	N/A	2008/08/11	BRN WI-00006 R1.0	Based on EPA 200.2
pH Water	17	N/A	2008/08/10	BRN SOP-00264 R2.0	Based on SM-4500H+B
Orthophosphate by Konelab (1)	17	N/A	2008/08/11	BRN SOP-00235 R3.0	SM 4500 PF
Sulphate by Automated Colourimetry	17	N/A	2008/08/09	BRN-SOP 00243 R1.0	Based on EPA 375.4
Total Dissolved Solids (Filt. Residue)	17	N/A	2008/08/11	BRN-00276 R2.0	APHA 2540
TKN (Calc. TN, N/N) total	17	N/A	2008/08/13		
Carbon (Total Organic)	17	N/A	2008/08/11	BRN SOP-00224 R3.0	Based on SM-5310C
Total Suspended Solids	17	N/A	2008/08/09	BRN SOP-00277 R2.0	Based on SM-2540 D
Turbidity	17	N/A	2008/08/11	BRN SOP-00265 R3.0	SM - 2130B

* Results relate only to the items tested.

(1) SCC/CAEAL

Encryption Key

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

ROB MACARTHUR, BBY Customer Service
Email: rob.macarthur@maxxamanalytics.com
Phone# (604) 444-4808 Ext:253

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CAEAL have approved this reporting process and electronic report format.

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		L03266	L03267		
Sampling Date		2008/08/04	2008/08/04		
	Units	**SW25**	**SW26**	**RDL**	**QC Batch**
Physical Properties					
Moisture	%	52	68	0.3	2495055

RDL = Reportable Detection Limit

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		L03216	L03217	L03218	L03219		L03220		L03221	L03222		
Sampling Date		2008/08/03	2008/08/03	2008/08/03	2008/08/03		2008/08/03		2008/08/03	2008/08/03		
	Units	**SW21**	**SW23**	**SW24**	**SW33**	**RDL**	**SW34**	**RDL**	**SW41**	**SW42**	**RDL**	**QC Batch**
CONVENTIONALS												
Cyanide + Thiocyanate	mg/L	0.0017	0.0017	0.0011	0.0023	0.0005	0.0077	0.0005	<0.0005	<0.0005	0.0005	2497494
Preparation												
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	N/A	FIELD	N/A	FIELD	FIELD	N/A	ONSITE
Calculated Parameters												
Nitrate (N)	mg/L	0.005	0.026	<0.002	<0.002	0.002	<0.002	0.002	0.004	<0.002	0.002	2492952
Misc. Inorganics												
Weak Acid Dissoc. Cyanide (CN)	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	<0.0005	0.0005	2497566
Dissolved Organic Carbon (C)	mg/L	3.6	6.0	3.8	14.0	0.5	2.0	0.5	2.5	3.3	0.5	2496509
Alkalinity (Total as CaCO3)	mg/L	5.6	12	5.7	100	0.5	54	0.5	5.1	5.4	0.5	2495060
Total Organic Carbon (C)	mg/L	4.2	6.5	4.5	14.1	0.5	3.2	0.5	2.8	2.7	0.5	2496466
Anions												
Orthophosphate (P)	mg/L	0.002	0.003	0.003	0.003	0.001	0.002	0.001	0.004	0.002	0.001	2493862
Dissolved Sulphate (SO4)	mg/L	<0.5	0.9	<0.5	33	0.5	190	5	<0.5	<0.5	0.5	2495075
Dissolved Chloride (Cl)	mg/L	<0.5	0.9	0.5	2.3	0.5	3.9	0.5	<0.5	<0.5	0.5	2495065
Nutrients												
Ammonia (N)	mg/L	0.11	0.10	0.06	0.10	0.01	0.14	0.01	0.10	0.09	0.01	2499571
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.14	0.30	0.20	0.69	0.02	0.19	0.02	0.18	0.16	0.02	2493367
Nitrate plus Nitrite (N)	mg/L	0.005	0.026	<0.002	<0.002	0.002	<0.002	0.002	0.004	<0.002	0.002	2500963
Nitrite (N)	mg/L	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002	<0.002	0.002	2500968
Total Nitrogen (N)	mg/L	0.14	0.32	0.20	0.69	0.02	0.19	0.02	0.18	0.16	0.02	2493809
Physical Properties												
Conductivity	uS/cm	14	33	14	240	1	550	1	14	14	1	2495056
pH	pH Units	7.1	7.2	7.1	8.0		8.0		7.0	7.1		2495053
Physical Properties												
Total Suspended Solids	mg/L	<1	<1	<1	2	1	<1	1	<1	<1	1	2495036
Total Dissolved Solids	mg/L	26	32	24	180	1	340	1	12	12	1	2496508
Turbidity	NTU	0.5	0.5	0.7	1.8	0.1	0.9	0.1	0.8	0.5	0.1	2495140

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		L03251	L03257	L03258	L03259	L03260		
Sampling Date		2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/04		
	Units	**SW8**	**SW9**	**SW15U**	**SW15D**	**SW40**	**RDL**	**QC Batch**
CONVENTIONALS								
Cyanide + Thiocyanate	mg/L	<0.0005	0.0006	0.0008	0.0009	<0.0005	0.0005	2497494
Preparation								
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	FIELD	N/A	ONSITE
Calculated Parameters								
Nitrate (N)	mg/L	<0.002	0.034	<0.002	0.033	<0.002	0.002	2492952
Misc. Inorganics								
Weak Acid Dissoc. Cyanide (CN)	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	2497566
Dissolved Organic Carbon (C)	mg/L	7.5	6.4	8.3	6.6	0.8	0.5	2496509
Alkalinity (Total as CaCO3)	mg/L	6.3	8.4	23	34	<0.5	0.5	2495060
Total Organic Carbon (C)	mg/L	6.5	8.0	10.0	9.1	<0.5	0.5	2496466
Anions								
Orthophosphate (P)	mg/L	0.004	0.002	0.001	0.001	<0.001	0.001	2493862
Dissolved Sulphate (SO4)	mg/L	6.2	5.7	0.6	1.2	<0.5	0.5	2495075
Dissolved Chloride (Cl)	mg/L	<0.5	0.5	0.7	0.7	<0.5	0.5	2495065
Nutrients								
Ammonia (N)	mg/L	0.10	0.14	0.17	0.12	0.12	0.01	2499571
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.30	0.28	0.27	0.25	<0.02	0.02	2493367
Nitrate plus Nitrite (N)	mg/L	0.004	0.036	<0.002	0.033	<0.002	0.002	2500963
Nitrite (N)	mg/L	0.004	0.002	<0.002	<0.002	<0.002	0.002	2500968
Total Nitrogen (N)	mg/L	0.31	0.31	0.27	0.28	<0.02	0.02	2493809
Physical Properties								
Conductivity	uS/cm	35	37	52	53	<1	1	2495056
pH	pH Units	7.0	6.9	7.3	7.4	5.7		2495053
Physical Properties								
Total Suspended Solids	mg/L	2	4	2	2	<1	1	2495036
Total Dissolved Solids	mg/L	30	36	50	46	<1	1	2496508
Turbidity	NTU	2.0	2.5	4.4	1.9	0.3	0.1	2495140

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		L03261	L03262	L03263	L03264	L03265		
Sampling Date		2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/07 11:40		
	Units	**SW25T**	**SW25B**	**SW26T**	**SW26B**	**TRIP BLANK**	**RDL**	**QC Batch**
CONVENTIONALS								
Cyanide + Thiocyanate	mg/L	0.0008	0.0008	<0.0005	0.0007	<0.0005	0.0005	2497494
Preparation								
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	FIELD	N/A	ONSITE
Calculated Parameters								
Nitrate (N)	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	2492952
Misc. Inorganics								
Weak Acid Dissoc. Cyanide (CN)	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	2497566
Dissolved Organic Carbon (C)	mg/L	7.8	8.0	8.1	8.6	1.4	0.5	2496509
Alkalinity (Total as CaCO3)	mg/L	250	4.5	4.4	4.6	<0.5	0.5	2495060
Total Organic Carbon (C)	mg/L	6.4	8.0	8.1	8.3	<0.5	0.5	2496466
Anions								
Orthophosphate (P)	mg/L	0.026	0.001	0.004	0.002	0.001	0.001	2493862
Dissolved Sulphate (SO4)	mg/L	7.1	7.3	7.1	7.1	<0.5	0.5	2495075
Dissolved Chloride (Cl)	mg/L	0.6	0.6	0.7	0.9	1.1	0.5	2495065
Nutrients								
Ammonia (N)	mg/L	<0.01	0.01	<0.01	<0.01	<0.01	0.01	2499571
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.28	0.28	0.30	0.24	<0.02	0.02	2493367
Nitrate plus Nitrite (N)	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	2500963
Nitrite (N)	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	2500968
Total Nitrogen (N)	mg/L	0.28	0.28	0.30	0.24	<0.02	0.02	2493809
Physical Properties								
Conductivity	uS/cm	35	35	35	35	1	1	2495056
pH	pH Units	6.9	6.9	6.9	6.9	5.6		2495053
Physical Properties								
Total Suspended Solids	mg/L	1	2	1	1	<1	1	2495036
Total Dissolved Solids	mg/L	32	40	34	34	1	1	2496508
Turbidity	NTU	1.7	1.4	1.5	1.5	<0.1	0.1	2495140

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

CSR/CCME METALS - SOIL (SOIL)

Maxxam ID		L03266		L03267		
Sampling Date		2008/08/04		2008/08/04		
	Units	SW25	QC Batch	SW26	RDL	QC Batch
Misc. Inorganics						
Soluble (2:1) pH	pH Units	5.68	2494170	5.86	0.01	2494170
Total Metals by ICPMS						
Total Aluminum (Al)	mg/kg	9500	2496800	17000	100	2500263
Total Antimony (Sb)	mg/kg	0.2	2496800	0.5	0.1	2500263
Total Arsenic (As)	mg/kg	2.9	2496800	8.0	0.2	2500263
Total Barium (Ba)	mg/kg	72.3	2496800	147	0.1	2500263
Total Beryllium (Be)	mg/kg	0.5	2496800	0.8	0.1	2500263
Total Bismuth (Bi)	mg/kg	0.2	2496800	0.3	0.1	2500263
Total Cadmium (Cd)	mg/kg	0.34	2496800	0.60	0.05	2500263
Total Chromium (Cr)	mg/kg	44	2496800	75	1	2500263
Total Cobalt (Co)	mg/kg	26.0	2496800	49.8	0.3	2500263
Total Copper (Cu)	mg/kg	35.2	2496800	60.8	0.5	2500263
Total Iron (Fe)	mg/kg	20200	2496800	33600	100	2500263
Total Lead (Pb)	mg/kg	6.4	2496800	8.6	0.1	2500263
Total Magnesium (Mg)	mg/kg	5570	2496800	8770	100	2500263
Total Manganese (Mn)	mg/kg	203	2496800	359	0.2	2500263
Total Mercury (Hg)	mg/kg	<0.05	2496800	<0.05	0.05	2500263
Total Molybdenum (Mo)	mg/kg	0.4	2496800	0.8	0.1	2500263
Total Nickel (Ni)	mg/kg	49.7	2496800	81.5	0.8	2500263
Total Phosphorus (P)	mg/kg	572	2496800	591	10	2500263
Total Potassium (K)	mg/kg	2480	2496800	4830	100	2500263
Total Selenium (Se)	mg/kg	<0.5	2496800	<0.5	0.5	2500263
Total Silver (Ag)	mg/kg	0.09	2496800	0.13	0.05	2500263
Total Sodium (Na)	mg/kg	104	2496800	123	100	2500263
Total Strontium (Sr)	mg/kg	15.8	2496800	17.6	0.1	2500263
Total Thallium (Tl)	mg/kg	0.21	2496800	0.38	0.05	2500263
Total Tin (Sn)	mg/kg	0.6	2496800	0.7	0.1	2500263
Total Titanium (Ti)	mg/kg	638	2496800	1030	1	2500263
Total Vanadium (V)	mg/kg	33	2496800	64	2	2500263
Total Zinc (Zn)	mg/kg	52	2496800	88	1	2500263
Total Zirconium (Zr)	mg/kg	4.3	2496800	5.1	0.5	2500263

RDL = Reportable Detection Limit

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		L03216		L03217	L03218	L03219	L03220	L03221	L03222	L03251		
Sampling Date		2008/08/03		2008/08/03	2008/08/03	2008/08/03	2008/08/03	2008/08/03	2008/08/03	2008/08/04		
	Units	**SW21**	**QC Batch**	**SW23**	**SW24**	**SW33**	**SW34**	**SW41**	**SW42**	**SW8**	**RDL**	**QC Batch**
Misc. Inorganics												
Dissolved Hardness (CaCO3)	mg/L	6.4	2492344	15.7	6.2	97.8	216	6.5	6.5	13.9	0.5	2493791
Dissolved Metals by ICPMS												
Dissolved Aluminum (Al)	mg/L	0.0066	2495974	0.0267	0.0057	0.0184	0.0087	0.0058	0.0066	0.0674	0.0002	2495974
Dissolved Antimony (Sb)	mg/L	<0.00002	2495974	<0.00002	<0.00002	0.00007	0.00007	<0.00002	<0.00002	<0.00002	0.00002	2495974
Dissolved Arsenic (As)	mg/L	0.00008	2495974	0.00026	0.00007	0.00309	0.00180	0.00008	0.00008	0.00035	0.00002	2495974
Dissolved Barium (Ba)	mg/L	0.00648	2495974	0.00944	0.00627	0.0152	0.0140	0.00651	0.00656	0.00886	0.00002	2495974
Dissolved Beryllium (Be)	mg/L	<0.00001	2495974	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	0.00001	2495974
Dissolved Bismuth (Bi)	mg/L	<0.000005	2495974	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2495974
Dissolved Boron (B)	mg/L	<0.05	2495974	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2495974
Dissolved Cadmium (Cd)	mg/L	<0.000005	2495974	0.000007	<0.000005	<0.000005	0.000051(1)	0.000034(1)	<0.000005	0.000008	0.000005	2495974
Dissolved Chromium (Cr)	mg/L	<0.0001	2495974	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0003	0.0001	2495974
Dissolved Cobalt (Co)	mg/L	<0.000005	2495974	0.000045	0.000005	0.000254	0.00133	<0.000005	<0.000005	0.000845	0.000005	2495974
Dissolved Copper (Cu)	mg/L	0.00034	2495974	0.00105	0.00028	0.00281	0.00097	0.00036	0.00031	0.00240	0.00005	2495974
Dissolved Iron (Fe)	mg/L	0.008	2495974	0.073	0.006	0.093	0.017	0.006	0.007	0.675	0.001	2495974
Dissolved Lead (Pb)	mg/L	0.000016	2495974	0.000014	0.000006	0.000020	0.000143	0.000014	0.000008	0.000055	0.000005	2495974
Dissolved Lithium (Li)	mg/L	0.0006	2495974	0.0007	0.0006	0.0012	0.0007	0.0007	0.0006	0.0007	0.0005	2495974
Dissolved Manganese (Mn)	mg/L	0.00108	2495974	0.00556	0.00064	0.0231	0.00605	0.00106	0.00111	0.0448	0.00005	2495974
Dissolved Mercury (Hg)	mg/L	<0.00001	2495974	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2495974
Dissolved Molybdenum (Mo)	mg/L	<0.00005	2495974	<0.00005	<0.00005	0.00053	0.00054	<0.00005	<0.00005	<0.00005	0.00005	2495974
Dissolved Nickel (Ni)	mg/L	0.00016	2495974	0.00128	0.00015	0.00400	0.00079	0.00014	0.00015	0.00223	0.00002	2495974
Dissolved Phosphorus (P)	mg/L	<0.002	2495974	0.002	<0.002	0.012	<0.002	<0.002	<0.002	0.003	0.002	2495974
Dissolved Selenium (Se)	mg/L	<0.00004	2495974	<0.00004	<0.00004	0.00012	0.00006	<0.00004	<0.00004	<0.00004	0.00004	2495974
Dissolved Silicon (Si)	mg/L	0.1	2495974	0.6	0.1	0.2	0.2	0.1	0.1	0.2	0.1	2495974
Dissolved Silver (Ag)	mg/L	<0.000005	2495974	<0.000005	<0.000005	0.000008	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2495974
Dissolved Strontium (Sr)	mg/L	0.00898	2495974	0.0155	0.00883	0.114	0.228	0.00903	0.00883	0.0139	0.00005	2495974
Dissolved Thallium (Tl)	mg/L	<0.000002	2495974	<0.000002	<0.000002	<0.000002	0.000003	<0.000002	<0.000002	<0.000002	0.000002	2495974
Dissolved Tin (Sn)	mg/L	<0.00001	2495974	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2495974
Dissolved Titanium (Ti)	mg/L	<0.0005	2495974	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	0.0005	2495974
Dissolved Uranium (U)	mg/L	0.000038	2495974	0.000046	0.000038	0.000649	0.000417	0.000042	0.000039	0.000095	0.000002	2495974
Dissolved Vanadium (V)	mg/L	<0.0002	2495974	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	2495974
Dissolved Zinc (Zn)	mg/L	0.0008	2495974	0.0005	0.0004	0.0005	0.0013(1)	0.0004	0.0006	0.0016(1)	0.0001	2495974
Dissolved Zirconium (Zr)	mg/L	<0.0001	2495974	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.0001	2495974
Dissolved Calcium (Ca)	mg/L	1.49	2498910	3.95	1.45	24.4	56.8	1.52	1.52	3.83	0.05	2498910
Dissolved Magnesium (Mg)	mg/L	0.65	2498910	1.41	0.63	8.98	18.1	0.66	0.66	1.06	0.05	2498910

RDL = Reportable Detection Limit
(1) - dissolved > total Metals, reanalyzed & confirmed. Possible trace level of field-filtered contamination on dissolved metal bottle or there is a discrepancy between samples taken.

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		L03216		L03217	L03218	L03219	L03220	L03221	L03222	L03251		
Sampling Date		2008/08/03		2008/08/03	2008/08/03	2008/08/03	2008/08/03	2008/08/03	2008/08/03	2008/08/04		
	Units	**SW21**	**QC Batch**	**SW23**	**SW24**	**SW33**	**SW34**	**SW41**	**SW42**	**SW8**	**RDL**	**QC Batch**
Dissolved Potassium (K)	mg/L	0.36	2498910	0.69	0.35	1.67	3.24	0.36	0.37	0.58	0.05	2498910
Dissolved Sodium (Na)	mg/L	0.44	2498910	0.51	0.43	11.3	23.6	0.47	0.46	0.59	0.05	2498910
Dissolved Sulphur (S)	mg/L	<3	2498910	<3	<3	12	72	<3	<3	<3	3	2498910

RDL = Reportable Detection Limit

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		L03257	L03258	L03259	L03260	L03261	L03262	L03263	L03264	L03265		
Sampling Date		2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/07 11:40		
	Units	**SW9**	**SW15U**	**SW15D**	**SW40**	**SW25T**	**SW25B**	**SW26T**	**SW26B**	**TRIP BLANK**	**RDL**	**QC Batch**
Misc. Inorganics												
Dissolved Hardness (CaCO3)	mg/L	15.5	24.4	24.7	<0.5	13.7	14.0	13.8	13.7	<0.5	0.5	2493791
Dissolved Metals by ICPMS												
Dissolved Aluminum (Al)	mg/L	0.0646	0.0470	0.0468	0.0009	0.0646	0.0650	0.0641	0.0653	0.0002	0.0002	2495974
Dissolved Antimony (Sb)	mg/L	<0.00002	0.00005	0.00005	<0.00002	0.00002	0.00002	0.00003	0.00002	<0.00002	0.00002	2495974
Dissolved Arsenic (As)	mg/L	0.00033	0.00102	0.00081	<0.00002	0.00034	0.00034	0.00035	0.00035	<0.00002	0.00002	2495974
Dissolved Barium (Ba)	mg/L	0.0100	0.0162	0.0169	0.00008	0.00919	0.00943	0.00946	0.00944	<0.00002	0.00002	2495974
Dissolved Beryllium (Be)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	0.00001	0.00001	0.00001	<0.00001	0.00001	2495974
Dissolved Bismuth (Bi)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2495974
Dissolved Boron (B)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2495974
Dissolved Cadmium (Cd)	mg/L	0.000016	<0.000005	<0.000005	<0.000005	0.000012	0.000022	0.000020	0.000015	<0.000005	0.000005	2495974
Dissolved Chromium (Cr)	mg/L	0.0003	0.0002	0.0002	<0.0001	0.0002	0.0003	0.0003	0.0003	<0.0001	0.0001	2495974
Dissolved Cobalt (Co)	mg/L	0.000947	0.000395	0.000418	<0.000005	0.000235	0.000230	0.000190	0.000187	<0.000005	0.000005	2495974
Dissolved Copper (Cu)	mg/L	0.00206	0.00129	0.00124	0.00005	0.00304	0.00309	0.00304	0.00303	<0.00005	0.00005	2495974
Dissolved Iron (Fe)	mg/L	1.02	0.305	0.223	<0.001	0.307	0.290	0.301	0.297	<0.001	0.001	2495974
Dissolved Lead (Pb)	mg/L	0.000083	0.000034	0.000014	0.000011	0.000052	0.000068	0.000077	0.000055	<0.000005	0.000005	2495974
Dissolved Lithium (Li)	mg/L	0.0006	0.0007	0.0007	<0.0005	0.0007	0.0008	0.0007	0.0007	<0.0005	0.0005	2495974
Dissolved Manganese (Mn)	mg/L	0.0387	0.0248	0.0193	0.00008	0.0106	0.0109	0.00962	0.00937	<0.00005	0.00005	2495974
Dissolved Mercury (Hg)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2495974
Dissolved Molybdenum (Mo)	mg/L	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00005	2495974
Dissolved Nickel (Ni)	mg/L	0.00255	0.00245	0.00254	<0.00002	0.00262	0.00266	0.00265	0.00262	<0.00002	0.00002	2495974
Dissolved Phosphorus (P)	mg/L	0.005	0.004	0.003	<0.002	0.002	<0.002	<0.002	0.002	<0.002	0.002	2495974
Dissolved Selenium (Se)	mg/L	<0.00004	0.00004	0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00004	2495974
Dissolved Silicon (Si)	mg/L	0.3	0.4	0.4	<0.1	0.2	0.2	0.2	0.2	<0.1	0.1	2495974
Dissolved Silver (Ag)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2495974
Dissolved Strontium (Sr)	mg/L	0.0151	0.0232	0.0240	<0.00005	0.0132	0.0133	0.0137	0.0137	<0.00005	0.00005	2495974
Dissolved Thallium (Tl)	mg/L	<0.000002	0.000002	0.000003	<0.000002	0.000002	<0.000002	0.000002	<0.000002	<0.000002	0.000002	2495974
Dissolved Tin (Sn)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00003	<0.00001	0.00002	<0.00001	0.00001	2495974
Dissolved Titanium (Ti)	mg/L	0.0010	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	2495974
Dissolved Uranium (U)	mg/L	0.000081	0.000069	0.000070	<0.000002	0.000131	0.000130	0.000132	0.000128	<0.000002	0.000002	2495974
Dissolved Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	2495974
Dissolved Zinc (Zn)	mg/L	0.0016	0.0012(1)	0.0006	0.0003	0.0014	0.0013	0.0013	0.0012	0.0002	0.0001	2495974
Dissolved Zirconium (Zr)	mg/L	0.0002	0.0002	0.0002	<0.0001	0.0002	0.0002	0.0002	0.0002	<0.0001	0.0001	2495974
Dissolved Calcium (Ca)	mg/L	4.28	7.21	7.29	<0.05	3.77	3.86	3.80	3.77	<0.05	0.05	2498910
Dissolved Magnesium (Mg)	mg/L	1.16	1.54	1.57	<0.05	1.05	1.06	1.05	1.04	<0.05	0.05	2498910

RDL = Reportable Detection Limit
(1) - dissolved > total Metals, reanalyzed & confirmed. Possible trace level of field-filtered contamination on dissolved metal bottle or there is a discrepancy between samples taken.

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		L03257	L03258	L03259	L03260	L03261	L03262	L03263	L03264	L03265		
Sampling Date		2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/07 11:40		
	Units	**SW9**	**SW15U**	**SW15D**	**SW40**	**SW25T**	**SW25B**	**SW26T**	**SW26B**	**TRIP BLANK**	**RDL**	**QC Batch**
Dissolved Potassium (K)	mg/L	0.48	0.75	0.76	<0.05	0.60	0.61	0.60	0.59	<0.05	0.05	2498910
Dissolved Sodium (Na)	mg/L	0.59	0.84	0.81	<0.05	0.60	0.60	0.60	0.60	<0.05	0.05	2498910
Dissolved Sulphur (S)	mg/L	<3	<3	<3	<3	<3	<3	<3	<3	<3	3	2498910

RDL = Reportable Detection Limit

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		L03216	L03217	L03218	L03219	L03220	L03221	L03222	L03251	L03257	L03258		
Sampling Date		2008/08/03	2008/08/03	2008/08/03	2008/08/03	2008/08/03	2008/08/03	2008/08/03	2008/08/04	2008/08/04	2008/08/04		
	Units	**SW21**	**SW23**	**SW24**	**SW33**	**SW34**	**SW41**	**SW42**	**SW8**	**SW9**	**SW15U**	**RDL**	**QC Batch**
Calculated Parameters													
Total Hardness (CaCO3)	mg/L	6.4	16.3	6.7	99.4	219	6.7	6.7	14.7	16.2	25.5	0.5	2493051
Total Metals by ICPMS													
Total Aluminum (Al)	mg/L	0.0090	0.0362	0.0093	0.0274	0.0186	0.0077	0.0082	0.0926	0.110	0.0734	0.0002	2494187
Total Antimony (Sb)	mg/L	<0.00002	<0.00002	<0.00002	0.00008	0.00007	<0.00002	<0.00002	<0.00002	0.00002	0.00005	0.00002	2494187
Total Arsenic (As)	mg/L	0.00008	0.00029	0.00008	0.00339	0.00236	0.00010	0.00008	0.00040	0.00042	0.00143	0.00002	2494187
Total Barium (Ba)	mg/L	0.00705	0.0101	0.00669	0.0157	0.0154	0.00646	0.00673	0.00927	0.0116	0.0159	0.00002	2494187
Total Beryllium (Be)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	0.00002	<0.00001	0.00001	2494187
Total Bismuth (Bi)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000007	<0.000005	0.000005	2494187
Total Boron (B)	mg/L	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2494187
Total Cadmium (Cd)	mg/L	<0.000005	0.000007	0.000044	0.000007	0.000007	<0.000005	<0.000005	0.000015	0.000026	<0.000005	0.000005	2494187
Total Chromium (Cr)	mg/L	<0.0001	0.0002	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	0.0003	0.0004	0.0003	0.0001	2494187
Total Cobalt (Co)	mg/L	0.000010	0.000107	0.000013	0.000288	0.00148	0.000010	0.000011	0.000955	0.00236	0.000613	0.000005	2494187
Total Copper (Cu)	mg/L	0.00035	0.00113	0.00044	0.00321	0.00113	0.00034	0.00032	0.00288	0.00263	0.00155	0.00005	2494187
Total Iron (Fe)	mg/L	0.018	0.130	0.017	0.170	0.079	0.018	0.018	1.01	2.07	0.761	0.001	2494187
Total Lead (Pb)	mg/L	0.000022	0.000016	0.000068	0.000058	0.000452	0.000010	0.000007	0.000082	0.000149	0.000095	0.000005	2494187
Total Lithium (Li)	mg/L	0.0006	0.0006	0.0005	0.0011	0.0008	0.0006	0.0005	0.0006	0.0006	0.0006	0.0005	2494187
Total Manganese (Mn)	mg/L	0.00376	0.0165	0.00322	0.0379	0.0165	0.00391	0.00394	0.0495	0.100	0.0352	0.00005	2494187
Total Mercury (Hg)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2494187
Total Molybdenum (Mo)	mg/L	<0.00005	<0.00005	<0.00005	0.00053	0.00056	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00005	2494187
Total Nickel (Ni)	mg/L	0.00019	0.00145	0.00018	0.00434	0.00095	0.00016	0.00017	0.00247	0.00332	0.00281	0.00002	2494187
Total Phosphorus (P)	mg/L	0.003	0.005	0.005	0.026	0.006	0.003	0.003	0.006	0.007	0.012	0.002	2494187
Total Selenium (Se)	mg/L	<0.00004	<0.00004	<0.00004	0.00013	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00004	2494187
Total Silicon (Si)	mg/L	0.1	0.7	0.1	0.3	0.2	0.1	0.1	0.2	0.4	0.3	0.1	2494187
Total Silver (Ag)	mg/L	<0.000005	<0.000005	<0.000005	0.000016	0.000006	<0.000005	<0.000005	<0.000005	0.000009	<0.000005	0.000005	2494187
Total Strontium (Sr)	mg/L	0.00948	0.0154	0.00939	0.118	0.240	0.00856	0.00907	0.0141	0.0158	0.0222	0.00005	2494187
Total Thallium (Tl)	mg/L	<0.000002	<0.000002	<0.000002	0.000002	0.000003	<0.000002	<0.000002	<0.000002	<0.000002	0.000003	0.000002	2494187
Total Tin (Sn)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2494187
Total Titanium (Ti)	mg/L	<0.0005	0.0007	<0.0005	0.0010	0.0009	<0.0005	<0.0005	0.0011	0.0014	0.0017	0.0005	2494187
Total Uranium (U)	mg/L	0.000050	0.000056	0.000046	0.000674	0.000457	0.000044	0.000047	0.000123	0.000121	0.000084	0.000002	2494187
Total Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	2494187
Total Zinc (Zn)	mg/L	0.0008	0.0007	0.0022	0.0011	0.0011	0.0003	0.0003	0.0013	0.0026	0.0007	0.0001	2494187
Total Zirconium (Zr)	mg/L	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.0002	0.0002	0.0001	2494187
Total Calcium (Ca)	mg/L	1.51	4.11	1.59	24.5	56.8	1.55	1.57	4.05	4.48	7.59	0.05	2503013
Total Magnesium (Mg)	mg/L	0.65	1.47	0.67	9.25	18.8	0.68	0.67	1.11	1.22	1.58	0.05	2503013
Total Potassium (K)	mg/L	0.37	0.71	0.37	1.71	3.31	0.37	0.37	0.60	0.50	0.77	0.05	2503013

RDL = Reportable Detection Limit

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		L03216	L03217	L03218	L03219	L03220	L03221	L03222	L03251	L03257	L03258		
Sampling Date		2008/08/03	2008/08/03	2008/08/03	2008/08/03	2008/08/03	2008/08/03	2008/08/03	2008/08/04	2008/08/04	2008/08/04		
	Units	**SW21**	**SW23**	**SW24**	**SW33**	**SW34**	**SW41**	**SW42**	**SW8**	**SW9**	**SW15U**	**RDL**	**QC Batch**
Total Sodium (Na)	mg/L	0.46	0.52	0.48	11.3	23.9	0.48	0.47	0.60	0.61	0.86	0.05	2503013
Total Sulphur (S)	mg/L	<3	<3	<3	13	76	<3	<3	3	3	<3	3	2503013

RDL = Reportable Detection Limit

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		L03259	L03260	L03261	L03262	L03263	L03264	L03265		
Sampling Date		2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/07 11:40		
	Units	**SW15D**	**SW40**	**SW25T**	**SW25B**	**SW26T**	**SW26B**	**TRIP BLANK**	**RDL**	**QC Batch**
Calculated Parameters										
Total Hardness (CaCO3)	mg/L	25.6	<0.5	13.5	13.7	13.7	13.9	<0.5	0.5	2493051
Total Metals by ICPMS										
Total Aluminum (Al)	mg/L	0.0630	0.0022	0.0935	0.0957	0.0924	0.0930	0.0005	0.0002	2494187
Total Antimony (Sb)	mg/L	0.00005	<0.00002	0.00002	0.00004	0.00002	0.00002	<0.00002	0.00002	2494187
Total Arsenic (As)	mg/L	0.00100	<0.00002	0.00036	0.00042	0.00036	0.00038	<0.00002	0.00002	2494187
Total Barium (Ba)	mg/L	0.0173	0.00003	0.00932	0.0121	0.00964	0.00994	<0.00002	0.00002	2494187
Total Beryllium (Be)	mg/L	<0.00001	<0.00001	0.00002	0.00002	0.00002	0.00002	<0.00001	0.00001	2494187
Total Bismuth (Bi)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2494187
Total Boron (B)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2494187
Total Cadmium (Cd)	mg/L	0.000007	<0.000005	0.000017	0.000066	0.000013	0.000013	<0.000005	0.000005	2494187
Total Chromium (Cr)	mg/L	0.0003	<0.0001	0.0004	0.0008	0.0003	0.0003	<0.0001	0.0001	2494187
Total Cobalt (Co)	mg/L	0.000498	<0.000005	0.000453	0.000466	0.000401	0.000412	<0.000005	0.000005	2494187
Total Copper (Cu)	mg/L	0.00148	<0.00005	0.00333	0.00358	0.00329	0.00335	<0.00005	0.00005	2494187
Total Iron (Fe)	mg/L	0.433	<0.001	0.551	0.544	0.502	0.535	<0.001	0.001	2494187
Total Lead (Pb)	mg/L	0.000033	0.000008	0.000080	0.000517	0.000069	0.000078	<0.000005	0.000005	2494187
Total Lithium (Li)	mg/L	0.0006	<0.0005	0.0006	0.0007	0.0007	0.0007	<0.0005	0.0005	2494187
Total Manganese (Mn)	mg/L	0.0239	0.00005	0.0194	0.0197	0.0177	0.0185	<0.00005	0.00005	2494187
Total Mercury (Hg)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2494187
Total Molybdenum (Mo)	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00005	2494187
Total Nickel (Ni)	mg/L	0.00278	0.00002	0.00270	0.00279	0.00274	0.00284	<0.00002	0.00002	2494187
Total Phosphorus (P)	mg/L	0.009	<0.002	0.006	0.005	0.005	0.005	<0.002	0.002	2494187
Total Selenium (Se)	mg/L	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00004	2494187
Total Silicon (Si)	mg/L	0.4	<0.1	0.3	0.3	0.2	0.2	<0.1	0.1	2494187
Total Silver (Ag)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2494187
Total Strontium (Sr)	mg/L	0.0236	<0.00005	0.0132	0.0134	0.0134	0.0136	<0.00005	0.00005	2494187
Total Thallium (Tl)	mg/L	0.000002	<0.000002	<0.000002	0.000002	<0.000002	0.000002	<0.000002	0.000002	2494187
Total Tin (Sn)	mg/L	<0.00001	<0.00001	0.00001	0.00009	<0.00001	<0.00001	<0.00001	0.00001	2494187
Total Titanium (Ti)	mg/L	0.0015	<0.0005	0.0011	0.0008	0.0008	0.0012	<0.0005	0.0005	2494187
Total Uranium (U)	mg/L	0.000076	<0.000002	0.000154	0.000157	0.000155	0.000157	<0.000002	0.000002	2494187
Total Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	2494187
Total Zinc (Zn)	mg/L	0.0013	0.0003	0.0016	0.0028	0.0019	0.0015	0.0001	0.0001	2494187
Total Zirconium (Zr)	mg/L	0.0002	<0.0001	0.0002	0.0002	0.0002	0.0002	<0.0001	0.0001	2494187
Total Calcium (Ca)	mg/L	7.61	<0.05	3.70	3.77	3.79	3.83	<0.05	0.05	2503013
Total Magnesium (Mg)	mg/L	1.61	<0.05	1.02	1.04	1.03	1.06	<0.05	0.05	2503013
Total Potassium (K)	mg/L	0.80	<0.05	0.58	0.58	0.59	0.60	<0.05	0.05	2503013

RDL = Reportable Detection Limit

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		L03259	L03260	L03261	L03262	L03263	L03264	L03265		
Sampling Date		2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/04	2008/08/07 11:40		
	Units	**SW15D**	**SW40**	**SW25T**	**SW25B**	**SW26T**	**SW26B**	**TRIP BLANK**	**RDL**	**QC Batch**
Total Sodium (Na)	mg/L	0.86	<0.05	0.59	0.61	0.59	0.62	<0.05	0.05	2503013
Total Sulphur (S)	mg/L	<3	<3	3	4	3	3	<3	3	2503013

RDL = Reportable Detection Limit

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2493809	Total Nitrogen (N)	2008/08/20	102	80 - 120	98	80 - 120	<0.02	mg/L	NC	25		
2493862	Orthophosphate (P)	2008/08/11	95	80 - 120	106	80 - 120	0.002, RDL=0.001	mg/L	NC	20		
2494170	Soluble (2:1) pH	2008/08/11			100	N/A			0.2	20		
2494187	Total Arsenic (As)	2008/08/12	100	75 - 125	98	75 - 125	<0.00002	mg/L	NC	25		
2494187	Total Beryllium (Be)	2008/08/12	106	75 - 125	98	75 - 125	<0.00001	mg/L	NC	25		
2494187	Total Cadmium (Cd)	2008/08/12	108	75 - 125	98	75 - 125	<0.000005	mg/L	NC	25		
2494187	Total Chromium (Cr)	2008/08/12	104	75 - 125	99	75 - 125	<0.0001	mg/L	NC	25		
2494187	Total Cobalt (Co)	2008/08/12	104	75 - 125	99	75 - 125	<0.000005	mg/L	NC	25		
2494187	Total Copper (Cu)	2008/08/12	107	75 - 125	102	75 - 125	<0.00005	mg/L	4.4	25		
2494187	Total Lead (Pb)	2008/08/12	101	75 - 125	99	75 - 125	<0.000005	mg/L	NC	25		
2494187	Total Lithium (Li)	2008/08/12	107	75 - 125	99	75 - 125	<0.0005	mg/L	NC	25		
2494187	Total Nickel (Ni)	2008/08/12	105	75 - 125	98	75 - 125	<0.00002	mg/L	23.0	25		
2494187	Total Selenium (Se)	2008/08/12	103	75 - 125	98	75 - 125	<0.00004	mg/L	NC	25		
2494187	Total Uranium (U)	2008/08/12	102	75 - 125	100	75 - 125	<0.000002	mg/L	9.0	25		
2494187	Total Vanadium (V)	2008/08/12	102	75 - 125	97	75 - 125	<0.0002	mg/L	NC	25		
2494187	Total Zinc (Zn)	2008/08/12	113	75 - 125	106	75 - 125	<0.0001	mg/L	13.0	25		
2494187	Total Aluminum (Al)	2008/08/12					0.0002, RDL=0.0002	mg/L	5.2	25		
2494187	Total Antimony (Sb)	2008/08/12					<0.00002	mg/L	NC	25		
2494187	Total Barium (Ba)	2008/08/12					<0.00002	mg/L	5.5	25		
2494187	Total Bismuth (Bi)	2008/08/12					<0.000005	mg/L	NC	25		
2494187	Total Boron (B)	2008/08/12					<0.05	mg/L	NC	25		
2494187	Total Iron (Fe)	2008/08/12					<0.001	mg/L	1.1	25		
2494187	Total Manganese (Mn)	2008/08/12					<0.00005	mg/L	4.0	25		
2494187	Total Mercury (Hg)	2008/08/12					<0.00001	mg/L	NC	25		
2494187	Total Molybdenum (Mo)	2008/08/12					<0.00005	mg/L	NC	25		
2494187	Total Phosphorus (P)	2008/08/12					<0.002	mg/L	NC	25		
2494187	Total Silicon (Si)	2008/08/12					<0.1	mg/L	NC	25		
2494187	Total Silver (Ag)	2008/08/12					<0.000005	mg/L	NC	25		
2494187	Total Strontium (Sr)	2008/08/12					<0.00005	mg/L	3.8	25		
2494187	Total Thallium (Tl)	2008/08/12					<0.000002	mg/L	NC	25		
2494187	Total Tin (Sn)	2008/08/12					<0.00001	mg/L	NC	25		
2494187	Total Titanium (Ti)	2008/08/12					<0.0005	mg/L	NC	25		
2494187	Total Zirconium (Zr)	2008/08/12					<0.0001	mg/L	NC	25		
2495036	Total Suspended Solids	2008/08/09			99	N/A	<1	mg/L				
2495055	Moisture	2008/08/10					<0.3	%	0.1	20		
2495056	Conductivity	2008/08/10			99	80 - 120	<1	uS/cm	0	25		
2495060	Alkalinity (Total as CaCO3)	2008/08/10	NC	80 - 120	90	80 - 120	<0.5	mg/L	0.8	25		
2495065	Dissolved Chloride (Cl)	2008/08/09	98	80 - 120	87	80 - 120	<0.5	mg/L	0.7	20		
2495075	Dissolved Sulphate (SO4)	2008/08/09	NC	75 - 125	98	80 - 120	<0.5	mg/L	3.4	20		

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2495140	Turbidity	2008/08/11			104	80 - 120	<0.1	NTU	10.1	25		
2495974	Dissolved Arsenic (As)	2008/12/08	95	75 - 125	97	75 - 125	<0.00002	mg/L	2.0	25		
2495974	Dissolved Beryllium (Be)	2008/12/08	104	75 - 125	95	75 - 125	<0.00001	mg/L	NC	25		
2495974	Dissolved Cadmium (Cd)	2008/12/08	102	75 - 125	98	75 - 125	<0.000005	mg/L	NC	25		
2495974	Dissolved Chromium (Cr)	2008/12/08	96	75 - 125	97	75 - 125	<0.0001	mg/L	NC	25		
2495974	Dissolved Cobalt (Co)	2008/12/08	96	75 - 125	97	75 - 125	<0.000005	mg/L	12.9	25		
2495974	Dissolved Copper (Cu)	2008/12/08	97	75 - 125	99	75 - 125	<0.00005	mg/L	6.0	25		
2495974	Dissolved Lead (Pb)	2008/12/08	101	75 - 125	97	75 - 125	<0.000005	mg/L	NC	25		
2495974	Dissolved Lithium (Li)	2008/12/08	107	75 - 125	100	75 - 125	<0.0005	mg/L	NC	25		
2495974	Dissolved Nickel (Ni)	2008/12/08	96	75 - 125	96	75 - 125	<0.00002	mg/L	5.6	25		
2495974	Dissolved Selenium (Se)	2008/12/08	102	75 - 125	99	75 - 125	<0.00004	mg/L	NC	25		
2495974	Dissolved Uranium (U)	2008/12/08	102	75 - 125	96	75 - 125	<0.000002	mg/L	0.7	25		
2495974	Dissolved Vanadium (V)	2008/12/08	96	75 - 125	99	75 - 125	0.0004, RDL=0.0002	mg/L	NC	25		
2495974	Dissolved Zinc (Zn)	2008/12/08	100	75 - 125	102	75 - 125	<0.0001	mg/L	NC	25		
2495974	Dissolved Aluminum (Al)	2008/12/08					<0.0002	mg/L	3.9	25		
2495974	Dissolved Antimony (Sb)	2008/12/08					<0.00002	mg/L	NC	25		
2495974	Dissolved Barium (Ba)	2008/12/08					<0.00002	mg/L	2.4	25		
2495974	Dissolved Bismuth (Bi)	2008/12/08					<0.000005	mg/L	NC	25		
2495974	Dissolved Boron (B)	2008/12/08					<0.05	mg/L	NC	25		
2495974	Dissolved Iron (Fe)	2008/12/08					<0.001	mg/L	1.1	25		
2495974	Dissolved Manganese (Mn)	2008/12/08					<0.00005	mg/L	2.3	25		
2495974	Dissolved Mercury (Hg)	2008/12/08					<0.00001	mg/L	NC	25		
2495974	Dissolved Molybdenum (Mo)	2008/12/08					<0.00005	mg/L	NC	25		
2495974	Dissolved Phosphorus (P)	2008/12/08					<0.002	mg/L	NC	25		
2495974	Dissolved Silicon (Si)	2008/12/08					<0.1	mg/L	1.9	25		
2495974	Dissolved Silver (Ag)	2008/12/08					<0.000005	mg/L	NC	25		
2495974	Dissolved Strontium (Sr)	2008/12/08					<0.00005	mg/L	3.1	25		
2495974	Dissolved Thallium (Tl)	2008/12/08					<0.000002	mg/L	NC	25		
2495974	Dissolved Tin (Sn)	2008/12/08					<0.00001	mg/L	NC	25		
2495974	Dissolved Titanium (Ti)	2008/12/08					<0.0005	mg/L	NC	25		
2495974	Dissolved Zirconium (Zr)	2008/12/08					<0.0001	mg/L	NC	25		
2496466	Total Organic Carbon (C)	2008/08/11	95	80 - 120	109	80 - 120	<0.5	mg/L	NC	20		
2496508	Total Dissolved Solids	2008/08/11	92	80 - 120	108	80 - 120	<1	mg/L	6.1	25		
2496509	Dissolved Organic Carbon (C)	2008/08/11	108	80 - 120	109	80 - 120	<0.5	mg/L	11.3	20		
2496800	Total Arsenic (As)	2008/08/12	120	75 - 125	116	75 - 125	<0.2	mg/kg	13.8	35	101	75 - 125
2496800	Total Beryllium (Be)	2008/08/12	119	75 - 125	112	75 - 125	<0.1	mg/kg	15.6	35		
2496800	Total Cadmium (Cd)	2008/08/12	116	75 - 125	119	75 - 125	<0.05	mg/kg	5.3	35	104	75 - 125
2496800	Total Chromium (Cr)	2008/08/12	115	75 - 125	109	75 - 125	<1	mg/kg	4.7	35	104	75 - 125
2496800	Total Cobalt (Co)	2008/08/12	117	75 - 125	112	75 - 125	<0.3	mg/kg	2.2	35	105	75 - 125

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2496800	Total Copper (Cu)	2008/08/12	117	75 - 125	117	75 - 125	<0.5	mg/kg	2.5	35	98	75 - 125
2496800	Total Lead (Pb)	2008/08/12	115	75 - 125	121	75 - 125	<0.1	mg/kg	8.9	35	106	75 - 125
2496800	Total Mercury (Hg)	2008/08/12	103	75 - 125	117	75 - 125	<0.05	mg/kg	NC	35		
2496800	Total Nickel (Ni)	2008/08/12	NC	75 - 125	109	75 - 125	<0.8	mg/kg	0.7	35	100	75 - 125
2496800	Total Selenium (Se)	2008/08/12	117	75 - 125	121	75 - 125	<0.5	mg/kg	NC	35		
2496800	Total Vanadium (V)	2008/08/12	NC	75 - 125	111	75 - 125	<2	mg/kg	3.6	35	103	75 - 125
2496800	Total Zinc (Zn)	2008/08/12	NC	75 - 125	115	75 - 125	<1	mg/kg	0.06	35	99	75 - 125
2496800	Total Aluminum (Al)	2008/08/12					<100	mg/kg	8.3	35	106	75 - 125
2496800	Total Antimony (Sb)	2008/08/12					<0.1	mg/kg	NC	35	104	75 - 125
2496800	Total Barium (Ba)	2008/08/12					<0.1	mg/kg	0.8	35	111	75 - 125
2496800	Total Bismuth (Bi)	2008/08/12					<0.1	mg/kg	NC	35	93	75 - 125
2496800	Total Iron (Fe)	2008/08/12					<100	mg/kg	0.9	35	105	75 - 125
2496800	Total Magnesium (Mg)	2008/08/12					<100	mg/kg	3.5	35	106	75 - 125
2496800	Total Manganese (Mn)	2008/08/12					<0.2	mg/kg	3.3	35	104	75 - 125
2496800	Total Molybdenum (Mo)	2008/08/12					<0.1	mg/kg	NC	35	103	75 - 125
2496800	Total Phosphorus (P)	2008/08/12					<10	mg/kg	0.008	35	100	75 - 125
2496800	Total Silver (Ag)	2008/08/12					<0.05	mg/kg	NC	35	104	75 - 125
2496800	Total Strontium (Sr)	2008/08/12					<0.1	mg/kg	4.6	35	101	75 - 125
2496800	Total Thallium (Tl)	2008/08/12					<0.05	mg/kg	NC	35	82	75 - 125
2496800	Total Titanium (Ti)	2008/08/12					<1	mg/kg	3.5	35	109	75 - 125
2496800	Total Potassium (K)	2008/08/12					<100	mg/kg	3.3	35		
2496800	Total Sodium (Na)	2008/08/12					<100	mg/kg	NC	35		
2496800	Total Tin (Sn)	2008/08/12					<0.1	mg/kg	NC	35		
2496800	Total Zirconium (Zr)	2008/08/12					<0.5	mg/kg	5.7	35		
2497494	Cyanide + Thiocyanate	2008/08/11	98	80 - 120	118	80 - 120	<0.0005	mg/L	NC	35		
2497566	Weak Acid Dissoc. Cyanide (CN)	2008/08/11	102	80 - 120	94	80 - 120	<0.0005	mg/L	NC	20		
2498910	Dissolved Calcium (Ca)	2008/12/08					<0.05	mg/L	1.7	25		
2498910	Dissolved Magnesium (Mg)	2008/12/08					<0.05	mg/L	1.1	25		
2498910	Dissolved Potassium (K)	2008/12/08					<0.05	mg/L	1.5	25		
2498910	Dissolved Sodium (Na)	2008/12/08					<0.05	mg/L	5.0	25		
2498910	Dissolved Sulphur (S)	2008/12/08					<3	mg/L	NC	25		
2499571	Ammonia (N)	2008/08/12	85	80 - 120	99	80 - 120	<0.01	mg/L	0.7	25		
2500263	Total Arsenic (As)	2008/08/12	110	75 - 125	120	75 - 125	0.3, RDL=0.2	mg/kg	0.7	35	96	75 - 125
2500263	Total Beryllium (Be)	2008/08/12	99	75 - 125	113	75 - 125	<0.1	mg/kg	2.2	35		
2500263	Total Cadmium (Cd)	2008/08/12	106	75 - 125	113	75 - 125	<0.05	mg/kg	2.4	35	96	75 - 125
2500263	Total Chromium (Cr)	2008/08/12	104	75 - 125	113	75 - 125	<1	mg/kg	1.1	35	98	75 - 125
2500263	Total Cobalt (Co)	2008/08/12	103	75 - 125	114	75 - 125	<0.3	mg/kg	2.3	35	98	75 - 125
2500263	Total Copper (Cu)	2008/08/12	103	75 - 125	119	75 - 125	<0.5	mg/kg	3.9	35	93	75 - 125
2500263	Total Lead (Pb)	2008/08/12	109	75 - 125	114	75 - 125	<0.1	mg/kg	0.8	35	101	75 - 125

Maxxam Job #: A839798
Report Date: 2008/08/15

GARTNER LEE LTD.
Client Project #: 70562
Site Reference: CULLATON LAKE
Your P.O. #: CULLATON LAKE
Sampler Initials: KW

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2500263	Total Mercury (Hg)	2008/08/12	106	75 - 125	106	75 - 125	<0.05	mg/kg	NC	35		
2500263	Total Nickel (Ni)	2008/08/12	104	75 - 125	117	75 - 125	<0.8	mg/kg	0.3	35	104	75 - 125
2500263	Total Selenium (Se)	2008/08/12	111	75 - 125	120	75 - 125	<0.5	mg/kg	NC	35		
2500263	Total Vanadium (V)	2008/08/12	92	75 - 125	115	75 - 125	<2	mg/kg	0.5	35	101	75 - 125
2500263	Total Zinc (Zn)	2008/08/12	NC	75 - 125	123	75 - 125	<1	mg/kg	4.6	35	94	75 - 125
2500263	Total Aluminum (Al)	2008/08/12					<100	mg/kg	1.4	35	98	75 - 125
2500263	Total Antimony (Sb)	2008/08/12					<0.1	mg/kg	NC	35	105	75 - 125
2500263	Total Barium (Ba)	2008/08/12					<0.1	mg/kg	0.4	35	105	75 - 125
2500263	Total Bismuth (Bi)	2008/08/12					<0.1	mg/kg	NC	35	98	75 - 125
2500263	Total Iron (Fe)	2008/08/12					<100	mg/kg	0.8	35	100	75 - 125
2500263	Total Magnesium (Mg)	2008/08/12					<100	mg/kg	0.5	35	99	75 - 125
2500263	Total Manganese (Mn)	2008/08/12					<0.2	mg/kg	1.7	35	99	75 - 125
2500263	Total Molybdenum (Mo)	2008/08/12					<0.1	mg/kg	1.3	35	101	75 - 125
2500263	Total Phosphorus (P)	2008/08/12					<10	mg/kg	1.8	35	104	75 - 125
2500263	Total Silver (Ag)	2008/08/12					<0.05	mg/kg	NC	35	103	75 - 125
2500263	Total Strontium (Sr)	2008/08/12					<0.1	mg/kg	0.6	35	96	75 - 125
2500263	Total Thallium (Tl)	2008/08/12					<0.05	mg/kg	NC	35	84	75 - 125
2500263	Total Titanium (Ti)	2008/08/12					<1	mg/kg	1.3	35	103	75 - 125
2500263	Total Potassium (K)	2008/08/12					<100	mg/kg	2.9	35		
2500263	Total Sodium (Na)	2008/08/12					<100	mg/kg	NC	35		
2500263	Total Tin (Sn)	2008/08/12					<0.1	mg/kg	5.3	35		
2500263	Total Zirconium (Zr)	2008/08/12					<0.5	mg/kg	NC	35		
2500963	Nitrate plus Nitrite (N)	2008/08/13	97	80 - 120	101	80 - 120	<0.002	mg/L	10.0	25		
2500968	Nitrite (N)	2008/08/13	103	80 - 120	103	80 - 120	<0.002	mg/L	NC	25		
2503013	Total Calcium (Ca)	2008/08/12					<0.05	mg/L	1.1	25		
2503013	Total Magnesium (Mg)	2008/08/12					<0.05	mg/L	2.0	25		
2503013	Total Potassium (K)	2008/08/12					<0.05	mg/L	0.4	25		
2503013	Total Sodium (Na)	2008/08/12					<0.05	mg/L	1.2	25		
2503013	Total Sulphur (S)	2008/08/12					<3	mg/L	NC	25		

N/A = Not Applicable
NC = Non-calculable
RDL = Reportable Detection Limit
RPD = Relative Percent Difference

Maxxam Analytics Inc — 8577 Commerce Court, Burnaby, British Columbia Canada V5A 4N5 — Tel (604) 444-4808 Toll-free (800) 440-4808 Fax (604) 444-4511 www.maxxamanalytics.com

REC'D IN WINNIPEG

CHAIN OF CUSTODY RECORD A839798 Page 1 of 3

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:		Laboratory Use Only:
Company Name	#2448 GARTNER LEE LTD.	Company Name	Same as invoice	Quotation #	A60324	MAXXAM JOB #: Cullaton Lake
Contact Name:	Kai Woloshyn	Contact Name		P.O. #	Cullaton Lake	BOTTLE ORDER #: 29678
Address:	2251 - 2nd AVENUE	Address		Project #	70562	CHAIN OF CUSTODY #: C#29678-03-01
	WHITEHORSE YT Y1A 5W1			Project Name	Cullaton Lake	PROJECT MANAGER: ROB MACARTHUR
Phone:	(867)633-6474 Fax (867)633-6321	Phone	Fax	Site Location	CULLATON LAKE	
Email:	kwoloshyn@gartnerlee.com	Email		Sampled By	KW, JS	

REGULATORY CRITERIA: CCME metals

SPECIAL INSTRUCTIONS: Please send to Burnaby lab for all analysis

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

TURNAROUND TIME (TAT) REQUIRED:

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified).
Standard TAT = 5-7 Working days for most tests
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: Time Required:
Rush Confirmation Number: (call lab for #)

ANALYSIS REQUESTED (Please be specific):

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Total Metals + Hg	Dissolved Metals + Hg	Cyanide (Total, WAD)	Total Nutrients (TKN, TOC, Ammonia)	Dissolved nutrients (DOC)	General chemistry	(TSS, pH, cond, Turbidity)	sulfate, chloride, TDS	Nitrate, Nitrite	Dissolved Orthophosphate	hardness, alkalinity	# of Bottles	Comments
1		SW21	Aug 3, 2008	Water		Y	X	X	X	X	X	X	X					7	
2		SW23	↓	↓		Y	X	X	X	X	X	X	X					7	
3		SW24				Y	X	X	X	X	X	X	X					7	
4		SW33				Y	X	X	X	X	X	X	X					7	
5		SW34	↓			Y	X	X	X	X	X	X	X					7	
6		SW41	Aug 3, 2008			Y	X	X	X	X	X	X	X					7	
7		SW42	Aug 3, 2008	↓		Y	X	X	X	X	X	X	X					7	
8																			
9																			
10																			

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	Time Sensitive	Temperature (°C) on Receipt	Condition of Sample on Receipt	Custody Seal Intact on Cooler?
Kai Woloshyn	08/08/05	2:00	H. Searley	08/08/06	12:10 pm	☐	4, 4, 4 @ WPG	☐ OK ☐ S/F	☐ Yes ☐ No
			A M[illegible]	07/08/06	11:46				

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

1, 4, 2 1, 1, 1
1, 1, 1 1, 1, 1

Maxxam ANALYTICS INC

8577 Commerce Court, Burnaby, British Columbia Canada V5A 4N5
Tel (604) 444-4808 Toll-free (800) 440-4808 Fax (604) 444-4511 www.maxxamanalytics.com

REC'D IN WINNIPEG

CHAIN OF CUSTODY RECORD

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#2448 GARTNER LEE LTD.	Company Name:	Same as invoice	Quotation #	A80324	MAXXAM JOB #:	BOTTLE ORDER #:
Contact Name:	Kai Woloshyn	Contact Name:		P.O. #	Cullaton Lake	Cullaton Lake	29678
Address:	2251 - 2nd AVENUE	Address:		Project #:	70562	CHAIN OF CUSTODY #:	PROJECT MANAGER:
	WHITEHORSE YT Y1A 5W1			Project Name:	Cullaton Lake	C#29678-02-01	ROB MACARTHUR
Phone:	(867)633-6474 Fax: (867)633-6321	Phone:	Fax:	Site Location:	CULLATON LAKE		
Email:	kwoloshyn@gartnerlee.com	Email:		Sampled By:	KW, SS		

REGULATORY CRITERIA

CCME Metals within low level

SPECIAL INSTRUCTIONS

Please send all samples to Burnaby for All analysis

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

TURNAROUND TIME (TAT) REQUIRED

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: ____ Time Required: ____
Rush Confirmation Number: ____ (call lab for #)

ANALYSIS REQUESTED (Please be specific)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	Total metals (including phosphorus + mercury)	Dissolved metals (including phosphorus + mercury)	Cyanide (WAD + Total)	Total nutrients (Ammonia, TOC, TKN)	Dissolved nutrients (DOC)	General chemistry	pH, cond, TSS, TDS, turbidity, hardness	alkalinity, sulphate, chloride, nitrate	nitrite, dissolved orthophosphate		# of Bottles	Comments
1		SW8	Aug. 4, 2006	Water	N	Y	X	X	X	X	X	X					7	
2		SW9	↓	↓			X	X	X	X	X	X					7	
3		~~S15u~~ SW15u					X	X	X	X	X	X					7	
4		SW15D					X	X	X	X	X	X					7	
5		SW40	↓	↓			X	X	X	X	X	X					7	
6																		
7																		
8																		
9																		
10																		

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	Time Sensitive	Temperature (°C) on Receipt	Condition of Sample on Receipt	Custody Seal Intact on Cooler?
Kai Woloshyn	06/08/05	20:00	H Seeley	08/08/06	12:10 pm	☐	2,5,3 © WPG	☐ OK ☐ S/F	☐ Yes ☐ No

Laboratory Use Only

White: Maxxam Yellow: Client

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

MaxXam Analytics Inc
8577 Commerce Court, Burnaby, British Columbia Canada V5A 4N5
Tel (604) 444-4808 Toll-free (800) 440-4808 Fax (604) 444-4811 www.maxxamanalytics.com

REC'D IN WINNIPEG

CHAIN OF CUSTODY RECORD

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#2448 GARTNER LEE LTD.	Company Name:	Same as invoice	Quotation #:	AB0324	MAXXAM JOB #:	BOTTLE ORDER #:
Contact Name:	Kai Woloshyn	Contact Name:		P.O. #:	Cullaton Lake	Cullaton Lake	28678
Address:	2251 - 2nd AVENUE WHITEHORSE YT Y1A 5W1	Address:		Project #:	70562	CHAIN OF CUSTODY #:	PROJECT MANAGER:
Phone:	(867)633-6474 Fax: (867)633-6321	Phone:	Fax:	Project Name:	Cullaton Lake	C#29678-01-01	ROB MACARTHUR
Email:	kwoloshyn@gartnerlee.com	Email:		Site Location:	CULLATON LAKE		
				Sampled By:	KW, SS		

REGULATORY CRITERIA: ultra low level CCME Mtls

SPECIAL INSTRUCTIONS: Please send all samples to Burnaby for all analysis

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

ANALYSIS REQUESTED (Please be specific)

TURNAROUND TIME (TAT) REQUIRED:

Regular (Standard) TAT: (will be applied if Rush TAT is not specified) ☒
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: _____ Time Required: _____
Rush Confirmation Number: _____ (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	Total Metals (including Hg)	Dissolved metals (including Hg)	Cyanide (Total and WAD)	Total Nutrients (Ammonia, TKN, Total P)	Dissolved Nutrients (DOC)	General chemistry	(pH, cond, TSS, TDS, Turbidity, hardness, Alkalinity, chloride, sulfide, dissolved orthophosphate)	Total Metals Cations	# of Bottles	Comments
1		SW25T	Aug 4,'08	Water	N	Y	X	X	X	X	X	X			7	
2		SW25B					X	X	X	X	X	X			7	
3		SW26T					X	X	X	X	X	X			7	
4		SW26B					X	X	X	X	X	X			7	
5		Trip Blank	07/17/08		N	N	X	X	X	X	X	X			7	
6		SW25	Aug 4,'08	Sediment	N	N								X	2	
7		SW26	Aug 4,'08	Sediment	N	N								X	2	
8																
9																
10																

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	Laboratory Use Only: Time Sensitive	Temperature (°C) on Receipt	Condition of Sample on Receipt	Custody Seal Intact on Cooler?
Kai Woloshyn	08/08/05	20:00	H. Sealey	08/08/06	12:10pm	☐	5.6, 3 @ WPG	☐ OK ☐ SIF	☐ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

Your Project #: 70562 CULLATON LAKE
Site: CULLATON LAKE
Your C.O.C. #: 28997-03, 28997-01, 28997-02, 28997-04

Attention: Jennifer Sarchuk
GARTNER LEE LTD.
6400 ROBERTS STREET
BURNABY, BC
Canada V5G 4L9

Report Date: 2008/09/22
This report supersedes all previous reports with the same Maxxam job number

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A846845
Received: 2008/09/10, 09:50

Sample Matrix: Water
Samples Received: 25

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	25	2008/09/12	2008/09/12	BRN SOP-00264 R2.0	Based on SM2320B
Chloride by Automated Colourimetry	25	N/A	2008/09/13	BRN-SOP 00234 R1.0	Based on EPA 325.2
Cyanide (Total)	25	N/A	2008/09/12	BRN SOP-00226 R1.0	Based on EPA 9012AR1
Cyanide WAD (weak acid dissociable)	8	N/A	2008/09/12	BRN SOP-00227 R1.0	Based on SM-4500CN I
Cyanide WAD (weak acid dissociable)	17	N/A	2008/09/15	BRN SOP-00227 R1.0	Based on SM-4500CN I
Carbon (DOC)	25	N/A	2008/09/15	BRN SOP-00224 R3.0	Based on SM-5310C
Conductance - water	25	N/A	2008/09/12	BRN SOP-00264 R2.0	Based on SM-2510B
Hardness Total (calculated as CaCO3)	25	N/A	2008/09/16		
Hardness (calculated as CaCO3)	25	N/A	2008/09/16		
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	20	N/A	2008/09/15	BRN SOP-00206	Based on EPA 200.8
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	5	N/A	2008/09/16	BRN SOP-00206	Based on EPA 200.8
Elements by ICPMS Low Level (dissolved) (1)	20	N/A	2008/09/15	BRN SOP-00206	Based on EPA 200.8
Elements by ICPMS Low Level (dissolved) (1)	5	N/A	2008/09/16	BRN SOP-00206	Based on EPA 200.8
Elements by ICPMS Low Level (total) (1)	20	2008/09/15	2008/09/15	BRN SOP-00206	Based on EPA 200.8
Elements by ICPMS Low Level (total) (1)	5	2008/09/15	2008/09/16	BRN SOP-00206	Based on EPA 200.8
Na, K, Ca, Mg, S by CRC ICPMS (total)	20	2008/09/15	2008/09/15	BRN SOP-00206	Based on EPA 200.8
Na, K, Ca, Mg, S by CRC ICPMS (total)	5	2008/09/15	2008/09/16	BRN SOP-00206	Based on EPA 200.8
Nitrogen (Total)	25	2008/09/15	2008/09/15	BRN SOP-00242 R2.0	Based on SM-4500N C
Ammonia-N	22	N/A	2008/09/12	BRN SOP-00232 R3.0	SM-4500 NH3 G
Ammonia-N	3	N/A	2008/09/15	BRN SOP-00232 R3.0	SM-4500 NH3 G
Nitrate+Nitrite (N) (low level	25	N/A	2008/09/12	BRN SOP-00233 R1.0	Based on EPA 353.2
Nitrite (N) (low level)	25	N/A	2008/09/12	BRN SOP-00233 R1.0	EPA 353.2
Nitrogen - Nitrate (as N)	25	N/A	2008/09/13		
Filter and HNO3 Preserve for Metals	25	N/A	2008/09/12	BRN WI-00006 R1.0	Based on EPA 200.2
pH Water	25	N/A	2008/09/12	BRN SOP-00264 R2.0	Based on SM-4500H+B
Orthophosphate by Konelab (1)	25	N/A	2008/09/12	BRN SOP-00235 R3.0	SM 4500 PF
Sulphate by Automated Colourimetry	25	N/A	2008/09/13	BRN-SOP 00243 R1.0	Based on EPA 375.4
Total Dissolved Solids (Filt. Residue)	25	N/A	2008/09/12	BRN-00276 R2.0	APHA 2540
TKN (Calc. TN, N/N) total	25	N/A	2008/09/16		
Carbon (Total Organic)	25	N/A	2008/09/15	BRN SOP-00224 R3.0	Based on SM-5310C
Total Suspended Solids	17	N/A	2008/09/15	BRN SOP-00277 R2.0	Based on SM-2540 D
Total Suspended Solids	8	N/A	2008/09/16	BRN SOP-00277 R2.0	Based on SM-2540 D
Turbidity	25	N/A	2008/09/11	BRN SOP-00265 R3.0	SM - 2130B

* Results relate only to the items tested.

(1) SCC/CAEAL

../2

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

Encryption Key

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

ROB MACARTHUR, BBY Customer Service
Email: rob.macarthur@maxxamanalytics.com
Phone# (604) 444-4808 Ext:253

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CAEAL have approved this reporting process and electronic report format.

Total cover pages: 2

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		L53450	L53451	L53452	L53453	L53454	L53455	L53456	L53457	L53458		
Sampling Date		2008/09/02	2008/09/03	2008/09/03	2008/09/03	2008/09/05	2008/09/03	2008/09/02	2008/09/02	2008/09/02		
	Units	**SW32**	**SW21**	**SW25T**	**SW26T**	**SW43**	**SW25B**	**SW2B**	**SW2**	**SW8**	**RDL**	**QC Batch**
CONVENTIONALS												
Cyanide + Thiocyanate	mg/L	0.0008	<0.0005	0.0008	0.0009	<0.0005	0.0008	0.0016	0.0008	0.0008	0.0005	2571070
Preparation												
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	N/A	ONSITE
Calculated Parameters												
Nitrate (N)	mg/L	0.002	0.012	0.008	0.005	0.002	0.009	0.002	0.094	0.007	0.002	2566293
Misc. Inorganics												
Weak Acid Dissoc. Cyanide (CN)	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	2571194
Dissolved Organic Carbon (C)	mg/L	8.0	3.4	9.2	10.2	<0.5	8.7	9.8	11.4	8.6	0.5	2574653
Alkalinity (Total as CaCO3)	mg/L	4.0	2.5	<0.5	2.4	<0.5	<0.5	2.2	3.2	<0.5	0.5	2571333
Total Organic Carbon (C)	mg/L	8.2	3.5	9.6	10.4	<0.5	10.6	10.1	12.2	9.0	0.5	2574658
Anions												
Orthophosphate (P)	mg/L	0.002	0.002	0.002	0.021	0.002	0.003	0.002	0.001	0.003	0.001	2567446
Dissolved Sulphate (SO4)	mg/L	1.3	1.1	13	5.7	<0.5	12	3.3	<0.5	15	0.5	2573319
Dissolved Chloride (Cl)	mg/L	2.5	<0.5	1.2	0.9	<0.5	0.7	0.8	0.8	<0.5	0.5	2573316
Nutrients												
Ammonia (N)	mg/L	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	2570821
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.19	0.14	0.31	0.31	<0.02	0.33	0.32	0.40	0.35	0.02	2567532
Nitrate plus Nitrite (N)	mg/L	0.002	0.012	0.008	0.005	0.002	0.009	0.004	0.097	0.009	0.002	2570694
Nitrite (N)	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	0.003	0.002	0.002	2570738
Total Nitrogen (N)	mg/L	0.19	0.15	0.32	0.32	<0.02	0.34	0.32	0.49	0.36	0.02	2577050
Physical Properties												
Conductivity	uS/cm	28	16	45	35	<1	45	31	29	48	1	2571330
pH	pH Units	6.7	6.6	5.4	6.5	4.4	5.3	6.4	6.5	5.0		2571319
Physical Properties												
Total Suspended Solids	mg/L	<1	<1	4	2	<1	4	3	1	4	1	2574922
Total Dissolved Solids	mg/L	16	30	44	34	4	44	30	34	34	1	2570084
Turbidity	NTU	0.4	0.4	2.4	1.4	0.3	2.3	1.7	1.2	2.5	0.1	2569090

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		L53459	L53460	L53461	L53463		L53473	L53475		L53477		
Sampling Date		2008/09/02	2008/09/02	2008/09/02	2008/08/20		2008/09/04	2008/09/04		2008/09/05		
	Units	**SW9**	**SW36**	**SW35**	**TRIP BLANK**	**RDL**	**SW34**	**SW33**	**RDL**	**SW41**	**RDL**	**QC Batch**
CONVENTIONALS												
Cyanide + Thiocyanate	mg/L	0.0009	0.0008	0.0007	<0.0005	0.0005	0.0036	0.0020	0.0005	0.0011	0.0005	2571070
Preparation												
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	N/A	FIELD	FIELD	N/A	FIELD	N/A	ONSITE
Calculated Parameters												
Nitrate (N)	mg/L	0.008	0.003	0.006	0.011	0.002	0.017	0.015	0.002	0.005	0.002	2566293
Misc. Inorganics												
Weak Acid Dissoc. Cyanide (CN)	mg/L	0.0006	<0.0005	<0.0005	<0.0005	0.0005	<0.0005	0.0008	0.0005	0.0005	0.0005	2571194
Dissolved Organic Carbon (C)	mg/L	8.6	9.4	8.3	<0.5	0.5	2.6	12.3	0.5	10.7	0.5	2574653
Alkalinity (Total as CaCO3)	mg/L	<0.5	3.9	<0.5	<0.5	0.5	45	71	0.5	16	0.5	2571333
Total Organic Carbon (C)	mg/L	9.0	9.6	8.8	<0.5	0.5	3.0	12.5	0.5	10.9	0.5	2574658
Anions												
Orthophosphate (P)	mg/L	0.002	0.003	0.003	0.001	0.001	0.002	0.003	0.001	0.005	0.001	2567446
Dissolved Sulphate (SO4)	mg/L	15	6.0	15	<0.5	0.5	190	60	5	0.5	0.5	2573319
Dissolved Chloride (Cl)	mg/L	0.6	0.6	0.7	<0.5	0.5	3.9	2.6	0.5	0.8	0.5	2573316
Nutrients												
Ammonia (N)	mg/L	0.02	<0.01	<0.01	<0.01	0.01	<0.01	0.03	0.01	<0.01	0.01	2570821
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.32	0.34	0.27	<0.02	0.02	0.14	0.69	0.02	0.32	0.02	2567532
Nitrate plus Nitrite (N)	mg/L	0.010	0.006	0.008	0.011	0.002	0.020	0.018	0.002	0.008	0.002	2570694
Nitrite (N)	mg/L	0.002	0.003	0.002	<0.002	0.002	0.003	0.003	0.002	0.003	0.002	2570738
Total Nitrogen (N)	mg/L	0.33	0.35	0.28	<0.02	0.02	0.16	0.71	0.02	0.33	0.02	2577050
Physical Properties												
Conductivity	uS/cm	49	40	48	<1	1	540	300	1	58	1	2571330
pH	pH Units	4.9	6.5	5.1	6.2		7.7	7.9		7.3		2571319
Physical Properties												
Total Suspended Solids	mg/L	4	<1	2	<1	1	1	2	1	<1	1	2574922
Total Dissolved Solids	mg/L	110	38	48	<1	1	310	180	1	100	1	2570084
Turbidity	NTU	2.6	1.3	2.1	<0.1	0.1	0.6	1.2	0.1	1.1	0.1	2569090

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		L53478		L53480	L53481		L53482	L53483		
Sampling Date		2008/09/05		2008/09/05	2008/09/05		2008/09/04	2008/09/04		
	Units	**SW40**	**QC Batch**	**SW15US**	**SW15DS**	**RDL**	**SW12**	**SW20**	**RDL**	**QC Batch**
CONVENTIONALS										
Cyanide + Thiocyanate	mg/L	0.0010	2571070	0.0011	0.0010	0.0005	<0.0005	0.0006	0.0005	2571070
Preparation										
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	FIELD	N/A	FIELD	FIELD	N/A	ONSITE
Calculated Parameters										
Nitrate (N)	mg/L	0.005	2566293	0.004	0.008	0.002	0.006	0.438	0.002	2566293
Misc. Inorganics										
Weak Acid Dissoc. Cyanide (CN)	mg/L	<0.0005	2571194	<0.0005	<0.0005	0.0005	<0.0005	<0.0005	0.0005	2571194
Dissolved Organic Carbon (C)	mg/L	10.6	2574653	10.9	10.5	0.5	2.8	2.9	0.5	2574653
Alkalinity (Total as CaCO3)	mg/L	16	2571333	16	15	0.5	<0.5	<0.5	0.5	2571333
Total Organic Carbon (C)	mg/L	10.8	2574658	11.0	10.7	0.5	3.3	3.0	0.5	2574658
Anions										
Orthophosphate (P)	mg/L	0.004	2567446	0.003	0.003	0.001	0.005	0.004	0.001	2567446
Dissolved Sulphate (SO4)	mg/L	0.8	2573319	<0.5	0.8	0.5	130	76	5	2573319
Dissolved Chloride (Cl)	mg/L	0.7	2573316	0.9	0.9	0.5	1.5	2.2	0.5	2573316
Nutrients										
Ammonia (N)	mg/L	<0.01	2570821	<0.01	<0.01	0.01	0.11	0.25	0.01	2570821
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.28	2567532	0.28	0.30	0.02	0.19	0.57	0.02	2567532
Nitrate plus Nitrite (N)	mg/L	0.007	2570694	0.006	0.010	0.002	0.006	0.438	0.002	2570694
Nitrite (N)	mg/L	0.002	2570738	0.002	0.002	0.002	<0.002	<0.002	0.002	2570738
Total Nitrogen (N)	mg/L	0.29	2577050	0.29	0.31	0.02	0.19	1.00	0.02	2577050
Physical Properties										
Conductivity	uS/cm	58	2571330	58	57	1	360	230	1	2571330
pH	pH Units	7.3	2571319	7.3	7.2		4.1	4.1		2571319
Physical Properties										
Total Suspended Solids	mg/L	<1	2574922	<1	1	1	<1	1	1	2577095
Total Dissolved Solids	mg/L	60	2570084	26	48	1	250	150	1	2570084
Turbidity	NTU	1.0	2569090	1.0	0.9	0.1	1.1	2.4	0.1	2569090

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		L53484		L53485		L53486	L53487		
Sampling Date		2008/09/04		2008/09/04		2008/09/04	2008/09/04		
	Units	**SW6**	**QC Batch**	**SW3**	**RDL**	**SW23**	**SW24**	**RDL**	**QC Batch**
CONVENTIONALS									
Cyanide + Thiocyanate	mg/L	<0.0005	2571070	<0.0005	0.0005	<0.0005	<0.0005	0.0005	2571070
Preparation									
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	FIELD	FIELD	N/A	ONSITE
Calculated Parameters									
Nitrate (N)	mg/L	0.148	2566293	0.009	0.002	0.007	0.014	0.002	2566293
Misc. Inorganics									
Weak Acid Dissoc. Cyanide (CN)	mg/L	<0.0005	2571194	<0.0005	0.0005	<0.0005	<0.0005	0.0005	2571194
Dissolved Organic Carbon (C)	mg/L	<0.5	2574653	4.7	0.5	7.4	3.9	0.5	2574653
Alkalinity (Total as CaCO3)	mg/L	<0.5	2571333	<0.5	0.5	6.7	2.4	0.5	2571333
Total Organic Carbon (C)	mg/L	<0.5	2574658	4.9	0.5	7.9	3.9	0.5	2574658
Anions									
Orthophosphate (P)	mg/L	0.013	2567446	0.004	0.001	0.003	0.002	0.001	2567446
Dissolved Sulphate (SO4)	mg/L	320	2573319	56	5	1.2	1.3	0.5	2573319
Dissolved Chloride (Cl)	mg/L	0.6	2573316	<0.5	0.5	0.8	0.7	0.5	2573316
Nutrients									
Ammonia (N)	mg/L	0.45	2570821	<0.01	0.01	<0.01	0.06	0.01	2574840
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.67	2567532	0.15	0.02	0.20	0.16	0.02	2567532
Nitrate plus Nitrite (N)	mg/L	0.156	2570694	0.009	0.002	0.007	0.014	0.002	2570694
Nitrite (N)	mg/L	0.008	2570738	<0.002	0.002	<0.002	<0.002	0.002	2570738
Total Nitrogen (N)	mg/L	0.82	2577050	0.16	0.02	0.21	0.18	0.02	2577050
Physical Properties									
Conductivity	uS/cm	1400	2571330	160	1	33	17	1	2571330
pH	pH Units	2.7(1)	2571319	3.9(1)		6.9	6.7		2571319
Physical Properties									
Total Suspended Solids	mg/L	<1	2577095	<1	1	<1	1	1	2577095
Total Dissolved Solids	mg/L	720	2570084	76	1	32	14	1	2570084
Turbidity	NTU	0.2	2569090	1.2	0.1	1.1	0.6	0.1	2569090

N/A = Not Applicable
RDL = Reportable Detection Limit
(1) - pH result is lower than the lowest standard (4 pH Units).

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		L53450	L53451	L53452	L53453	L53454	L53455	L53456	L53457	L53458		
Sampling Date		2008/09/02	2008/09/03	2008/09/03	2008/09/03	2008/09/05	2008/09/03	2008/09/02	2008/09/02	2008/09/02		
	Units	**SW32**	**SW21**	**SW25T**	**SW26T**	**SW43**	**SW25B**	**SW2B**	**SW2**	**SW8**	**RDL**	**QC Batch**
Misc. Inorganics												
Dissolved Hardness (CaCO3)	mg/L	13.7	8.1	17.9	16.0	<0.5	17.9	13.7	13.7	18.4	0.5	2570025

RDL = Reportable Detection Limit

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		L53450	L53451	L53452	L53453	L53454	L53455	L53456	L53457	L53458		
Sampling Date		2008/09/02	2008/09/03	2008/09/03	2008/09/03	2008/09/05	2008/09/03	2008/09/02	2008/09/02	2008/09/02		
	Units	**SW32**	**SW21**	**SW25T**	**SW26T**	**SW43**	**SW25B**	**SW2B**	**SW2**	**SW8**	**RDL**	**QC Batch**
Dissolved Metals by ICPMS												
Dissolved Aluminum (Al)	mg/L	0.0846	0.0065	0.263	0.155	0.0023(1)	0.252	0.130	0.109	0.291	0.0002	2574276
Dissolved Antimony (Sb)	mg/L	0.00003	<0.00002	0.00003	0.00003	<0.00002	0.00003	0.00003	0.00003	0.00003	0.00002	2574276
Dissolved Arsenic (As)	mg/L	0.00032	0.00010	0.00037	0.00037	<0.00002	0.00036	0.00043	0.00047	0.00037	0.00002	2574276
Dissolved Barium (Ba)	mg/L	0.0125(1)	0.00682	0.0141	0.0133	0.00009	0.0137	0.0128	0.0121	0.0143	0.00002	2574276
Dissolved Beryllium (Be)	mg/L	<0.00001	<0.00001	0.00006	0.00003	<0.00001	0.00005	0.00001	0.00001	0.00007	0.00001	2574276
Dissolved Bismuth (Bi)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2574276
Dissolved Boron (B)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2574276
Dissolved Cadmium (Cd)	mg/L	0.000022	<0.000005	0.000080	0.000026	0.000011	0.000077	0.000010	<0.000005	0.000086	0.000005	2574276
Dissolved Chromium (Cr)	mg/L	0.0004	<0.0001	0.0006	0.0006	<0.0001	0.0006	0.0004	0.0005	0.0006	0.0001	2574276
Dissolved Cobalt (Co)	mg/L	0.000119(1)	0.000007	0.00359	0.000851	<0.000005	0.00362	0.000659	0.000187	0.00438	0.000005	2574276
Dissolved Copper (Cu)	mg/L	0.00162	0.00038	0.00713	0.00355	0.00013	0.00702	0.00183	0.00186	0.00808	0.00005	2574276
Dissolved Iron (Fe)	mg/L	0.112	0.008	0.436	0.239	0.002	0.440	0.401	0.190	0.507	0.001	2574276
Dissolved Lead (Pb)	mg/L	0.000040(1)	0.000057(1)	0.000074	0.000068	0.000021	0.000074	0.000040	0.000016	0.000128	0.000005	2574276
Dissolved Lithium (Li)	mg/L	<0.0005	0.0006	0.0011	0.0007	<0.0005	0.0011	0.0006	<0.0005	0.0012	0.0005	2574276
Dissolved Manganese (Mn)	mg/L	0.00806(1)	0.00105	0.0865	0.0210	0.00010	0.0863	0.0453	0.0236	0.101	0.00005	2574276
Dissolved Mercury (Hg)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2574276
Dissolved Molybdenum (Mo)	mg/L	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00005	2574276
Dissolved Nickel (Ni)	mg/L	0.00296(1)	0.00022	0.00500	0.00331	0.00002	0.00491	0.00318	0.00257	0.00559	0.00002	2574276
Dissolved Phosphorus (P)	mg/L	0.005	0.002	0.005	0.006	<0.002	0.005	0.005	0.006	0.004	0.002	2574276
Dissolved Selenium (Se)	mg/L	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	0.00004	2574276
Dissolved Silicon (Si)	mg/L	1.1	0.1	1.1	1.1	<0.1	1.2	1.3	1.0	1.1	0.1	2574276
Dissolved Silver (Ag)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2574276
Dissolved Strontium (Sr)	mg/L	0.0132	0.0102	0.0169	0.0154	0.00011	0.0167	0.0137	0.0141	0.0174	0.00005	2574276
Dissolved Thallium (Tl)	mg/L	<0.000002	<0.000002	0.000003	<0.000002	<0.000002	0.000004	0.000003	0.000003	0.000003	0.000002	2574276
Dissolved Tin (Sn)	mg/L	<0.00001	<0.00001	0.00002	0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2574276
Dissolved Titanium (Ti)	mg/L	0.0013	<0.0005	0.0010	0.0011	<0.0005	0.0010	0.0010	0.0014	0.0008	0.0005	2574276
Dissolved Uranium (U)	mg/L	0.000041	0.000041	0.000282	0.000144	<0.000002	0.000275	0.000077	0.000070	0.000333	0.000002	2574276
Dissolved Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	2574276
Dissolved Zinc (Zn)	mg/L	0.0022(1)	0.0006	0.0051	0.0020	0.0010(1)	0.0051	0.0009	0.0004	0.0057	0.0001	2574276
Dissolved Zirconium (Zr)	mg/L	0.0002	<0.0001	0.0003	0.0003	<0.0001	0.0003	0.0003	0.0003	0.0003	0.0001	2574276
Dissolved Calcium (Ca)	mg/L	4.11	1.96	4.98	4.61	0.06	5.03	3.82	3.81	5.11	0.05	2577299
Dissolved Magnesium (Mg)	mg/L	0.84	0.77	1.31	1.08	<0.05	1.30	1.02	1.02	1.37	0.05	2577299
Dissolved Potassium (K)	mg/L	0.46	0.39	0.63	0.55	<0.05	0.63	0.58	0.58	0.64	0.05	2577299
Dissolved Sodium (Na)	mg/L	0.69	0.47	0.68	0.66	<0.05	0.67	0.69	0.68	0.67	0.05	2577299
Dissolved Sulphur (S)	mg/L	<3	<3	5	<3	<3	5	<3	<3	6	3	2577299

RDL = Reportable Detection Limit
(1) - dissolved > total, reanalyzed & confirmed. Possible trace level of field-filtered contamination on dissolved metal bottle or there is a discrepancy between samples taken.

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		L53459	L53460	L53461	L53463	L53473	L53475	L53477	L53478	L53480		
Sampling Date		2008/09/02	2008/09/02	2008/09/02	2008/08/20	2008/09/04	2008/09/04	2008/09/05	2008/09/05	2008/09/05		
	Units	**SW9**	**SW36**	**SW35**	**TRIP BLANK**	**SW34**	**SW33**	**SW41**	**SW40**	**SW15US**	**RDL**	**QC Batch**
Misc. Inorganics												
Dissolved Hardness (CaCO3)	mg/L	18.2	17.6	18.6	<0.5	224	122	29.4	29.2	29.2	0.5	2570025

RDL = Reportable Detection Limit

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		L53459	L53460	L53461	L53463	L53473	L53475	L53477	L53478	L53480		
Sampling Date		2008/09/02	2008/09/02	2008/09/02	2008/08/20	2008/09/04	2008/09/04	2008/09/05	2008/09/05	2008/09/05		
	Units	**SW9**	**SW36**	**SW35**	**TRIP BLANK**	**SW34**	**SW33**	**SW41**	**SW40**	**SW15US**	**RDL**	**QC Batch**
Dissolved Metals by ICPMS												
Dissolved Aluminum (Al)	mg/L	0.289	0.0869	0.247	0.0034	0.0098	0.0181	0.0969	0.0980	0.0973	0.0002	2574276
Dissolved Antimony (Sb)	mg/L	0.00002	0.00002	0.00003	<0.00002	0.00005	0.00010	0.00006	0.00006	0.00006	0.00002	2574276
Dissolved Arsenic (As)	mg/L	0.00036	0.00031	0.00035	0.00002	0.00150	0.00245	0.00083	0.00084	0.00084	0.00002	2574276
Dissolved Barium (Ba)	mg/L	0.0138	0.0152	0.0153	0.00007	0.0145	0.0170	0.0178	0.0179	0.0179	0.00002	2574276
Dissolved Beryllium (Be)	mg/L	0.00006	0.00002	0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2574276
Dissolved Bismuth (Bi)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2574276
Dissolved Boron (B)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2574276
Dissolved Cadmium (Cd)	mg/L	0.000083	0.000011	0.000056	0.000020	<0.000005	0.000006	0.000006	<0.000005	0.000008	0.000005	2574276
Dissolved Chromium (Cr)	mg/L	0.0006	0.0004	0.0005	<0.0001	<0.0001	0.0001	0.0004	0.0004	0.0004	0.0001	2574276
Dissolved Cobalt (Co)	mg/L	0.00421	0.000365	0.00235	0.000007	0.00110	0.000382	0.000096	0.000097	0.000089	0.000005	2574276
Dissolved Copper (Cu)	mg/L	0.00783	0.00206	0.00657	0.00021	0.00091	0.00360	0.00197	0.00193	0.00191	0.00005	2574276
Dissolved Iron (Fe)	mg/L	0.567	0.396	0.435	0.004	0.008	0.109	0.104	0.103	0.106	0.001	2574276
Dissolved Lead (Pb)	mg/L	0.000083	0.000030	0.000075	0.000052(1)	0.000020	0.000047	0.000019	0.000014	0.000034(1)	0.000005	2574276
Dissolved Lithium (Li)	mg/L	0.0012	0.0010	0.0012	<0.0005	0.0007	0.0012	0.0007	0.0006	0.0006	0.0005	2574276
Dissolved Manganese (Mn)	mg/L	0.0973	0.0265	0.0640	0.00022	0.00111	0.0135	0.00173	0.00170	0.00171	0.00005	2574276
Dissolved Mercury (Hg)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2574276
Dissolved Molybdenum (Mo)	mg/L	<0.00005	<0.00005	<0.00005	<0.00005	0.00060	0.00058	0.00005	<0.00005	<0.00005	0.00005	2574276
Dissolved Nickel (Ni)	mg/L	0.00558	0.00283	0.00505	0.00012(1)	0.00074	0.00422	0.00280	0.00268	0.00268	0.00002	2574276
Dissolved Phosphorus (P)	mg/L	0.005	0.005	0.004	<0.002	<0.002	0.012	0.004	0.005	0.004	0.002	2574276
Dissolved Selenium (Se)	mg/L	0.00005	0.00004	<0.00004	<0.00004	0.00006	0.00009	0.00005	0.00004	0.00005	0.00004	2574276
Dissolved Silicon (Si)	mg/L	1.2	1.2	1.2	<0.1	0.3	0.1	1.7	1.7	1.7	0.1	2574276
Dissolved Silver (Ag)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000018	<0.000005	<0.000005	<0.000005	0.000005	2574276
Dissolved Strontium (Sr)	mg/L	0.0178	0.0164	0.0186	0.00014	0.231	0.134	0.0270	0.0271	0.0269	0.00005	2574276
Dissolved Thallium (Tl)	mg/L	0.000003	<0.000002	0.000003	<0.000002	0.000003	0.000002	0.000003	0.000003	0.000003	0.000002	2574276
Dissolved Tin (Sn)	mg/L	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2574276
Dissolved Titanium (Ti)	mg/L	0.0006	0.0006	0.0005	<0.0005	<0.0005	0.0007	0.0012	0.0008	0.0013	0.0005	2574276
Dissolved Uranium (U)	mg/L	0.000335	0.000078	0.000286	<0.000002	0.000395	0.000734	0.000105	0.000108	0.000106	0.000002	2574276
Dissolved Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	2574276
Dissolved Zinc (Zn)	mg/L	0.0060	0.0021	0.0055	0.0014(1)	0.0002	0.0014	0.0008	0.0007	0.0026(1)	0.0001	2574276
Dissolved Zirconium (Zr)	mg/L	0.0002	0.0004	0.0002	<0.0001	<0.0001	<0.0001	0.0003	0.0003	0.0003	0.0001	2574276
Dissolved Calcium (Ca)	mg/L	4.96	4.27	5.09	0.09	58.1	29.8	8.68	8.68	8.71	0.05	2577299
Dissolved Magnesium (Mg)	mg/L	1.42	1.67	1.44	<0.05	19.1	11.5	1.87	1.84	1.82	0.05	2577299
Dissolved Potassium (K)	mg/L	0.61	0.61	0.62	<0.05	3.33	1.68	0.76	0.76	0.75	0.05	2577299
Dissolved Sodium (Na)	mg/L	0.70	0.74	0.71	0.05	24.9	14.9	1.03	1.03	1.00	0.05	2577299
Dissolved Sulphur (S)	mg/L	5	<3	5	<3	79	24	<3	<3	<3	3	2577299

RDL = Reportable Detection Limit
(1) - dissolved > total, reanalyzed & confirmed. Possible trace level of field-filtered contamination on dissolved metal bottle or there is a discrepancy between samples taken.

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		L53481	L53482		L53483	L53484	L53485	L53486	L53487		
Sampling Date		2008/09/05	2008/09/04		2008/09/04	2008/09/04	2008/09/04	2008/09/04	2008/09/04		
	Units	**SW15DS**	**SW12**	**QC Batch**	**SW20**	**SW6**	**SW3**	**SW23**	**SW24**	**RDL**	**QC Batch**
Misc. Inorganics											
Dissolved Hardness (CaCO3)	mg/L	28.2	134	2570025	81.2	78.3	32.7	16.6	7.7	0.5	2570025

RDL = Reportable Detection Limit

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		L53481	L53482		L53483	L53484	L53485	L53486	L53487		
Sampling Date		2008/09/05	2008/09/04		2008/09/04	2008/09/04	2008/09/04	2008/09/04	2008/09/04		
	Units	SW15DS	SW12	QC Batch	SW20	SW6	SW3	SW23	SW24	RDL	QC Batch
Dissolved Metals by ICPMS											
Dissolved Aluminum (Al)	mg/L	0.0862	1.07	2574276	0.485	14.1	1.47	0.0294	0.0060	0.0002	2574300
Dissolved Antimony (Sb)	mg/L	0.00005	<0.00002	2574276	<0.00002	<0.00002	0.00002	0.00002	<0.00002	0.00002	2574300
Dissolved Arsenic (As)	mg/L	0.00079	0.00061	2574276	0.00056	0.00074	0.00060	0.00026	0.00008	0.00002	2574300
Dissolved Barium (Ba)	mg/L	0.0173	0.0260	2574276	0.0249	0.00850	0.0795	0.00908	0.00633	0.00002	2574300
Dissolved Beryllium (Be)	mg/L	<0.00001	0.00084	2574276	0.00048	0.00180	0.00045	<0.00001	<0.00001	0.00001	2574300
Dissolved Bismuth (Bi)	mg/L	<0.000005	<0.000005	2574276	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2574300
Dissolved Boron (B)	mg/L	<0.05	<0.05	2574276	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2574300
Dissolved Cadmium (Cd)	mg/L	0.000009	0.00127	2574276	0.000391	0.00167	0.000910	<0.000005	<0.000005	0.000005	2574300
Dissolved Chromium (Cr)	mg/L	0.0004	0.0003	2574276	0.0002	0.0230	0.0006	0.0002	<0.0001	0.0001	2574300
Dissolved Cobalt (Co)	mg/L	0.000099	0.0612	2574276	0.0253	0.257	0.0459	0.000035	0.000009	0.000005	2574300
Dissolved Copper (Cu)	mg/L	0.00206	0.0372	2574276	0.00666	0.180	0.0105	0.00114	0.00034	0.00005	2574300
Dissolved Iron (Fe)	mg/L	0.111	0.043	2574276	0.097	39.6	0.500	0.056	0.008	0.001	2574300
Dissolved Lead (Pb)	mg/L	0.000034(1)	0.000123	2574276	0.000039	0.00245	0.000210	0.000055	0.000013	0.000005	2574300
Dissolved Lithium (Li)	mg/L	0.0007	0.0103	2574276	0.0065	0.0205	0.0029	0.0006	0.0005	0.0005	2574300
Dissolved Manganese (Mn)	mg/L	0.00282	3.86	2574276	1.77	4.02	2.90	0.00339	0.00143	0.00005	2574300
Dissolved Mercury (Hg)	mg/L	<0.00001	<0.00001	2574276	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2574300
Dissolved Molybdenum (Mo)	mg/L	<0.00005	<0.00005	2574276	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00005	2574300
Dissolved Nickel (Ni)	mg/L	0.00300	0.112	2574276	0.0535	0.138	0.0468	0.00132	0.00023	0.00002	2574300
Dissolved Phosphorus (P)	mg/L	0.005	<0.002	2574276	<0.002	<0.002	0.005	0.002	<0.002	0.002	2574300
Dissolved Selenium (Se)	mg/L	<0.00004	0.00009	2574276	0.00006	0.00019	<0.00004	<0.00004	<0.00004	0.00004	2574300
Dissolved Silicon (Si)	mg/L	1.6	1.7	2574276	0.3	14.7	2.7	0.7	0.1	0.1	2574300
Dissolved Silver (Ag)	mg/L	<0.000005	<0.000005	2574276	<0.000005	0.000047	<0.000005	<0.000005	<0.000005	0.000005	2574300
Dissolved Strontium (Sr)	mg/L	0.0259	0.132	2574276	0.0908	0.0670	0.0545	0.0160	0.0100	0.00005	2574300
Dissolved Thallium (Tl)	mg/L	0.000003	0.000082	2574276	0.000057	0.000081	0.000024	<0.000002	<0.000002	0.000002	2574300
Dissolved Tin (Sn)	mg/L	<0.00001	<0.00001	2574276	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2574300
Dissolved Titanium (Ti)	mg/L	0.0010	<0.0005	2574276	<0.0005	0.0009	<0.0005	<0.0005	<0.0005	0.0005	2574300
Dissolved Uranium (U)	mg/L	0.000102	0.000626	2574276	0.000330	0.0184	0.000221	0.000062	0.000046	0.000002	2574300
Dissolved Vanadium (V)	mg/L	<0.0002	<0.0002	2574276	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	2574300
Dissolved Zinc (Zn)	mg/L	0.0016(1)	0.117	2574276	0.0251	0.124	0.0792	0.0004	0.0006	0.0001	2574300
Dissolved Zirconium (Zr)	mg/L	0.0003	<0.0001	2574276	<0.0001	<0.0001	0.0001	0.0002	<0.0001	0.0001	2574300
Dissolved Calcium (Ca)	mg/L	8.34	37.7	2577299	26.8	17.9	8.38	4.16	1.83	0.05	2577302
Dissolved Magnesium (Mg)	mg/L	1.80	9.63	2577299	3.47	8.20	2.86	1.50	0.75	0.05	2577302
Dissolved Potassium (K)	mg/L	0.75	3.51	2577299	1.45	0.81	2.20	0.68	0.37	0.05	2577302
Dissolved Sodium (Na)	mg/L	1.02	1.42	2577299	0.68	0.77	0.82	0.57	0.49	0.05	2577302
Dissolved Sulphur (S)	mg/L	<3	55	2577299	31	129	19	<3	<3	3	2577302

RDL = Reportable Detection Limit
(1) - dissolved > total, reanalyzed & confirmed. Possible trace level of field-filtered contamination on dissolved metal bottle or there is a discrepancy between samples taken.

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		L53450	L53451	L53452	L53453	L53454	L53455	L53456	L53457	L53458	L53459		
Sampling Date		2008/09/02	2008/09/03	2008/09/03	2008/09/03	2008/09/05	2008/09/03	2008/09/02	2008/09/02	2008/09/02	2008/09/02		
	Units	**SW32**	**SW21**	**SW25T**	**SW26T**	**SW43**	**SW25B**	**SW2B**	**SW2**	**SW8**	**SW9**	**RDL**	**QC Batch**
Calculated Parameters													
Total Hardness (CaCO3)	mg/L	12.6	7.6	17.0	14.7	<0.5	16.6	13.0	13.0	17.7	17.1	0.5	2570057

RDL = Reportable Detection Limit

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		L53450	L53451	L53452	L53453	L53454	L53455	L53456	L53457	L53458	L53459		
Sampling Date		2008/09/02	2008/09/03	2008/09/03	2008/09/03	2008/09/05	2008/09/03	2008/09/02	2008/09/02	2008/09/02	2008/09/02		
	Units	SW32	SW21	SW25T	SW26T	SW43	SW25B	SW2B	SW2	SW8	SW9	RDL	QC Batch
Total Metals by ICPMS													
Total Aluminum (Al)	mg/L	0.0789	0.0089	0.349	0.169	<0.0002	0.340	0.133	0.115	0.411	0.383	0.0002	2574355
Total Antimony (Sb)	mg/L	0.00003	<0.00002	0.00003	0.00003	<0.00002	0.00003	0.00003	0.00003	0.00003	0.00002	0.00002	2574355
Total Arsenic (As)	mg/L	0.00031	0.00012	0.00040	0.00038	<0.00002	0.00041	0.00045	0.00049	0.00040	0.00038	0.00002	2574355
Total Barium (Ba)	mg/L	0.0116	0.00614	0.0133	0.0120	0.00004	0.0130	0.0117	0.0115	0.0139	0.0136	0.00002	2574355
Total Beryllium (Be)	mg/L	<0.00001	<0.00001	0.00007	0.00003	<0.00001	0.00006	0.00002	0.00001	0.00006	0.00008	0.00001	2574355
Total Bismuth (Bi)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2574355
Total Boron (B)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2574355
Total Cadmium (Cd)	mg/L	0.000006	0.000013	0.000078	0.000027	<0.000005	0.000080	0.000013	<0.000005	0.000090	0.000088	0.000005	2574355
Total Chromium (Cr)	mg/L	0.0004	<0.0001	0.0007	0.0005	<0.0001	0.0007	0.0004	0.0004	0.0008	0.0007	0.0001	2574355
Total Cobalt (Co)	mg/L	0.000089	0.000013	0.00379	0.000954	<0.000005	0.00374	0.000719	0.000206	0.00468	0.00426	0.000005	2574355
Total Copper (Cu)	mg/L	0.00157	0.00040	0.00826	0.00385	<0.00005	0.00802	0.00198	0.00199	0.00923	0.00848	0.00005	2574355
Total Iron (Fe)	mg/L	0.107	0.019	0.853	0.406	<0.001	0.830	0.618	0.318	1.01	0.876	0.001	2574355
Total Lead (Pb)	mg/L	0.000014	0.000025	0.000132	0.000077	0.000040	0.000135	0.000061	0.000030	0.000158	0.000147	0.000005	2574355
Total Lithium (Li)	mg/L	<0.0005	0.0006	0.0010	0.0007	<0.0005	0.0010	<0.0005	<0.0005	0.0011	0.0011	0.0005	2574355
Total Manganese (Mn)	mg/L	0.00176	0.00289	0.0887	0.0235	<0.00005	0.0861	0.0478	0.0291	0.105	0.0970	0.00005	2574355
Total Mercury (Hg)	mg/L	0.00001	0.00001	0.00001	0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	0.00001	2574355
Total Molybdenum (Mo)	mg/L	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00005	2574355
Total Nickel (Ni)	mg/L	0.00219	0.00020	0.00547	0.00348	<0.00002	0.00519	0.00332	0.00282	0.00603	0.00572	0.00002	2574355
Total Phosphorus (P)	mg/L	0.004	0.004	0.006	0.006	<0.002	0.005	0.007	0.007	0.007	0.005	0.002	2574355
Total Selenium (Se)	mg/L	<0.00004	<0.00004	0.00004	0.00005	<0.00004	0.00004	0.00004	0.00005	<0.00004	<0.00004	0.00004	2574355
Total Silicon (Si)	mg/L	0.9	0.2	1.2	1.2	<0.1	1.1	1.4	1.1	1.2	1.1	0.1	2574355
Total Silver (Ag)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000007	0.000005	2574355
Total Strontium (Sr)	mg/L	0.0126	0.00972	0.0166	0.0145	<0.00005	0.0164	0.0131	0.0139	0.0177	0.0171	0.00005	2574355
Total Thallium (Tl)	mg/L	0.000002	<0.000002	0.000003	0.000002	<0.000002	0.000003	0.000002	0.000003	0.000004	0.000005	0.000002	2574355
Total Tin (Sn)	mg/L	<0.00001	<0.00001	0.00007	0.00006	<0.00001	0.00002	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2574355
Total Titanium (Ti)	mg/L	0.0006	<0.0005	0.0010	0.0009	<0.0005	0.0008	0.0007	0.0008	0.0010	0.0007	0.0005	2574355
Total Uranium (U)	mg/L	0.000046	0.000046	0.000357	0.000160	<0.000002	0.000342	0.000086	0.000083	0.000425	0.000400	0.000002	2574355
Total Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	2574355
Total Zinc (Zn)	mg/L	0.0008	0.0019	0.0059	0.0025	0.0002	0.0056	0.0016	0.0008	0.0064	0.0062	0.0001	2574355
Total Zirconium (Zr)	mg/L	0.0002	<0.0001	0.0003	0.0003	<0.0001	0.0003	0.0003	0.0003	0.0003	0.0003	0.0001	2574355
Total Calcium (Ca)	mg/L	3.74	1.79	4.66	4.18	<0.05	4.58	3.53	3.53	4.80	4.68	0.05	2577301
Total Magnesium (Mg)	mg/L	0.80	0.75	1.30	1.04	<0.05	1.26	1.01	1.02	1.37	1.32	0.05	2577301
Total Potassium (K)	mg/L	0.40	0.35	0.57	0.49	<0.05	0.56	0.52	0.54	0.59	0.57	0.05	2577301
Total Sodium (Na)	mg/L	0.68	0.49	0.69	0.66	<0.05	0.68	0.70	0.70	0.69	0.66	0.05	2577301
Total Sulphur (S)	mg/L	<3	<3	5	<3	<3	4	<3	<3	5	5	3	2577301

RDL = Reportable Detection Limit

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		L53460	L53461	L53463	L53473	L53475	L53477	L53478	L53480	L53481		
Sampling Date		2008/09/02	2008/09/02	2008/08/20	2008/09/04	2008/09/04	2008/09/05	2008/09/05	2008/09/05	2008/09/05		
	Units	**SW36**	**SW35**	**TRIP BLANK**	**SW34**	**SW33**	**SW41**	**SW40**	**SW15US**	**SW15DS**	**RDL**	**QC Batch**
Calculated Parameters												
Total Hardness (CaCO3)	mg/L	16.6	17.5	5.1	219	121	27.4	27.7	27.2	27.8	0.5	2570057

RDL = Reportable Detection Limit

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		L53460	L53461	L53463	L53473	L53475	L53477	L53478	L53480	L53481		
Sampling Date		2008/09/02	2008/09/02	2008/08/20	2008/09/04	2008/09/04	2008/09/05	2008/09/05	2008/09/05	2008/09/05		
	Units	SW36	SW35	TRIP BLANK	SW34	SW33	SW41	SW40	SW15US	SW15DS	RDL	QC Batch
Total Metals by ICPMS												
Total Aluminum (Al)	mg/L	0.0976	0.313	0.0051	0.0156	0.0208	0.104	0.106	0.101	0.0965	0.0002	2574355
Total Antimony (Sb)	mg/L	0.00002	0.00003	<0.00002	0.00006	0.00010	0.00005	0.00005	0.00005	0.00006	0.00002	2574355
Total Arsenic (As)	mg/L	0.00034	0.00036	<0.00002	0.00172	0.00260	0.00085	0.00083	0.00083	0.00083	0.00002	2574355
Total Barium (Ba)	mg/L	0.0149	0.0147	0.00013	0.0146	0.0171	0.0164	0.0172	0.0169	0.0178	0.00002	2574355
Total Beryllium (Be)	mg/L	0.00002	0.00006	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2574355
Total Bismuth (Bi)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2574355
Total Boron (B)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2574355
Total Cadmium (Cd)	mg/L	0.000016	0.000063	<0.000005	<0.000005	0.000009	0.000008	<0.000005	0.000005	<0.000005	0.000005	2574355
Total Chromium (Cr)	mg/L	0.0004	0.0007	<0.0001	<0.0001	0.0001	0.0005	0.0004	0.0004	0.0004	0.0001	2574355
Total Cobalt (Co)	mg/L	0.000397	0.00235	<0.000005	0.00127	0.000396	0.000108	0.000115	0.000108	0.000117	0.000005	2574355
Total Copper (Cu)	mg/L	0.00225	0.00689	0.00063	0.00102	0.00380	0.00197	0.00192	0.00181	0.00192	0.00005	2574355
Total Iron (Fe)	mg/L	0.560	0.729	0.002	0.037	0.149	0.155	0.154	0.135	0.176	0.001	2574355
Total Lead (Pb)	mg/L	0.000050	0.000118	0.000031	0.000093	0.000056	0.000031	0.000020	0.000020	0.000018	0.000005	2574355
Total Lithium (Li)	mg/L	0.0009	0.0012	<0.0005	0.0007	0.0012	0.0007	0.0006	0.0007	0.0007	0.0005	2574355
Total Manganese (Mn)	mg/L	0.0283	0.0655	0.00031	0.0106	0.0241	0.00381	0.00381	0.00382	0.00470	0.00005	2574355
Total Mercury (Hg)	mg/L	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	2574355
Total Molybdenum (Mo)	mg/L	<0.00005	<0.00005	<0.00005	0.00061	0.00054	<0.00005	<0.00005	<0.00005	<0.00005	0.00005	2574355
Total Nickel (Ni)	mg/L	0.00275	0.00511	0.00006	0.00085	0.00395	0.00274	0.00274	0.00257	0.00276	0.00002	2574355
Total Phosphorus (P)	mg/L	0.005	0.004	<0.002	0.004	0.012	0.005	0.005	0.004	0.005	0.002	2574355
Total Selenium (Se)	mg/L	<0.00004	<0.00004	<0.00004	0.00006	0.00010	0.00004	<0.00004	<0.00004	<0.00004	0.00004	2574355
Total Silicon (Si)	mg/L	1.3	1.1	<0.1	0.3	0.1	1.5	1.6	1.4	1.6	0.1	2574355
Total Silver (Ag)	mg/L	<0.000005	<0.000005	<0.000005	0.000006	0.000021	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2574355
Total Strontium (Sr)	mg/L	0.0162	0.0177	0.00134	0.233	0.133	0.0247	0.0257	0.0256	0.0262	0.00005	2574355
Total Thallium (Tl)	mg/L	0.000002	0.000002	<0.000002	0.000003	0.000002	0.000002	0.000002	0.000002	0.000003	0.000002	2574355
Total Tin (Sn)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00005	<0.00001	<0.00001	<0.00001	0.00001	2574355
Total Titanium (Ti)	mg/L	0.0010	0.0005	<0.0005	<0.0005	0.0007	0.0008	0.0006	0.0007	0.0010	0.0005	2574355
Total Uranium (U)	mg/L	0.000089	0.000320	0.000003	0.000415	0.000751	0.000106	0.000109	0.000105	0.000110	0.000002	2574355
Total Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	2574355
Total Zinc (Zn)	mg/L	0.0025	0.0056	0.0009	0.0003	0.0015	0.0024	0.0007	0.0008	0.0006	0.0001	2574355
Total Zirconium (Zr)	mg/L	0.0004	0.0003	<0.0001	<0.0001	<0.0001	0.0003	0.0003	0.0003	0.0003	0.0001	2574355
Total Calcium (Ca)	mg/L	4.02	4.79	2.02	56.6	29.5	8.11	8.21	8.06	8.21	0.05	2577301
Total Magnesium (Mg)	mg/L	1.60	1.35	<0.05	18.9	11.6	1.74	1.75	1.72	1.76	0.05	2577301
Total Potassium (K)	mg/L	0.58	0.58	<0.05	3.26	1.66	0.70	0.71	0.69	0.73	0.05	2577301
Total Sodium (Na)	mg/L	0.74	0.68	1.99	24.8	14.8	0.97	0.97	0.95	0.98	0.05	2577301
Total Sulphur (S)	mg/L	<3	5	<3	78	23	<3	<3	<3	<3	3	2577301

RDL = Reportable Detection Limit

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		L53482		L53483	L53484	L53485	L53486	L53487		
Sampling Date		2008/09/04		2008/09/04	2008/09/04	2008/09/04	2008/09/04	2008/09/04		
	Units	**SW12**	**QC Batch**	**SW20**	**SW6**	**SW3**	**SW23**	**SW24**	**RDL**	**QC Batch**
Calculated Parameters										
Total Hardness (CaCO3)	mg/L	128	2570057	81.5	79.3	31.5	15.9	7.5	0.5	2570057

RDL = Reportable Detection Limit

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

LOW LEVEL TOTAL METALS - WATER (WATER)

Maxxam ID		L53482		L53483	L53484	L53485	L53486	L53487		
Sampling Date		2008/09/04		2008/09/04	2008/09/04	2008/09/04	2008/09/04	2008/09/04		
	Units	SW12	QC Batch	SW20	SW6	SW3	SW23	SW24	RDL	QC Batch
Total Metals by ICPMS										
Total Aluminum (Al)	mg/L	1.17	2574355	0.526	14.1	1.44	0.0347	0.0173	0.0002	2574387
Total Antimony (Sb)	mg/L	<0.00002	2574355	<0.00002	<0.00002	0.00003	<0.00002	<0.00002	0.00002	2574387
Total Arsenic (As)	mg/L	0.00069	2574355	0.00062	0.00076	0.00062	0.00026	0.00009	0.00002	2574387
Total Barium (Ba)	mg/L	0.0235	2574355	0.0261	0.00840	0.0797	0.00895	0.00730	0.00002	2574387
Total Beryllium (Be)	mg/L	0.00080	2574355	0.00050	0.00180	0.00046	<0.00001	<0.00001	0.00001	2574387
Total Bismuth (Bi)	mg/L	<0.000005	2574355	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	2574387
Total Boron (B)	mg/L	<0.05	2574355	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2574387
Total Cadmium (Cd)	mg/L	0.00128	2574355	0.000381	0.00169	0.000873	0.000006	<0.000005	0.000005	2574387
Total Chromium (Cr)	mg/L	0.0004	2574355	0.0004	0.0228	0.0005	0.0002	0.0001	0.0001	2574387
Total Cobalt (Co)	mg/L	0.0615	2574355	0.0256	0.255	0.0451	0.000057	0.000037	0.000005	2574387
Total Copper (Cu)	mg/L	0.0351	2574355	0.00690	0.178	0.0104	0.00120	0.00046	0.00005	2574387
Total Iron (Fe)	mg/L	0.091	2574355	0.170	38.8	0.560	0.083	0.049	0.001	2574387
Total Lead (Pb)	mg/L	0.000149	2574355	0.000096	0.00245	0.000205	0.000012	0.000024	0.000005	2574387
Total Lithium (Li)	mg/L	0.0100	2574355	0.0070	0.0205	0.0029	0.0006	0.0006	0.0005	2574387
Total Manganese (Mn)	mg/L	3.91	2574355	1.76	4.02	2.79	0.00716	0.0143	0.00005	2574387
Total Mercury (Hg)	mg/L	<0.00001	2574355	0.00002	0.00001	<0.00001	<0.00001	<0.00001	0.00001	2574387
Total Molybdenum (Mo)	mg/L	<0.00005	2574355	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00005	2574387
Total Nickel (Ni)	mg/L	0.110	2574355	0.0530	0.137	0.0458	0.00131	0.00023	0.00002	2574387
Total Phosphorus (P)	mg/L	0.004	2574355	0.004	<0.002	0.007	0.004	0.004	0.002	2574387
Total Selenium (Se)	mg/L	0.00009	2574355	0.00008	0.00022	<0.00004	<0.00004	<0.00004	0.00004	2574387
Total Silicon (Si)	mg/L	3.4	2574355	0.3	16.2	2.5	0.6	0.2	0.1	2574387
Total Silver (Ag)	mg/L	<0.000005	2574355	<0.000005	0.000049	0.000007	<0.000005	<0.000005	0.000005	2574387
Total Strontium (Sr)	mg/L	0.126	2574355	0.0890	0.0642	0.0523	0.0151	0.00968	0.00005	2574387
Total Thallium (Tl)	mg/L	0.000072	2574355	0.000063	0.000080	0.000024	0.000002	<0.000002	0.000002	2574387
Total Tin (Sn)	mg/L	<0.00001	2574355	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	0.00001	2574387
Total Titanium (Ti)	mg/L	0.0009	2574355	0.0028	0.0015	0.0010	<0.0005	0.0006	0.0005	2574387
Total Uranium (U)	mg/L	0.000702	2574355	0.000334	0.0172	0.000216	0.000060	0.000053	0.000002	2574387
Total Vanadium (V)	mg/L	<0.0002	2574355	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	2574387
Total Zinc (Zn)	mg/L	0.113	2574355	0.0258	0.125	0.0760	0.0006	0.0011	0.0001	2574387
Total Zirconium (Zr)	mg/L	<0.0001	2574355	0.0001	0.0002	0.0001	0.0002	<0.0001	0.0001	2574387
Total Calcium (Ca)	mg/L	35.6	2577301	27.0	18.0	8.19	4.05	1.80	0.05	2577305
Total Magnesium (Mg)	mg/L	9.60	2577301	3.42	8.38	2.68	1.41	0.72	0.05	2577305
Total Potassium (K)	mg/L	3.37	2577301	1.46	0.83	2.13	0.66	0.37	0.05	2577305
Total Sodium (Na)	mg/L	1.36	2577301	0.71	0.78	0.76	0.54	0.47	0.05	2577305
Total Sulphur (S)	mg/L	56	2577301	31	138	19	<3	<3	3	2577305

RDL = Reportable Detection Limit

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER Comments

BLANK Total Dissolved Solids (Filt. Residue): 250ml of DI water used

Sample L53463-01 Total Dissolved Solids (Filt. Residue): 250ml of sample was used

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2567446	Orthophosphate (P)	2008/09/12	92	80 - 120	101	80 - 120	0.002, RDL=0.001	mg/L	NC	20
2569090	Turbidity	2008/09/11			101	80 - 120	<0.1	NTU	5.4	25
2570084	Total Dissolved Solids	2008/09/12	NC	80 - 120	90	80 - 120	<1	mg/L	6.5	25
2570694	Nitrate plus Nitrite (N)	2008/09/12	97	80 - 120	101	80 - 120	<0.002	mg/L	NC	25
2570738	Nitrite (N)	2008/09/12	99	80 - 120	100	80 - 120	<0.002	mg/L	NC	25
2570821	Ammonia (N)	2008/09/12	93	80 - 120	101	80 - 120	<0.01	mg/L	0.8	25
2571070	Cyanide + Thiocyanate	2008/09/12	102	80 - 120	93	80 - 120	<0.0005	mg/L	NC	35
2571194	Weak Acid Dissoc. Cyanide (CN)	2008/09/12	104	80 - 120	107	80 - 120	<0.0005	mg/L	NC	20
2571330	Conductivity	2008/09/12			104	80 - 120	<1	uS/cm	0.2	25
2571333	Alkalinity (Total as CaCO3)	2008/09/12	NC	80 - 120	89	80 - 120	<0.5	mg/L	1.7	25
2573316	Dissolved Chloride (Cl)	2008/09/13	98	80 - 120	99	80 - 120	<0.5	mg/L	NC	20
2573319	Dissolved Sulphate (SO4)	2008/09/13	98	75 - 125	99	80 - 120	<0.5	mg/L	NC	20
2574276	Dissolved Arsenic (As)	2008/09/15	95	75 - 125	99	75 - 125	<0.00002	mg/L	4.1	25
2574276	Dissolved Beryllium (Be)	2008/09/15	108	75 - 125	105	75 - 125	<0.00001	mg/L	NC	25
2574276	Dissolved Cadmium (Cd)	2008/09/15	104	75 - 125	104	75 - 125	<0.000005	mg/L	NC	25
2574276	Dissolved Chromium (Cr)	2008/09/15	92	75 - 125	96	75 - 125	<0.0001	mg/L	NC	25
2574276	Dissolved Cobalt (Co)	2008/09/15	91	75 - 125	95	75 - 125	<0.000005	mg/L	10.1	25
2574276	Dissolved Copper (Cu)	2008/09/15	92	75 - 125	97	75 - 125	<0.00005	mg/L	1.7	25
2574276	Dissolved Lead (Pb)	2008/09/15	99	75 - 125	104	75 - 125	<0.000005	mg/L	2.1	25
2574276	Dissolved Lithium (Li)	2008/09/15	103	75 - 125	105	75 - 125	<0.0005	mg/L	NC	25
2574276	Dissolved Nickel (Ni)	2008/09/15	83	75 - 125	94	75 - 125	<0.00002	mg/L	5.3	25
2574276	Dissolved Selenium (Se)	2008/09/15	96	75 - 125	100	75 - 125	<0.00004	mg/L	NC	25
2574276	Dissolved Uranium (U)	2008/09/15	90	75 - 125	93	75 - 125	<0.000002	mg/L	1.7	25
2574276	Dissolved Vanadium (V)	2008/09/15	93	75 - 125	97	75 - 125	<0.0002	mg/L	NC	25
2574276	Dissolved Zinc (Zn)	2008/09/15	94	75 - 125	100	75 - 125	<0.0001	mg/L	5.6	25
2574276	Dissolved Aluminum (Al)	2008/09/15					<0.0002	mg/L	1.9	25
2574276	Dissolved Antimony (Sb)	2008/09/15					<0.00002	mg/L	NC	25
2574276	Dissolved Barium (Ba)	2008/09/15					<0.00002	mg/L	3.5	25
2574276	Dissolved Bismuth (Bi)	2008/09/15					<0.000005	mg/L	NC	25
2574276	Dissolved Boron (B)	2008/09/15					<0.05	mg/L	NC	25
2574276	Dissolved Iron (Fe)	2008/09/15					<0.001	mg/L	0	25
2574276	Dissolved Manganese (Mn)	2008/09/15					<0.00005	mg/L	2.3	25
2574276	Dissolved Mercury (Hg)	2008/09/15					0.00002, RDL=0.00001	mg/L	NC	25
2574276	Dissolved Molybdenum (Mo)	2008/09/15					<0.00005	mg/L	NC	25
2574276	Dissolved Phosphorus (P)	2008/09/15					<0.002	mg/L	NC	25
2574276	Dissolved Silicon (Si)	2008/09/15					<0.1	mg/L	1.3	25
2574276	Dissolved Silver (Ag)	2008/09/15					<0.000005	mg/L	NC	25
2574276	Dissolved Strontium (Sr)	2008/09/15					<0.00005	mg/L	1.8	25
2574276	Dissolved Thallium (Tl)	2008/09/15					<0.000002	mg/L	NC	25
2574276	Dissolved Tin (Sn)	2008/09/15					<0.00001	mg/L	NC	25

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2574276	Dissolved Titanium (Ti)	2008/09/15					<0.0005	mg/L	NC	25
2574276	Dissolved Zirconium (Zr)	2008/09/15					<0.0001	mg/L	NC	25
2574300	Dissolved Arsenic (As)	2008/09/16	91	75 - 125	98	75 - 125	<0.00002	mg/L	2.6	25
2574300	Dissolved Beryllium (Be)	2008/09/16	100	75 - 125	103	75 - 125	<0.00001	mg/L	4.1	25
2574300	Dissolved Cadmium (Cd)	2008/09/16	100	75 - 125	100	75 - 125	<0.000005	mg/L	1	25
2574300	Dissolved Chromium (Cr)	2008/09/16	94	75 - 125	98	75 - 125	<0.0001	mg/L	NC	25
2574300	Dissolved Cobalt (Co)	2008/09/16	NC	75 - 125	98	75 - 125	<0.000005	mg/L	0.8	25
2574300	Dissolved Copper (Cu)	2008/09/16	NC	75 - 125	102	75 - 125	<0.00005	mg/L	1.3	25
2574300	Dissolved Lead (Pb)	2008/09/16	96	75 - 125	103	75 - 125	<0.000005	mg/L	2.5	25
2574300	Dissolved Lithium (Li)	2008/09/16	NC	75 - 125	99	75 - 125	<0.0005	mg/L	0.5	25
2574300	Dissolved Nickel (Ni)	2008/09/16	NC	75 - 125	99	75 - 125	<0.00002	mg/L	0.2	25
2574300	Dissolved Selenium (Se)	2008/09/16	109	75 - 125	106	75 - 125	<0.00004	mg/L	NC	25
2574300	Dissolved Uranium (U)	2008/09/16	100	75 - 125	106	75 - 125	<0.000002	mg/L	0.8	25
2574300	Dissolved Vanadium (V)	2008/09/16	93	75 - 125	93	75 - 125	<0.0002	mg/L	NC	25
2574300	Dissolved Zinc (Zn)	2008/09/16	NC	75 - 125	102	75 - 125	<0.0001	mg/L	1.5	25
2574300	Dissolved Aluminum (Al)	2008/09/16					<0.0002	mg/L	0.7	25
2574300	Dissolved Antimony (Sb)	2008/09/16					<0.00002	mg/L	NC	25
2574300	Dissolved Barium (Ba)	2008/09/16					<0.00002	mg/L	0.6	25
2574300	Dissolved Bismuth (Bi)	2008/09/16					<0.000005	mg/L	NC	25
2574300	Dissolved Boron (B)	2008/09/16					<0.05	mg/L	NC	25
2574300	Dissolved Iron (Fe)	2008/09/16					<0.001	mg/L	0.1	25
2574300	Dissolved Manganese (Mn)	2008/09/16					<0.00005	mg/L	0.8	25
2574300	Dissolved Mercury (Hg)	2008/09/16					0.00002, RDL=0.00001	mg/L	NC	25
2574300	Dissolved Molybdenum (Mo)	2008/09/16					<0.00005	mg/L	NC	25
2574300	Dissolved Phosphorus (P)	2008/09/16					<0.002	mg/L	NC	25
2574300	Dissolved Silicon (Si)	2008/09/16					<0.1	mg/L	NC	25
2574300	Dissolved Silver (Ag)	2008/09/16					<0.000005	mg/L	NC	25
2574300	Dissolved Strontium (Sr)	2008/09/16					<0.00005	mg/L	1.4	25
2574300	Dissolved Thallium (Tl)	2008/09/16					<0.000002	mg/L	4.9	25
2574300	Dissolved Tin (Sn)	2008/09/16					<0.00001	mg/L	NC	25
2574300	Dissolved Titanium (Ti)	2008/09/16					<0.0005	mg/L	NC	25
2574300	Dissolved Zirconium (Zr)	2008/09/16					<0.0001	mg/L	NC	25
2574355	Total Arsenic (As)	2008/09/15	97	75 - 125	99	75 - 125	<0.00002	mg/L	8.4	25
2574355	Total Beryllium (Be)	2008/09/15	104	75 - 125	104	75 - 125	<0.00001	mg/L	NC	25
2574355	Total Cadmium (Cd)	2008/09/15	100	75 - 125	99	75 - 125	<0.000005	mg/L	NC	25
2574355	Total Chromium (Cr)	2008/09/15	93	75 - 125	97	75 - 125	<0.0001	mg/L	NC	25
2574355	Total Cobalt (Co)	2008/09/15	94	75 - 125	98	75 - 125	<0.000005	mg/L	4.0	25
2574355	Total Copper (Cu)	2008/09/15	95	75 - 125	100	75 - 125	<0.00005	mg/L	4.8	25
2574355	Total Lead (Pb)	2008/09/15	96	75 - 125	102	75 - 125	<0.000005	mg/L	NC	25
2574355	Total Lithium (Li)	2008/09/15	95	75 - 125	101	75 - 125	<0.0005	mg/L	NC	25

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2574355	Total Nickel (Ni)	2008/09/15	95	75 - 125	99	75 - 125	<0.00002	mg/L	3.5	25
2574355	Total Selenium (Se)	2008/09/15	99	75 - 125	106	75 - 125	<0.00004	mg/L	NC	25
2574355	Total Uranium (U)	2008/09/15	96	75 - 125	102	75 - 125	<0.000002	mg/L	1.8	25
2574355	Total Vanadium (V)	2008/09/15	91	75 - 125	96	75 - 125	<0.0002	mg/L	NC	25
2574355	Total Zinc (Zn)	2008/09/15	101	75 - 125	103	75 - 125	<0.0001	mg/L	12.9	25
2574355	Total Aluminum (Al)	2008/09/15					<0.0002	mg/L	2.5	25
2574355	Total Antimony (Sb)	2008/09/15					<0.00002	mg/L	NC	25
2574355	Total Barium (Ba)	2008/09/15					<0.00002	mg/L	2.7	25
2574355	Total Bismuth (Bi)	2008/09/15					<0.000005	mg/L	NC	25
2574355	Total Boron (B)	2008/09/15					<0.05	mg/L	NC	25
2574355	Total Iron (Fe)	2008/09/15					<0.001	mg/L	10.0	25
2574355	Total Manganese (Mn)	2008/09/15					<0.00005	mg/L	0	25
2574355	Total Mercury (Hg)	2008/09/15					<0.00001	mg/L	NC	25
2574355	Total Molybdenum (Mo)	2008/09/15					<0.00005	mg/L	NC	25
2574355	Total Phosphorus (P)	2008/09/15					<0.002	mg/L	NC	25
2574355	Total Silicon (Si)	2008/09/15					<0.1	mg/L	10.0	25
2574355	Total Silver (Ag)	2008/09/15					<0.000005	mg/L	NC	25
2574355	Total Strontium (Sr)	2008/09/15					<0.00005	mg/L	1.8	25
2574355	Total Thallium (Tl)	2008/09/15					<0.000002	mg/L	NC	25
2574355	Total Tin (Sn)	2008/09/15					<0.00001	mg/L	NC	25
2574355	Total Titanium (Ti)	2008/09/15					<0.0005	mg/L	NC	25
2574355	Total Zirconium (Zr)	2008/09/15					<0.0001	mg/L	NC	25
2574387	Total Arsenic (As)	2008/09/16	100	75 - 125	98	75 - 125	<0.00002	mg/L	1.5	25
2574387	Total Beryllium (Be)	2008/09/16	110	75 - 125	104	75 - 125	<0.00001	mg/L	0.2	25
2574387	Total Cadmium (Cd)	2008/09/16	105	75 - 125	99	75 - 125	<0.000005	mg/L	1.3	25
2574387	Total Chromium (Cr)	2008/09/16	102	75 - 125	98	75 - 125	<0.0001	mg/L	NC	25
2574387	Total Cobalt (Co)	2008/09/16	NC	75 - 125	99	75 - 125	<0.000005	mg/L	0.7	25
2574387	Total Copper (Cu)	2008/09/16	NC	75 - 125	101	75 - 125	<0.00005	mg/L	0.04	25
2574387	Total Lead (Pb)	2008/09/16	100	75 - 125	103	75 - 125	<0.000005	mg/L	3.6	25
2574387	Total Lithium (Li)	2008/09/16	NC	75 - 125	101	75 - 125	<0.0005	mg/L	1.8	25
2574387	Total Nickel (Ni)	2008/09/16	NC	75 - 125	100	75 - 125	<0.00002	mg/L	0.2	25
2574387	Total Selenium (Se)	2008/09/16	106	75 - 125	102	75 - 125	<0.00004	mg/L	NC	25
2574387	Total Uranium (U)	2008/09/16	101	75 - 125	102	75 - 125	<0.000002	mg/L	1	25
2574387	Total Vanadium (V)	2008/09/16	101	75 - 125	94	75 - 125	<0.0002	mg/L	NC	25
2574387	Total Zinc (Zn)	2008/09/16	NC	75 - 125	102	75 - 125	<0.0001	mg/L	0.9	25
2574387	Total Aluminum (Al)	2008/09/16					<0.0002	mg/L	0.5	25
2574387	Total Antimony (Sb)	2008/09/16					<0.00002	mg/L	NC	25
2574387	Total Barium (Ba)	2008/09/16					<0.00002	mg/L	0.2	25
2574387	Total Bismuth (Bi)	2008/09/16					<0.000005	mg/L	NC	25
2574387	Total Boron (B)	2008/09/16					<0.05	mg/L	NC	25

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2574387	Total Iron (Fe)	2008/09/16					<0.001	mg/L	0.6	25
2574387	Total Manganese (Mn)	2008/09/16					<0.00005	mg/L	1.3	25
2574387	Total Mercury (Hg)	2008/09/16					0.00001, RDL=0.00001	mg/L	NC	25
2574387	Total Molybdenum (Mo)	2008/09/16					<0.00005	mg/L	NC	25
2574387	Total Phosphorus (P)	2008/09/16					<0.002	mg/L	NC	25
2574387	Total Silicon (Si)	2008/09/16					<0.1	mg/L	NC	25
2574387	Total Silver (Ag)	2008/09/16					<0.000005	mg/L	NC	25
2574387	Total Strontium (Sr)	2008/09/16					<0.00005	mg/L	1.3	25
2574387	Total Thallium (Tl)	2008/09/16					<0.000002	mg/L	3.5	25
2574387	Total Tin (Sn)	2008/09/16					<0.00001	mg/L	NC	25
2574387	Total Titanium (Ti)	2008/09/16					<0.0005	mg/L	3.6	25
2574387	Total Zirconium (Zr)	2008/09/16					<0.0001	mg/L	NC	25
2574653	Dissolved Organic Carbon (C)	2008/09/15	118	80 - 120	105	80 - 120	<0.5	mg/L	0.5	20
2574658	Total Organic Carbon (C)	2008/09/15	104	80 - 120	100	80 - 120	<0.5	mg/L	NC	20
2574840	Ammonia (N)	2008/09/15	103	80 - 120	89	80 - 120	<0.01	mg/L	0.7	25
2574922	Total Suspended Solids	2008/09/15			99	N/A	<1	mg/L		
2577050	Total Nitrogen (N)	2008/09/15	99	80 - 120	105	80 - 120	<0.02	mg/L	1.5	25
2577095	Total Suspended Solids	2008/09/16			102	N/A	<1	mg/L		
2577299	Dissolved Calcium (Ca)	2008/09/15					<0.05	mg/L	0.5	25
2577299	Dissolved Magnesium (Mg)	2008/09/15					<0.05	mg/L	1.6	25
2577299	Dissolved Potassium (K)	2008/09/15					<0.05	mg/L	1.1	25
2577299	Dissolved Sodium (Na)	2008/09/15					<0.05	mg/L	1.9	25
2577299	Dissolved Sulphur (S)	2008/09/15					<3	mg/L	NC	25
2577301	Total Calcium (Ca)	2008/09/15					<0.05	mg/L	1.5	25
2577301	Total Magnesium (Mg)	2008/09/15					<0.05	mg/L	0.3	25
2577301	Total Potassium (K)	2008/09/15					<0.05	mg/L	0.5	25
2577301	Total Sodium (Na)	2008/09/15					<0.05	mg/L	0.4	25
2577301	Total Sulphur (S)	2008/09/15					<3	mg/L	NC	25
2577302	Dissolved Calcium (Ca)	2008/09/16					<0.05	mg/L	0.1	25
2577302	Dissolved Magnesium (Mg)	2008/09/16					<0.05	mg/L	0.5	25
2577302	Dissolved Potassium (K)	2008/09/16					<0.05	mg/L	0.6	25
2577302	Dissolved Sodium (Na)	2008/09/16					<0.05	mg/L	0.4	25
2577302	Dissolved Sulphur (S)	2008/09/16					<3	mg/L	2.1	25
2577305	Total Calcium (Ca)	2008/09/16					<0.05	mg/L	0.8	25
2577305	Total Magnesium (Mg)	2008/09/16					<0.05	mg/L	2.2	25
2577305	Total Potassium (K)	2008/09/16					<0.05	mg/L	1.2	25

Maxxam Job #: A846845
Report Date: 2008/09/22

GARTNER LEE LTD.
Client Project #: 70562 CULLATON LAKE
Site Reference: CULLATON LAKE
Sampler Initials: JS

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2577305	Total Sodium (Na)	2008/09/16					<0.05	mg/L	0.3	25
2577305	Total Sulphur (S)	2008/09/16					<3	mg/L	2.9	25

N/A = Not Applicable
NC = Non-calculable
RDL = Reportable Detection Limit
RPD = Relative Percent Difference

REC'D IN WINNIPEG

Maxxam Analytics Inc

6577 Commerce Court, Burnaby, British Columbia Canada V5A 4N5
Tel (604) 444-4808 Toll-free (800) 440-4808 Fax (604) 444-4511 www.maxxamanalytics.com

CHAIN OF CUSTODY RECORD A846845 Page 1 of 4

INVOICE INFORMATION:
Company Name: #2448 GARTNER LEE LTD.
Contact Name: Kai Woloshyn
Address: 2251 - 2nd AVENUE, WHITEHORSE YT Y1A 5W1
Phone: (867)633-6474 Fax: (867)633-6321
Email: kwoloshyn@gartnerlee.com

REPORT INFORMATION (if differs from invoice):
Company Name: #6042
Contact Name: Jennifer Sarchuk
Address: 6400 ROBERTS STREET, BURNABY BC V5G 4L9
Phone: (604)299-4144 Fax: (604)299-1455
Email: kwoloshyn@gartnerlee.com, jsarchuk@gartnerlee

PROJECT INFORMATION:
Quotation #: A80110
P.O. #: Cullaton Lake
Project #: 70862 THOMPSON MANITOBA BOTTLES
Project Name: Cullaton Lake
Site Location: Cullaton Lake
Sampled By: JS/ KC

Laboratory Use Only:
MAXXAM JOB #: Cullaton Lake
BOTTLE ORDER #: 28997
CHAIN OF CUSTODY #: C#28997-03-01
PROJECT MANAGER: ROB MACARTHUR

REGULATORY CRITERIA: CCME Metals

SPECIAL INSTRUCTIONS: Please send to Burnaby lab for all analysis

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

TURNAROUND TIME (TAT) REQUIRED:
Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: ______ Time Required: ______
Rush Confirmation Number: ______ (call lab for #)

ANALYSIS REQUESTED (Please be specific):

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Total metals ETP + Hg	Dissolved metals ETP	Cyanide (total, WAD)	Total Nutrients TOC, Ammonia	Dissolved Nutrients (DOC)	General Chem.	TSS, pH, Cond, Acidity, Sulfate	Chloride, TDS	Nitrate, Nitrite	Dissolved ammonia	Hardness, alkalinity	# of Bottles	Comments
1		SW32	Sept. 2	water		Y	X	X	X	X	X	X	X					7	
2		SW21	Sept. 3	water		Y	X	X	X	X	X	X	X					7	
3		SW25T	Sept. 3	water		Y	X	X	X	X	X	X	X					7	
4		SW26T	Sept. 3	water		Y	X	X	X	X	X	X	X					7	
5		SW43	Sept. 5	water		Y	X	X	X	X	X	X	X					7	
6		SW25B	Sept. 3	water		Y	X	X	X	X	X	X	X					7	
7																			
8																			
9																			
10																			

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:
Jen Sarchuk / Jen Sarchuk	08/09/07	8:45	Vicki Yeung / VICKI YEUNG @ WPG	08/09/09	10:30 AM

Laboratory Use Only: Time Sensitive ☐ | Temperature (°C) on Receipt: 8,3,5° C @ WPG | Condition of Sample on Receipt: ☐ OK ☐ S/F | Custody Seal intact on Cooler? ☐ Yes ☐ No

White: Maxxam Yellow: Client

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

JR 10/9/08 9:50

1,1,1 1,1,1 1,1,1
1,1,1 1,1,1

MaxXam Analytics Inc. 8577 Commerce Court, Burnaby, British Columbia Canada V5A 4N5
Tel (604) 444-4808 Toll-free (800) 440-4808 Fax (604) 444-4511 www.maxxamanalytics.com

REC'D IN WINNIPEG

CHAIN OF CUSTODY RECORD

INVOICE INFORMATION:

Company Name:	#2448 GARTNER LEE LTD.
Contact Name	Kal Wokoshyn
Address	2251 - 2nd AVENUE WHITEHORSE YT Y1A 5W1
Phone	(867)633-6474 Fax: (867)633-6321
Email	kwokoshyn@gartnerlee.com

REPORT INFORMATION (if differs from invoice):

Company Name:	#6042
Contact Name:	Jennifer Sarchuk
Address	6400 ROBERTS STREET BURNABY BC V5G 4L9
Phone	(604)299-4144 Fax: (604)299-1455
Email:	kwokoshyn@gartnerlee.com, jsarchuk@gartnerlee.com

PROJECT INFORMATION:

Quotation #:	A80110
P.O. #:	Cullaton Lake
Project #:	7036Z THOMPSON MANITOBA BOTTLES
Project Name:	Cullaton Lake
Site Location:	Cullaton Lake
Sampled By:	JS/EC

Laboratory Use Only:

MAXXAM JOB #:	BOTTLE ORDER #:
Cullaton Lake	26997
CHAIN OF CUSTODY #:	PROJECT MANAGER:
C#26997-01-01	ROB MACARTHUR

REGULATORY CRITERIA: CCME metals.

SPECIAL INSTRUCTIONS: Please send to Burnaby lab for all analysis

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

ANALYSIS REQUESTED (Please be specific):

TURNAROUND TIME (TAT) REQUIRED:

Regular (Standard) TAT: (will be applied if Rush TAT is not specified) ☒
Standard TAT = 5-7 Working days for most tests
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: _____ Time Required: _____
Rush Confirmation Number: _____ (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	Total metals Arp + thg	Dissolved metals Arp+thg	Cyanide (total, wad)	CTKD total cyanide	Dissolved cyanide (DOC)	General chem.	(TSS, pH, Cond, turb, surface chloride, TDS, Nitrate, Nitrite, Dissolved ammonia, hardness, alkalinity)			# of Bottles	Comments
1		SW28	Sept. 2	water		Y	X	X	X	X	X	X	X			7	
2		SW2	Sept. 2	water		Y	X	X	X	X	X	X	X			7	
3		SW8	Sept 2	water		Y	X	X	X	X	X	X	X			7	
4		SW9	Sept 2	water		Y	X	X	X	X	X	X	X			7	
5		SW36	Sept. 2	water		Y	X	X	X	X	X	X	X			7	
6		SW35	Sept 2	water		Y	X	X	X	X	X	X	X			7	
7																	
8																	
9																	
10																	

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:
Jennifer Sarchuk	08/09/07	8:45	Vicki Young CUPS	08/09/09	10:30 AM

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Condition of Sample on Receipt	Custody Seal Intact on Cooler?
☐	2,3,5°C @ WRS	☐ OK ☐ SIF	☐ Yes ☐ No

White: Maxxam Yellow: Client

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

JR, 9:50 10/9/08

1,1,1 1,1,1 1,1,1
1,1,1 1,1,1

Maxxam Analytics Inc — 8577 Commerce Court, Burnaby, British Columbia Canada V5A 4N5
Tel (604) 444-4808 Toll-free (800) 440-4808 Fax (604) 444-4511 www.maxxamanalytics.com

REC'D IN WINNIPEG

CHAIN OF CUSTODY RECORD

Page 3 of 4

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:	
Company Name	#2448 GARTNER LEE LTD.	Company Name	#6042	Quotation #	A80110
Contact Name	Kai Woloshyn	Contact Name	Jennifer Sarchuk	P.O. #	Cullaton Lake
Address	2251 - 2nd AVENUE	Address	8400 ROBERTS STREET	Project #	7086 2-THOMPSON MANITOBA BOTTLES
	WHITEHORSE YT Y1A 5W1		BURNABY BC V5G 4L9	Project Name	Cullaton Lake
Phone	(867)633-6474 Fax (867)633-6321	Phone	(604)299-4144 Fax (604)299-1455	Site Location	Cullaton Lake
Email	kwoloshyn@gartnerlee.com	Email	kwoloshyn@gartnerlee.com, jsarchuk@gartnerlee	Sampled By	JS/EC

Laboratory Use Only:

MAXXAM JOB #:	BOTTLE ORDER #:
Cullaton Lake	28997
CHAIN OF CUSTODY #:	PROJECT MANAGER:
C#28997-02-01	ROB MACARTHUR

REGULATORY CRITERIA: CCME metals

SPECIAL INSTRUCTIONS: Please send to Burnaby lab for all analysis

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

TURNAROUND TIME (TAT) REQUIRED:
Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: ________ Time Required: ________
Rush Confirmation Number: ________ (call lab for #)

ANALYSIS REQUESTED: Regulated Drinking Water ? (Y/N); Metals Field Filtered ? (Y/N); Total metals (Hg+Ti); Dissolved metals (As+Hg); Cyanide (Total, WAD); Total nutrients (TKN, TP, Ammonia); Dissolved Nutrients (DOC); General chem; TSS, pH, Cond, turb; Sulfate, chloride; TDS, Nitrate; Nitrite, Dissolved Orthophosphate; hardness, alkalinity

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Total metals	Dissolved metals	Cyanide	Total nutrients	Dissolved Nutrients	General chem	TSS, pH, Cond, turb, Sulfate, chloride	TDS, Nitrate	Nitrite, Dissolved Orthophosphate	hardness, alkalinity	# of Bottles	Comments
1		Trip blank	Aug. 20	water		Y	X	X	X	X	X	X	X				7	
2		SW34	Sept. 4	water		Y	X	X	X	X	X	X	X				7	
3		SW33	Sept. 4	water		Y	X	X	X	X	X	X	X				7	
4		SW41	Sept. 5	water		Y	X	X	X	X	X	X	X				7	
5		SW40	Sept. 5	water		Y	X	X	X	X	X	X	X				7	
6		SW15US	Sept 5	water		Y	X	X	X	X	X	X	X				7	
7		SW15ds	Sept 5	water		Y	X	X	X	X	X	X	X				7	
8																		
9																		
10																		

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	Time Sensitive	Temperature (°C) on Receipt	Condition of Sample on Receipt	Custody Seal Intact on Cooler?
J Sarchuk / Jen Sarchuk	08/09/07	9:00	Vicki Young / Vicki YOUNG @ WPG	08/09/09	10:30AM	☐	23.5°C @ WPG	☐ OK ☐ S/F	☐ Yes ☐ No

White: Maxxam Yellow: Client

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

JR 9:50 10/9/08

Maxxam Analytics Inc — 8577 Commerce Court, Burnaby, British Columbia Canada V5A 4N5 — Tel (604) 444-4808 Toll-free (800) 440-4808 Fax (604) 444-4511 www.maxxamanalytics.com

REC'D IN WINNIPEG

CHAIN OF CUSTODY RECORD

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:	
Company Name:	#2448 GARTNER LEE LTD.	Company Name:	#6042	Quotation #:	A80110
Contact Name:	Kai Woloshyn	Contact Name:	Jennifer Sarchuk	P.O. #:	Cullaton Lake
Address:	2251 - 2nd AVENUE WHITEHORSE YT Y1A 5W1	Address:	6400 ROBERTS STREET BURNABY BC V5G 4L9	Project #:	70862 THOMPSON MANITOBA BOTTLES
Phone:	(867)633-6474 Fax: (867)633-6321	Phone:	(604)299-4144 Fax: (604)299-1455	Project Name:	Cullaton Lake
Email:	kwoloshyn@gartnerlee.com	Email:	kwoloshyn@gartnerlee.com, jsarchuk@gartnerlee	Site Location:	Cullaton
				Sampled By:	JS/KS

Laboratory Use Only:

MAXXAM JOB #:	BOTTLE ORDER #:
Cullaton Lake	26997
CHAIN OF CUSTODY #: C#26997-04-01	PROJECT MANAGER: ROB MACARTHUR

REGULATORY CRITERIA: CCME metals

SPECIAL INSTRUCTIONS: please send to Burnaby lab for all analysis

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

TURNAROUND TIME (TAT) REQUIRED

Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: ______ Time Required: ______
Rush Confirmation Number: ______ (call lab for #)

ANALYSIS REQUESTED: Regulated Drinking Water ? (Y/N); Metals Field Filtered ? (Y/N); total metals (Hg, Sb, etc.); Dissolved metal (Hg); Cyanide (total, WAD); total nutrients (TKN, TOC); Dissolved nutrients (DOC); General chem; TSS, pH, cond, alk, sulfate, chloride, TDS, hardness; Nitrite, ortho-phosphate (dissolved)

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Matrix	Regulated Drinking Water	Metals Field Filtered	total metals	Dissolved metal	Cyanide	total nutrients	Dissolved nutrients	General chem	TSS, pH, cond, etc.	Nitrite, ortho-phosphate		# of Bottles	Comments
1		SW12	Sept. 4	water		Y	X	X	X	X	X	X	X	~~X~~ ~~X~~		7	
2		SW20	Sept. 4	water		Y	X	X	X	X	X	X	X			7	
3		SW6	Sept. 4	water		Y	X	X	X	X	X	X	X			7	
4		SW3	Sept. 4	water		Y	X	X	X	X	X	X	X			7	
5		SW23	Sept. 4	water		Y	X	X	X	X	X	X	X			7	
6		SW24	Sept. 4	water		Y	X	X	X	X	X	X	X			7	
7																	
8																	
9																	
10																	

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	Time Sensitive	Temperature (°C) on Receipt	Condition of Sample on Receipt	Custody Seal intact on Cooler?
Jen Sarchuk	08/09/07	9:00	Vikki Young @ WPG	08/09/09	10:30 AM	☐	2,3,5°C @ WPG	☐ OK ☐ S/F	☐ Yes ☐ No

White: Maxxam Yellow: Client

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

JR. 10/9/08 9:50

Station		Water Quality Guideline		PWQO	Water Licence	Upstream Reference						Upstream Lake (Reference)	Shear Lake													
						SW2	SW2	SW2B	SW2B	SW32	SW32	SW27(1)	SW7	SW25-T	SW25T	SW25T	SW25B	SW25B	SW25-B1	SW25-B2	SW25-B3	SW26-T	SW26T	SW26T	SW26-B	SW26B
Date	Units	CCME a	Notes			28-Jun-08	2-Sep-08	28-Jun-08	2-Sep-08	27-Jun-08	2-Sep-08		27-Jun-08	15-May-08	4-Aug-08	3-Sep-08	4-Aug-08	3-Sep-08	15-May-08	15-May-08	15-May-08	15-May-08	4-Aug-08	3-Sep-08	15-May-08	4-Aug-08
Conductivity	μS/cm					23	29	25	31	24	28	**154**	27	158	35	45	35	35	164	163	167	148	35	45	150	35
pH		**6.5-9.0**			**6.0-9.5**	6.5	6.5	6.5	*6.4*	6.6	6.7	**7.0**	*6.3*	6.7	6.9	*5.4*	6.9	6.5	6.6	6.6	6.6	6.7	6.9	*5.3*	6.7	6.9
Hardness						9.9	13.0	10.7	13.0	11.2	12.6	**72**	10.4	65	13.5	17.0	13.7	14.7	67	68	69	61	13.7	16.6	62	13.9
Total Suspended Solids	mg/L				**50**	1	1	1	3	1	1	**33**	2	2	1	4	2	2	2	2	2	5	1	4	2	1
Total Dissolved Solids	mg/L					22	34	24	30	20	16	**83**	26	89	32	44	40	34	96	93	102	86	34	44	84	34
Turbidity	NTU					0.9	1.2	0.6	1.7	0.3	0.4	**17.6**	1.2	2.2	1.7	2.4	1.4	1.4	1.6	1.5	2.4	4.4	1.5	2.3	4.6	1.5
Ammonium as N						0.02	0.01	0.01	0.01	0.01	0.01	**0.61**	0.05	0.05	0.01	0.01	0.01	0.01	0.06	0.05	0.05	0.05	0.01	0.01	0.05	0.01
						2.6		3.5		3.2			2.7													
Alkalinity, Total (as CaCO3)						3.4	3.2	3.2	2.2	4.1	4.0	**60**	1.3	21	250	0.5	4.5	2.4	19	20	22	21	4.4	0.5	20	4.6
Chloride (Cl)						0.8	0.8	0.9	0.8	5.3	2.5	**1**	0.5	1.2	0.6	1.2	0.6	0.9	5	1.3	7.1	1.7	0.7	0.7	0.9	0.9
Sulfate (SO4)						0.5	0.5	0.9	3.3	0.5	1.3	**14**	3.7	46.7	7.1	13	7.3	5.7	50.4	50.6	51.8	45	7.1	12	44.5	7.1
Nitrate as N		**2.9**	**c**			0.002	0.094	0.002	0.002	0.002	0.002	**0.01**	0.008	0.03	0.002	0.008	0.002	0.005	0.11	0.04	0.1	0.03	0.002	0.009	0.03	0.002
Nitrite as N		**0.06**				0.002	0.003	0.002	0.002	0.003	0.002	**0.005**	0.002	0.005	0.002	0.002	0.002	0.002	0.005	0.005	0.005	0.005	0.002	0.002	0.005	0.002
Nitrate and Nitrite as N						0.002	0.097	0.002	0.004	0.003	0.002	**0.01**	0.008	0.03	0.002	0.008	0.002	0.005	0.11	0.04	0.1	0.03	0.002	0.009	0.03	0.002
Total Kjeldahl Nitrogen						0.25	0.40	0.26	0.32	0.24	0.19	**2.02**	0.23	0.64	0.28	0.31	0.28	0.31	0.57	0.7	0.65	0.61	0.30	0.33	0.61	0.24
Total Nitrogen							0.49		0.32		0.19				0.28	0.32	0.28	0.32					0.30	0.34		0.24
Total Organic Carbon						8.7	12.2	8.1	10.1	8.6	8.2	**39.2**	7.9	17.4	6.4	9.6	8.0	10.4	17.5	18	18.1	15.8	8.1	10.6	16.2	8.3
Dissolved Organic Carbon						8.6	11.4	8.3	9.8	9.0	8.0	**30**	7.1	15.2	7.8	9.2	8.0	10.2	16.2	15.8	15.9	14.5	8.1	8.7	14.4	8.6
Orthophosphate as P						0.002	0.001	0.002	0.002	0.002	0.002	**0.08**	0.002	0.05	0.026	0.002	0.001	0.021	0.06	0.06	0.06	0.06	0.004	0.003	0.06	0.002
Total Cyanide		**0.005**			**1.6**	0.0009	0.0008	0.0007	0.0016	0.0008	0.0008	**0.002**	0.0008	0.001	0.0008	0.0008	0.0008	0.0009	0.001	0.001	0.001	0.001	0.0005	0.0008	0.001	0.0007
WAD Cyanide							0.0005		0.0005		0.0005				0.0005	0.0005	0.0005	0.0005					0.0005	0.0005		0.0005
Aluminum	mg/L	**0.005**	**d**			*0.110*	*0.115*	*0.096*	*0.133*	*0.112*	*0.0789*	***0.359***	*0.154*	*0.334*	*0.0935*	*0.349*	*0.0957*	*0.169*	*0.344*	*0.329*	*0.351*	*0.27*	*0.0924*	*0.340*	*0.258*	*0.0930*
Antimony	mg/L			**0.02**		0.00002	0.00003	0.00002	0.00003	0.00003	0.00003	**0.0004**	0.00002	0.0002	0.00002	0.00003	0.00004	0.00003	0.0002	0.0002	0.0002	0.0004	0.00002	0.00003	0.0002	0.00002
Arsenic	mg/L	**0.005**			**0.6**	0.00043	0.00049	0.00036	0.00045	0.00036	0.00031	**0.0027**	0.00032	0.0007	0.00036	0.00040	0.00042	0.00038	0.0007	0.0006	0.0006	0.0006	0.00036	0.00041	0.0005	0.00038
Barium	mg/L					0.00965	0.0115	0.0116	0.0117	.0120	0.0116	**0.09**	0.0109	0.055	0.00932	0.0133	0.0121	0.0120	0.057	0.055	0.058	0.053	0.00964	0.0130	0.055	0.00994
Beryllium	mg/L					0.00001	0.00001	0.00001	0.00002	0.00001	0.00001	**0.0002**	0.00002	0.0001	0.00002	0.00007	0.00002	0.00003	0.0001	0.0001	0.0001	0.0002	0.00002	0.00006	0.0001	0.00002
Bismuth	mg/L					0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	**0.001**	0.000005	0.0005	0.000005	0.000005	0.000005	0.000005	0.0005	0.0005	0.0005	0.001	0.000005	0.000005	0.0005	0.000005
Boron	mg/L			**0.2**		0.05	0.05	0.05	0.05	0.05	0.05	**0.004**	0.05	0.003	0.05	0.05	0.05	0.05	0.003	0.003	0.002	0.004	0.05	0.05	0.003	0.05
Cadmium	mg/L	**0.000017**	**e**			*0.000098*	0.000005	*0.000039*	0.000013	*0.000036*	0.000006	***0.00003***	*0.000018*	*0.00022*	0.000017	*0.000078*	*0.000066*	*0.000027*	*0.00016*	*0.00016*	*0.00016*	*0.0002*	0.000013	*0.000080*	*0.00014*	0.000013
Calcium	mg/L					2.75	3.53	2.97	3.53	3.32	3.74	**20.8**	2.92	18.5	3.70	4.66	3.77	4.18	19.2	19.2	19.4	18	3.79	4.58	17.7	3.83
Chromium	mg/L	**0.001**	**f**			0.0003	0.0004	0.0003	0.0004	0.0005	0.0004	***0.002***	0.0004	0.001	0.0004	0.0007	0.0008	0.0005	0.001	0.001	0.001	0.001	0.0003	0.0007	0.0008	0.0003
Cobalt	mg/L			**0.0009**		0.00014	0.000206	0.000175	0.000719	0.000078	0.000089	**0.0072**	*0.00123*	*0.0055*	*0.000453*	*0.00379*	*0.000466*	*0.000954*	*0.0069*	*0.0067*	*0.0076*	*0.0052*	0.000401	*0.00374*	*0.0054*	0.000412
Copper	mg/L	**0.002**	**g**		**0.4**	0.00175	0.00199	0.0018	0.00198	0.00196	0.00157	***0.004***	*0.00264*	*0.008*	*0.00333*	*0.00826*	*0.00358*	*0.00385*	*0.009*	*0.009*	*0.009*	*0.007*	*0.00329*	*0.00802*	*0.007*	*0.00335*
Iron	mg/L	**0.3**				0.164	*0.318*	0.204	*0.618*	0.104	0.107	***13***	*0.321*	*0.6*	*0.551*	*0.853*	*0.544*	*0.406*	*0.6*	*0.6*	*0.6*	*0.6*	*0.502*	*0.830*	*0.6*	*0.535*
Lead	mg/L	**0.001**	**h**		**0.4**	0.000074	0.000030	0.000030	0.000061	0.000032	0.000014	**0.0002**	0.000069	*0.0013*	0.000080	0.000132	0.000517	0.000077	0.0003	0.0006	0.0004	*0.0027*	0.000069	0.000135	*0.0047*	0.000078
Lithium	mg/L					0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	**0.002**	0.0005	0.003	0.0006	0.0010	0.0007	0.0007	0.003	0.003	0.003	0.002	0.0007	0.0010	0.003	0.0007
Magnesium	mg/L					0.74	1.02	0.80	1.01	0.72	0.80	**5.1**	0.76	4.7	1.02	1.30	1.04	1.04	5	5	5	4.6	1.03	1.26	4.5	1.06
Manganese	mg/L					0.0213	0.0291	0.0107	0.0478	0.0010	0.00176	**2.04**	0.0316	0.261	0.0194	0.0887	0.0197	0.0235	0.304	0.302	0.318	0.297	0.0177	0.0861	0.31	0.0185
Mercury	mg/L	**0.026**	**i**			0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	**0.01**	0.00001	0.01	0.00001	0.00001	0.00001	0.00001	0.01	0.01	0.01	0.01	0.00001	0.00001	0.01	0.00001
Molybdenum	mg/L	**0.073**				0.00006	0.00005	0.00008	0.00005	0.00005	0.00005	**0.002**	0.00005	0.001	0.00005	0.00005	0.00005	0.00005	0.001	0.001	0.001	0.002	0.00005	0.00005	0.001	0.00005
Nickel	mg/L	**0.025**	**j**		**0.6**	0.00231	0.00282	0.00268	0.00332	0.00264	0.00219	**0.013**	0.00308	0.0128	0.00270	0.00547	0.00279	0.00348	0.0135	0.0133	0.0138	0.011	0.00274	0.00519	0.0113	0.00284
Phosphorus	mg/L			**0.02**		0.005	0.007	0.004	0.007	0.007	0.004	**0.09**	0.005	0.05	0.006	0.006	0.005	0.006	0.05	0.05	0.05	0.05	0.005	0.005	0.05	0.005
Potassium	mg/L					0.57	0.54	0.60	0.52	0.60	0.40	**2.8**	0.61	2.5	0.58	0.57	0.58	0.49	2.6	2.6	2.6	2.4	0.59	0.56	2.4	0.60
Selenium	mg/L	**0.001**				0.00004	0.00005	0.00004	0.00004	0.00004	0.00004	**0.0004**	0.00004	0.0002	0.00004	0.00004	0.00004	0.00005	0.0002	0.0002	0.0002	0.0004	0.00004	0.00004	0.0002	0.00004
Silicon	mg/L					0.5	1.1	0.5	1.4	1.0	0.9	**6.93**	0.6	5.18	0.3	1.2	0.3	1.2	5.41	4.86	5.3	4.69	0.2	1.1	4.67	0.2
Silver	mg/L	**0.0001**				0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	**0.00002**	0.000005	0.00001	0.000005	0.000005	0.000005	0.000005	0.00001	0.00001	0.00001	0.00002	0.000005	0.000005	0.00001	0.000005
Sodium	mg/L					0.51	0.70	0.55	0.70	0.63	0.68	**3.3**	0.49	2.6	0.59	0.69	0.61	0.66	2.7	2.7	2.8	2.6	0.59	0.68	2.6	0.62
Strontium	mg/L					0.0102	0.0139	0.0112	0.0131	0.0111	0.0126	**0.08**	0.0103	0.065	0.0132	0.0166	0.0134	0.0145	0.066	0.066	0.067	0.06	0.0134	0.0164	0.06	0.0136
Sulfur	mg/L											**5.2**		16.3					17.5	17.3	17.5	15			15.6	
Thallium	mg/L	**0.0008**				0.000002	0.000003	0.000002	0.000002	0.000002	0.000002	**0.0001**	0.000003	0.00005	0.000002	0.000003	0.000002	0.000002	0.00005	0.00005	0.00005	0.0001	0.000002	0.000003	0.00005	0.000002
Tin	mg/L					0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	**0.002**	0.00001	0.001	0.00001	0.00007	0.00009	0.00006	0.001	0.001	0.001	0.002	0.00001	0.00002	0.001	0.00001
Titanium	mg/L					0.0008	0.0008	0.0005	0.0007	0.0006	0.0006	**0.0039**	0.0009	0.0025	0.0011	0.0010	0.0008	0.0009	0.0022	0.0021	0.002	0.0021	0.0008	0.0008	0.002	0.0012
Uranium	mg/L			**0.005**		0.000071	0.000083	0.000067	0.000086	0.000064	0.000046	**0.001**	0.000148	0.0005	0.000154	0.000357	0.000157	0.000160	0.0005	0.0005	0.0005	0.001	0.000155	0.000342	0.0005	0.000157
Vanadium	mg/L			**0.006**		0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	**0.0008**	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Zinc	mg/L	**0.03**			**0.6**	0.0008	0.0008	0.0013	0.0016	0.0015	0.0008	**0.004**	0.0018	0.014	0.0016	0.0059	0.0028	0.0025	0.012	0.012	0.013	0.01	0.0019	0.0056	0.01	0.0015
Zirconium	mg/L			**0.004**		0.0002	0.0003	0.0002	0.0003	0.0003	0.0002	**0.002**	0.0003	0.001	0.0002	0.0003	0.0002	0.0003	0.001	0.001	0.001	0.002	0.0002	0.0003	0.001	0.0002

Station	Seeps(EWR)					Shear Creek												Kognak River (Upstream)						Kognak River (Downstream)		
	SW3	SW6	SW6	SW12	SW20	SW8	SW8	SW8	SW9	SW9-R (SW41)	SW9	SW9	SW35	SW36	SW23	SW23	SW21	SW21-1	SW21-1	SW21-2	SW21-2 (SW41)	SW21-3	SW21-3 (SW42)	SW24	SW24	SW24
Date	4-Sep-08	28-Jun-08	4-Sep-08	4-Sep-08	4-Sep-08	27-Jun-08	4-Aug-08	2-Sep-08	27-Jun-08	27-Jun-08	4-Aug-08	2-Sep-08	2-Sep-08	2-Sep-08	3-Aug-08	4-Sep-08	3-Sep-08	28-Jun-08	3-Aug-08	28-Jun-08	3-Aug-08	28-Jun-08	3-Aug-08	28-Jun-08	3-Aug-08	4-Sep-08
Conductivity	160	1300	1400	360	230	26	35	48	26	28	37	49	48	40	33	33	16	73	14	67	14	73	14	18	14	17
pH	*3.9*	*2.7*	*2.7*	*4.1*	*4.1*	*6.2*	7.0	*5.0*	*6.2*	*6.1*	6.9	*4.9*	*5.1*	6.5	7.2	6.9	6.6	7.5	7.1	7.4	7.0	7.5	7.1	6.7	7.1	6.7
Hardness	31.5	170	79.3	128	81.5	10.3	14.7	17.7	10.7	10.8	16.2	17.1	17.5	16.6	16.3	15.9	7.6	41.5	6.4	38.4	6.7	36.5	6.7	7.4	6.7	7.5
Total Suspended Solids	1	3	1	1	1	2	2	4	2	2	4	4	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Total Dissolved Solids	76	720	720	250	150	24	30	34	24	26	36	110	48	38	32	32	30	48	26	48	12	58	12	16	24	14
Turbidity	1.2	0.4	0.2	1.1	2.4	1.3	2.0	2.5	1.5	1.5	2.5	2.6	2.1	1.3	0.5	1.1	0.4	0.7	0.5	0.6	0.8	0.3	0.5	0.5	0.7	0.6
Ammonium as N	0.01	0.5	0.45	0.11	0.25	0.07	0.10	0.01	0.22	0.01	0.14	0.02	0.01	0.01	0.10	0.01	0.01	0.02	0.11	0.04	0.10	0.04	0.09	0.19	0.06	0.06
		248				2.9			3.2	3.0								2.0		1.7		1.8		1.8		
Alkalinity, Total (as CaCO3)	0.5	0.5	0.5	0.5	0.5	1.1	6.3	0.5	1.1	0.9	8.4	0.5	0.5	3.9	12	6.7	2.5	28	5.6	26	5.1	29	5.4	3.0	5.7	2.4
Chloride (Cl)	0.5	0.5	0.6	1.5	2.2	1.7	0.5	0.5	37	1.2	0.5	0.6	0.7	0.6	0.9	0.8	0.5	0.7	0.5	0.8	0.5	0.5	0.5	4.2	0.5	0.7
Sulfate (SO4)	56	350	320	130	76	3.8	6.2	15	8.5	4.5	5.7	15	15	6.0	0.9	1.2	1.1	1.5	0.5	1.3	0.5	1.1	0.5	1.2	0.5	1.3
Nitrate as N	0.009	0.792	0.148	0.006	0.438	0.003	0.002	0.007	0.007	0.002	0.034	0.008	0.006	0.003	0.026	0.007	0.012	0.004	0.005	0.004	0.004	0.003	0.002	.010	0.002	0.014
Nitrite as N	0.002	0.002	0.008	0.002	0.002	0.002	0.004	0.002	0.008	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Nitrate and Nitrite as N	0.009	0.792	0.156	0.006	0.438	0.003	0.004	0.009	0.015	0.002	0.036	0.010	0.008	0.006	0.026	0.007	0.012	0.004	0.005	0.004	0.004	0.003	0.002	.010	0.002	0.014
Total Kjeldahl Nitrogen	0.15	0.81	0.67	0.19	0.57	0.25	0.30	0.35	0.21	0.23	0.28	0.32	0.27	0.34	0.30	0.20	0.14	0.22	0.14	0.22	0.18	0.24	0.16	0.16	0.20	0.16
Total Nitrogen	0.16		0.82	0.19	1.00		0.31	0.36			0.31	0.33	0.28	0.35	0.32	0.21	0.15		0.14		0.18		0.16		0.20	0.18
Total Organic Carbon	4.9	0.5	0.5	3.3	3.0	8.1	6.5	9.0	6.6	7.2	8.0	9.0	8.8	9.6	6.5	7.9	3.5	7.2	4.2	8.1	2.8	6.8	2.7	4.0	4.5	3.9
Dissolved Organic Carbon	4.7	-	0.5	2.8	2.9	7.4	7.5	8.6	7.3	7.5	6.4	8.6	8.3	9.4	6.0	7.4	3.4	6.8	3.6	6.2	2.5	6.7	3.3	3.8	3.8	3.9
Orthophosphate as P	0.004	0.004	0.013	0.005	0.004	0.002	0.004	0.003	0.004	0.003	0.002	0.002	0.003	0.003	0.003	0.003	0.002	0.001	0.002	0.002	0.004	0.002	0.002	0.002	0.003	0.002
Total Cyanide	0.0005	-	0.0005	0.0005	0.0006	0.0006	0.0005	0.0008	0.0006	0.0006	0.0006	0.0009	0.0007	0.0008	0.0017	0.0005	0.0005	0.0008	0.0017	.0010	0.0005	0.0008	0.0005	0.0005	0.0011	0.0005
WAD Cyanide	0.0005		0.0005	0.0005	0.0005		0.0005	0.0005			0.0005	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005		0.0005		0.0005		0.0005		0.0005	0.0005
Aluminum	*1.44*	*15.2*	*14.1*	*1.17*	*0.526*	*0.152*	*0.0926*	*0.411*	*0.152*	*0.179*	*0.110*	*0.383*	*0.313*	*0.0976*	*0.0362*	*0.0347*	*0.0089*	*0.0178*	*0.0090*	*0.0170*	*0.0077*	*0.0177*	*0.0082*	*0.0131*	*0.0093*	*0.0173*
Antimony	0.00003	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00003	0.00002	0.00002	0.00002	0.00002	0.00003	0.00002	0.00002	0.00002	0.00002	0.00003	0.00002	0.00003	0.00002	0.00004	0.00002	0.00002	0.00002	0.00002
Arsenic	0.00062	0.00095	0.00076	0.00069	0.00062	0.00033	0.00040	0.00040	0.00032	0.00032	0.00042	0.00038	0.00036	0.00034	0.00029	0.00026	0.00012	0.00091	0.00008	0.00086	0.00010	0.00083	0.00008	0.00007	0.00008	0.00009
Barium	0.0797	0.0104	0.00840	0.0235	0.0261	0.0109	0.00927	0.0139	0.0110	0.0109	0.0116	0.0136	0.0147	0.0149	0.0101	0.00895	0.00614	0.0108	0.00705	0.0105	0.00646	0.0104	0.00673	0.00741	0.00669	0.00730
Beryllium	0.00046	0.00197	0.00180	0.00080	0.00050	0.00002	0.00002	0.00006	0.00002	0.00003	0.00002	0.00008	0.00006	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Bismuth	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000007	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Boron	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cadmium	*0.000873*	*0.00288*	*0.00169*	*0.00128*	*0.000381*	*0.000024*	0.000015	*0.000090*	*0.000033*	*0.000074*	*0.000026*	*0.000088*	*0.000063*	0.000016	0.000007	0.000006	0.000013	*0.000025*	0.000005	0.000006	0.000005	*0.000028*	0.000005	0.000005	*0.000044*	0.000005
Calcium	8.19	39.1	18.0	35.6	27.0	2.90	4.05	4.80	3.01	3.03	4.48	4.68	4.79	4.02	4.11	4.05	1.79	10.9	1.51	10.1	1.55	9.61	1.57	1.72	1.59	1.80
Chromium	0.0005	*0.021*	*0.0228*	0.0004	0.0004	0.0004	0.0003	0.0008	0.0004	0.0004	0.0004	0.0007	0.0007	0.0004	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Cobalt	*0.0451*	*0.268*	*0.255*	*0.0615*	*0.0256*	*0.00130*	*0.000955*	*0.00468*	*0.00122*	*0.00177*	*0.00236*	*0.00426*	*0.00235*	*0.000397*	0.000107	0.000057	0.000013	0.000044	0.000010	0.000040	0.000010	0.000033	0.000011	0.000016	0.000013	0.000037
Copper	*0.0104*	*0.196*	*0.178*	*0.0351*	*0.00690*	*0.00261*	*0.00288*	*0.00923*	*0.00260*	*0.00291*	*0.00263*	*0.00848*	*0.00689*	*0.00225*	0.00113	0.00120	0.00040	0.00129	0.00035	0.00122	0.00034	0.00128	0.00032	0.00037	0.00044	0.00046
Iron	*0.560*	*16.7*	*38.8*	0.091	0.170	*0.317*	*1.01*	*1.01*	*0.327*	*0.376*	*2.07*	*0.876*	*0.729*	*0.560*	0.130	0.083	0.019	0.051	0.018	0.050	0.018	0.054	0.018	0.022	0.017	0.049
Lead	0.000205	*0.00229*	*0.00245*	0.000149	0.000096	0.000048	0.000082	0.000158	0.000050	0.000086	0.000149	0.000147	0.000118	0.000050	0.000016	0.000012	0.000025	0.000012	0.000022	0.000012	0.000010	0.000024	0.000007	0.000007	0.000068	0.000024
Lithium	0.0029	0.0279	0.0205	0.0100	0.0070	0.0005	0.0006	0.0011	0.0005	0.0006	0.0006	0.0011	0.0012	0.0009	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0006	0.0006	0.0005	0.0005	0.0005	0.0006
Magnesium	2.68	17.6	8.38	9.60	3.42	0.75	1.11	1.37	0.77	0.79	1.22	1.32	1.35	1.60	1.47	1.41	0.75	3.45	0.65	3.19	0.68	3.05	0.67	0.75	0.67	0.72
Manganese	2.79	6.18	4.02	3.91	1.76	0.0352	0.0495	0.105	0.0340	0.0505	0.100	0.0970	0.0655	0.0283	0.0165	0.00716	0.00289	0.00371	0.00376	0.00400	0.00391	0.00414	0.00394	0.00509	0.00322	0.0143
Mercury	0.00001	0.00001	0.00001	0.00001	0.00002	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	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum	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	0.00005	0.00005	0.00005	0.00005	0.00009	0.00005	0.00005	0.00005	0.00005	0.00005	0.00006	0.00005	0.00005
Nickel	*0.0458*	*0.178*	*0.137*	*0.110*	*0.0530*	0.00310	0.00247	0.00603	0.00320	0.00355	0.00332	0.00572	0.00511	0.00275	0.00145	0.00131	0.00020	0.00163	0.00019	0.00147	0.00016	0.00148	0.00017	0.00023	0.00018	0.00023
Phosphorus	0.007	0.002	0.002	0.004	0.004	0.005	0.006	0.007	0.005	0.007	0.007	0.005	0.004	0.005	0.005	0.004	0.004	0.002	0.003	0.002	0.003	0.003	0.003	0.002	0.005	0.004
Potassium	2.13	1.40	0.83	3.37	1.46	0.61	0.60	0.59	0.62	0.65	0.50	0.57	0.58	0.58	0.71	0.66	0.35	0.68	0.37	0.64	0.37	0.64	0.37	0.40	0.37	0.37
Selenium	0.00004	0.00043	0.00022	0.00009	0.00008	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00005	0.00004	0.00006	0.00004	0.00004	0.00004	0.00004
Silicon	2.5	11.6	16.2	3.4	0.3	0.6	0.2	1.2	0.6	0.6	0.4	1.1	1.1	1.3	0.7	0.6	0.2	0.7	0.1	0.6	0.1	0.6	0.1	0.2	0.1	0.2
Silver	0.000007	0.000040	0.000049	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000009	0.000007	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000006	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Sodium	0.76	1.48	0.78	1.36	0.71	0.48	0.60	0.69	0.49	0.57	0.61	0.66	0.68	0.74	0.52	0.54	0.49	0.70	0.46	0.65	0.48	0.64	0.47	0.49	0.48	0.47
Strontium	0.0523	0.135	0.0642	0.126	0.0890	0.0102	0.0141	0.0177	0.0103	0.0105	0.0158	0.0171	0.0177	0.0162	0.0154	0.0151	0.00972	0.0412	0.00948	0.0383	0.00856	0.0366	0.00907	0.00985	0.00939	0.00968
Sulfur																										
Thallium	0.000024	0.000111	0.000080	0.000072	0.000063	0.000003	0.000002	0.000004	0.000003	0.000003	0.000002	0.000005	0.000002	0.000002	0.000002	0.000002	0.000002	0.000002	0.000002	0.000009	0.000002	0.000005	0.000002	0.000002	0.000002	0.000002
Tin	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	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
Titanium	0.0010	0.0012	0.0015	0.0009	0.0028	0.0007	0.0011	0.0010	.0010	0.0014	0.0014	0.0007	0.0005	0.0010	0.0007	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0008	0.0005	0.0005	0.0005	0.0006
Uranium	0.000216	*0.0174*	*0.0172*	0.000702	0.000334	0.000141	0.000123	0.000425	0.000139	0.000148	0.000121	0.000400	0.000320	0.000089	0.000056	0.000060	0.000046	.000060	0.000050	0.000068	0.000044	0.000064	0.000047	0.000050	0.000046	0.000053
Vanadium	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Zinc	*0.0760*	*0.226*	*0.125*	*0.113*	0.0258	0.0018	0.0013	0.0064	0.0020	0.0046	0.0026	0.0062	0.0056	0.0025	0.0007	0.0006	0.0019	0.0004	0.0008	0.0004	0.0003	0.0008	0.0003	0.0009	0.0022	0.0011
Zirconium	0.0001	0.0001	0.0002	0.0001	0.0001	0.0002	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0003	0.0004	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Foot Notes:

All units mg/L unless otherwise noted

a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2007

b) Minimum dissolved oxygen level for the protection of early life stages of cold-water biota (9.5 mg/L). A level of 6.5 mg/L is protective of older life stages of cold-water biota.

c) Main guideline value is expressed as nitrate (13 mg NO3-/L); the alternate value, expressed as N (2.9 mg as N/L), is presented

d) 0.005 mg/L at pH <6.5; 0.1 mg/L at pH≥6.5

e) An alternative, hardness-dependent, site-specific guideline may be used in place of the generic value. The site-specific values at water hardnesses of 10 and 60 mg/L are 10 ^ {0.86[log(hardness)]-3.2} = 0.0046 and 0.021 ug/L, respectively.

f) The guideline value for Cr(VI) was conservatively applied to the measured total Cr concentration.

g) The guideline value varies with hardness. The value for a hardness of 0-120 mg/L as CaCO3 is presented. Other values are 3 ug/L and 4 ug/L at hardnesses 120-180 mg/L and >180 mg/L, respectively.

h) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 2 ug/L, 4 ug /L and 7 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.

i) The guideline value for inorganic mercury is presented. This value may not prevent accumulation of methylmercury in aquatic life. Use of the inorganic mercury guideline value for screening total mercury concentrations would not be appropriate if any information suggested that methylmercury was present at the site. The guideline value for methylmercury is approximately an order of magnitude lower, at 0.004 ug/L, but eevn so, CCME warns that it may not protect higher trophic level fish.

j) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 65 ug/L, 110 ug /L and 150 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.

*Average of sample and replicate

exceedance

non-detect

Station		Water Quality Guidelines		PWQO	Water Licence	Upstream Road Crossings		Tailings Pond #1				Seepage				Talings Pond #1 Outlet					Tailinngs Pond #2 Outlet			Tailings Pond #2 Discharge		Quarry Pit	
						SW18U	SW18D	940-2A	940-2B	940-19A	940-19B	940-20A	940-20B	940-22A	940-22B	SW34	SW34	SW34	940-18A	940-18B	SW33	SW33	SW33	940-3A	940-3B	940-23A	940-23B
Date	Units	CCME [a]	Notes			28-Jun-08	28-Jun-08	28-Jun-08	28-Jun-08	28-Jun-08	28-Jun-08	28-Jun-08	28-Jun-08	28-Jun-08	28-Jun-08	28-Jun-08	3-Aug-08	4-Sep-08	28-Jun-08	28-Jun-08	28-Jun-08	3-Aug-08	4-Sep-08	28-Jun-08	28-Jun-08	28-Jun-08	28-Jun-08
Physical Tests																											
Conductivity (Field) uS/cm	µS/cm					84	103	360	360	1113	1113	745	745	860	860	358	537	466	358	358	164	240	251	164	164	92	92
Hardness						49.0	57.2	162	161	749	765	370	361	546	547	159	219	219	159	160	82.3	99.4	121	82.3	79.7	46.7	45.1
Conductivity	µS/cm					99	110	410	410	1200	1200	800	810	930	930	400	550	540	400	400	190	240	300	190	190	110	110
pH		6.5-9.0			6.0-9.5	7.4	7.5	7.5	7.5	7.9	7.9	8.1	8.1	8.0	8.0	7.5	8.0	7.7	7.5	7.5	7.7	8.0	7.9	7.7	7.7	7.4	7.4
Total Suspended Solids	mg/L				50	1	1	1	2	<1	1	4	6	1	1	1	1	1	<1	<1	2	2	2	2	2	<1	2
Total Dissolved Solids	mg/L					88	94	270	250	970	950	520	540	720	720	250	340	310	250	260	130	180	180	130	130	64	68
Turbidity	NTU					0.6	0.5	1.0	1.0	1.7	1.6	10.1	9.6	1.5	1.3	1.0	0.9	0.6	1.0	1.2	1.5	1.8	1.2	1.5	1.8	0.9	0.7
Dissolved Anions and Nutrients																											
Ammonium as N						0.12	0.02									-	0.14	0.01			-	0.10	0.03				
						4.2	2.8	2.3	2.1	4.0	3.9	4.0	4.3	3.9	3.2	2.1			2.1	2.2	1.7			1.7	1.9	2.3	1.7
Alkalinity, Total (as CaCO3)						36	40	33	33	110	110	240	240	120	120	36	54	45	36	37	58	100	71	58	58	21	22
Chloride (Cl)						0.5	0.7	3.0	3.0	2.8	3.1	4.2	4.4	5.5	5.7	2.8	3.9	3.9	2.8	2.8	1.9	2.3	2.6	1.9	1.7	0.8	0.8
Sulfate (SO4)						6.2	11	160	160	650	610	200	210	420	420	160	190	190	160	140	33	33	60	33	31	29	26
Nitrate as N		2.9	c			0.002	0.002	0.015	0.013	0.006	<0.002	0.006	0.016	0.002	0.003	0.013	0.002	0.017	0.013	0.006	0.003	0.002	0.015	0.003	0.003	0.056	0.073
Nitrite as N		0.06				0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	0.002	0.003	<0.002	<0.002	0.002	0.002	0.003	<0.002	<0.002	0.002	0.002
Nitrate and Nitrite as N						0.002	0.002	0.015	0.013	0.006	<0.002	0.006	0.016	0.002	0.003	0.013	0.002	0.020	0.013	0.006	0.003	0.002	0.018	0.003	0.003	0.058	0.075
Total Kjeldahl Nitrogen						0.33	0.31									-	0.19	0.14			-	0.69	0.69				
Total Nitrogen																	0.19	0.16				0.69	0.71				
Total Organic Carbon						10.9	10.7	-	-	-	-	-	-	-	-	2.2	3.2	3.0	2.2	-	10.7	14.1	12.5	10.7	-	-	-
Dissolved Organic Carbon						10.8	10.6	-	-	-	-	-	-	-	-	2.1	2.0	2.6	2.1	-	11.1	14.0	12.3	11.1	-	-	-
Orthophosphate as P						0.001	0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.002	0.002	<0.001	<0.001	0.001	0.003	0.003	<0.001	<0.001	0.005	0.001
Total Cyanide		0.005			1.6	0.0015	0.0014	0.0088	0.0089	0.0009	0.0008	0.0038	0.0039	0.0015	0.0013		*0.0077*	0.0036	0.0077	0.0076	0.0016	0.0023	0.0020	0.0016	0.0016	<0.0005	<0.0005
WAD Cyanide																	0.0005	0.0005				0.0005	0.0008				
Total Metals	mg/L																										
Aluminum	mg/L	0.005	d			*0.0163*	*0.0159*	0.102	0.0628	0.0054	0.0067	0.0259	0.0264	0.0172	0.0143	*0.0178*	*0.0186*	*0.0156*	0.0178	0.0167	*0.0294*	*0.0274*	*0.0208*	0.0294	0.0268	0.0304	0.0278
Antimony	mg/L			0.02		0.00004	0.00004	0.00004	0.00004	0.00023	0.00025	0.00018	0.00018	0.00023	0.00023	0.00004	0.00007	0.00006	0.00004	0.00004	0.00008	0.00008	0.00010	0.00008	0.00008	0.00010	0.00010
Arsenic	mg/L	0.005			0.6	0.00198	0.00175	0.00563	0.00322	0.00250	0.00239	0.00337	0.00330	0.00339	0.00336	0.00133	0.00236	0.00172	0.00133	0.00129	0.0032	0.00339	0.00260	0.00320	0.00313	0.00084	0.00084
Barium	mg/L					0.0135	0.0139	0.0122	0.0115	0.0207	0.0210	0.0365	0.0356	0.0283	0.0281	0.0119	0.0154	0.0146	0.0119	0.0120	0.0129	0.0157	0.0171	0.0129	0.0126	0.00498	0.00502
Beryllium	mg/L					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	<0.00001	<0.00001	0.00001	0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Bismuth	mg/L					0.000005	0.000005	0.000012	0.000007	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000005	0.000005	0.000005	<0.000005	<0.000005	0.000005	0.000005	0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Boron	mg/L			0.2		0.05	0.05	<0.05	<0.05	0.11	0.11	<0.05	<0.05	0.14	0.14	0.05	0.05	0.05	<0.05	<0.05	0.05	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	0.000017	e			0.000016	*0.000042*	0.000022	0.000032	.000470	0.00112	0.000026	0.000048	0.000080	0.000047	0.000008	0.000007	0.000005	0.000008	0.000010	*0.000034*	0.000007	0.000009	0.000034	0.00114	0.000018	0.000015
Calcium	mg/L					14.5	17.0	42.4	41.7	204	209	95.8	93.6	159	159	41.7	56.8	56.6	41.7	42.1	21.2	24.5	29.5	21.2	20.4	12.4	12.0
Chromium	mg/L	0.001	f			0.0002	0.0001	0.0004	0.0003	<0.0001	<0.0001	0.0002	0.0002	0.0001	<0.0001	0.0001	0.0001	0.0001	<0.0001	<0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	<0.0001
Cobalt	mg/L			9.E-04		0.000149	0.000120	0.00227	0.00162	0.00102	0.000992	0.00314	0.00302	0.000965	0.000956	0.000960	0.00148	0.00127	0.000960	0.000905	0.000334	0.000288	0.000396	0.000334	0.000298	0.000116	0.000112
Copper	mg/L	0.002	g		0.4	0.00093	0.00090	0.00136	0.00110	0.00143	0.00157	0.00423	0.00398	0.00239	0.00238	0.00086	0.00113	0.00102	0.00086	0.00085	*0.00374*	*0.00321*	*0.00380*	0.00374	0.00364	0.00102	0.00092
Iron	mg/L	0.3				0.148	0.134	0.490	0.259	0.362	0.381	0.294	0.307	0.090	0.086	0.132	0.079	0.037	0.132	0.111	0.230	0.170	0.149	0.230	0.272	0.086	0.070
Lead	mg/L	0.001	h		0.4	0.000031	0.000027	0.00146	0.000984	0.00182	0.00186	0.000229	0.000201	0.000057	0.000047	0.000319	0.000452	0.000093	0.000319	0.000329	0.000056	0.000058	0.000056	0.000056	0.000080	0.000085	0.000085
Lithium	mg/L					0.0007	0.0006	0.0006	0.0005	0.0016	0.0016	0.0006	0.0006	0.0022	0.0022	0.0005	0.0008	0.0007	0.0005	0.0005	0.0009	0.0011	0.0012	0.0009	0.0008	<0.0005	<0.0005
Magnesium	mg/L					3.09	3.57	13.6	13.7	58.0	59.1	31.8	30.9	36.3	36.3	13.3	18.8	18.9	13.3	13.5	7.16	9.25	11.6	7.16	6.97	3.80	3.70
Manganese	mg/L					0.0307	0.0233	0.147	0.0961	0.108	0.111	0.525	0.463	0.0343	0.0319	0.0726	0.0165	0.0106	0.0726	0.0561	0.0570	0.0379	0.0241	0.0570	0.0479	0.0141	0.0142
Mercury	mg/L	0.026	i			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	<0.00001	<0.00001	0.00001	0.00001	0.00001	0.00001	<0.00001	0.00001	<0.00001
Molybdenum	mg/L	0.073				0.00007	0.00008	0.00020	0.00019	0.00034	0.00035	0.00217	0.00214	0.00083	0.00083	0.00018	0.00056	0.00061	0.00018	0.00017	0.00044	0.00053	0.00054	0.00044	0.00042	0.00023	0.00023
Nickel	mg/L	0.025	j		0.6	0.00236	0.00219	0.00258	0.00194	0.00858	0.00883	0.00644	0.00639	0.00415	0.00420	0.00124	0.00095	0.00085	0.00124	0.00114	0.00357	0.00434	0.00395	0.00357	0.00366	0.00141	0.00128
Phosphorus	mg/L					0.005	0.004	0.010	0.007	0.009	0.009	0.034	0.031	0.011	0.011	0.005	0.006	0.004	0.005	0.005	0.017	0.026	0.012	0.017	0.017	0.004	0.004
Potassium	mg/L					0.62	0.66	2.34	2.33	4.89	4.98	6.78	6.63	4.54	4.51	2.26	3.31	3.26	2.26	2.29	1.43	1.71	1.66	1.43	1.41	0.58	0.57
Selenium	mg/L	0.001				0.00005	0.00004	<0.00004	<0.00004	.00010	.00010	0.00010	0.00009	0.00009	0.00010	0.00004	0.00004	0.00006	<0.00004	<0.00004	0.00008	0.00013	0.00010	0.00008	0.00014	0.00005	<0.00004
Silicon	mg/L					1.1	1.1	0.3	0.2	2.4	2.5	0.1	0.1	0.7	0.7	0.2	0.2	0.3	0.2	0.3	0.1	0.3	0.1	<0.1	0.1	0.1	0.1
Silver	mg/L	0.0001				0.000005	0.000005	0.000011	0.000007	0.000008	0.000007	0.000006	0.000006	<0.000005	<0.000005	0.000007	0.000006	0.000006	0.000007	<0.000005	0.000031	0.000016	0.000021	0.000031	0.000028	0.000006	0.000007
Sodium	mg/L					0.94	1.08	17.1	17.4	7.36	7.52	52.3	51.1	12.1	12.0	16.6	23.9	24.8	16.6	16.8	7.12	11.3	14.8	7.12	7.06	2.07	2.00
Strontium	mg/L					0.0595	0.0729	0.170	0.167	0.750	0.752	0.417	0.410	0.545	0.532	0.164	0.240	0.233	0.164	0.167	.0940	0.118	0.133	0.094	0.0912	0.0664	0.0672
Sulfur	mg/L																										
Thallium	mg/L	0.0008				0.000002	0.000002	0.000003	0.000002	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000002	0.000003	0.000003	0.000002	<0.000002	0.000006	0.000002	0.000002	0.000006	0.000004	0.000003	0.000002
Tin	mg/L					0.00001	0.00001	<0.00001	0.00008	0.00004	0.00004	<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	<0.00001	<0.00001	<0.00001
Titanium	mg/L					0.0005	0.0005	0.0036	0.0017	<0.0005	<0.0005	0.0007	0.0010	0.0007	0.0007	0.0005	0.0009	0.0005	<0.0005	<0.0005	0.0006	0.0010	0.0007	0.0006	<0.0005	0.0013	0.0012
Uranium	mg/L			0.005		0.000091	0.000099	0.000418	0.000391	0.00167	0.00168	0.0111	0.0111	0.00689	0.00685	0.000384	0.000457	0.000415	0.000384	0.000380	0.000448	0.000674	0.000751	0.000448	0.000426	0.000280	0.000281
Vanadium	mg/L			0.006		0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	0.0002	0.0002	0.0002	<0.0002	<0.0002	0.0002	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Zinc	mg/L	0.03			0.6	0.0406	0.0020	0.0011	0.0014	0.0161	0.0182	0.0016	0.0011	0.0022	0.0011	0.0003	0.0011	0.0003	0.0003	0.0005	0.0009	0.0011	0.0015	0.0009	0.0025	0.0086	0.0077
Zirconium	mg/L			0.004		0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.0002	<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	<0.0001

Foot Notes:

All units mg/L unless otherwise noted

a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2007

b) Minimum dissolved oxygen level for the protection of early life stages of cold-water biota (9.5 mg/L). A level of 6.5 mg/L is protective of older life stages of cold-water biota.

c) Main guideline value is expressed as nitrate (13 mg NO3-/L); the alternate value, expressed as N (2.9 mg as N/L), is presented

d) 0.005 mg/L at pH <6.5; 0.1 mg/L at pH ≥6.5

e) An alternative, hardness-dependent, site-specific guideline may be used in place of the generic value. The site-specific values at water hardnesses of 10 and 60 mg/L are 10 ^ {0.86[log(hardness)]-3.2} = 0.0046 and 0.021 ug/L, respectively.

f) The guideline value for Cr(VI) was conservatively applied to the measured total Cr concentration.

g) The guideline value varies with hardness. The value for a hardness of 0-120 mg/L as CaCO3 is presented. Other values are 3 ug/L and 4 ug/L at hardnesses 120-180 mg/L and >180 mg/L, respectively.

h) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 2 ug/L, 4 ug /L and 7 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.

i) The guideline value for inorganic mercury is presented. This value may not prevent accumulation of methylmercury in aquatic life. Use of the inorganic mercury guideline value for screening total mercury concentrations would not be appropriate if any information suggested that methylmercury was present at the site. The guideline value for methylmercury is approximately an order of magnitude lower, at 0.004 ug/L, but eevn so, CCME warns that it may not protect higher troph

j) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 65 ug/L, 110 ug /L and 150 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.

*Average of sample and replicate

Italic

non-detect

Station		Water Quality Guidelines		PWQO	Water	SW13 (Upstream)	SW13 (Downstream)	Road Crossings										AirStrip
								SW15 (Upstream)				SW15 (Downstream)		SW16 (Upstream)	SW16 (Downstream)	SW18 (Upstream)	SW18 (Downstream)	SW38
Date	Units	CCME a	Notes		Licence	28-Jun-08	28-Jun-08	4-Aug-08	5-Sep-08	5-Sep-08	5-Sep-08	4-Aug-08	5-Sep-08	28-Jun-08	28-Jun-08	28-Jun-08	28-Jun-08	28-Jun-08
Conductivity	µS/cm					32	33	52	58	58	58	53	57	47	47	99	110	440
pH		6.5-9.0			6.0-9.5	6.8	6.8	7.3	7.3	7.3	7.3	7.4	7.2	7.2	7.2	7.4	7.5	*3.7*
Hardness						15.7	15.9	25.5	27.2	27.4	27.7	25.6	27.8	23.6	23.4	49.0	57.2	119
Total Suspended Solids	mg/L				50	1	1	2	1	1	1	2	1	1	1	1	1	1
Total Dissolved Solids	mg/L					30	32	50	26	100	60	46	48	44	46	88	94	300
Total Organic Carbon	mg/L					13.1	13.5	10.0	11.0	10.9	10.8	9.1	10.7	8.6	8.5	10.9	10.7	-
Dissolved Organic Carbon	mg/L					12.3	12.6	8.3	10.9	10.7	10.6	6.6	10.5	8.2	8.5	10.8	10.6	-
Alkalinity, Total (as CaCO3)						6.6	5.7	23	16	16	16	34	15	15	15	36	40	0.5
Turbidity	NTU					0.5	0.5	4.4	1.0	1.1	1.0	1.9	0.9	0.5	0.4	0.6	0.5	0.4
Chloride (Cl)						0.8	2.1	0.7	0.9	0.8	0.7	0.7	0.9	0.7	0.7	0.5	0.7	0.7
Sulfate (SO4)						0.5	0.5	0.6	0.5	0.5	0.8	1.2	0.8	0.5	0.5	6.2	11	160
Total Cyanide		0.005			1.6	0.0015	0.0012	0.0008	0.0011	0.0011	0.0010	0.0009	0.0010	.0010	.0010	0.0015	0.0014	0.0005
WAD Cyanide								0.0005	0.0005	0.0005	0.0005	0.0005	0.0005					
Ammonium as N						0.05	0.01	0.17	0.01	0.01	0.01	0.12	0.01	0.01	0.02	0.12	0.02	-
						2.7	3.0							2.2	2.2	4.2	2.8	62.0
Nitrate as N		2.9	c			0.002	0.002	0.002	0.004	0.005	0.005	0.033	0.008	0.003	0.005	0.002	0.002	0.007
Nitrite as N		0.06				0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Nitrate and Nitrite as N						0.002	0.002	0.002	0.006	0.008	0.007	0.033	0.010	0.003	0.005	0.002	0.002	0.007
Total Kjeldahl Nitrogen						0.28	0.31	0.27	0.28	0.32	0.28	0.25	0.30	0.25	0.24	0.33	0.31	-
Total Nitrogen								0.27	0.29	0.33	0.29	0.28	0.31					
Phosphorus	mg/L			0.02		0.004	0.005	0.012	0.004	0.005	0.005	0.009	0.005	0.003	0.004	0.005	0.004	0.004
Orthophosphate as P						0.002	0.003	0.001	0.003	0.005	0.004	0.001	0.003	0.002	0.009	0.001	0.001	0.002
Aluminum	mg/L	0.005	d			*0.166*	*0.172*	*0.0734*	*0.101*	*0.104*	*0.106*	*0.0630*	*0.0965*	*0.0571*	*0.0562*	*0.0163*	*0.0159*	*6.90*
Antimony	mg/L			0.02		0.00004	0.00004	0.00005	0.00005	0.00005	0.00005	0.00005	0.00006	0.00005	0.00004	0.00004	0.00004	0.00002
Arsenic	mg/L	0.005			0.6	0.00055	0.00053	0.00143	0.00083	0.00085	0.00083	0.00100	0.00083	0.00055	0.00051	0.00198	0.00175	0.00066
Barium	mg/L					0.0135	0.0137	0.0159	0.0169	0.0164	0.0172	0.0173	0.0178	0.00863	0.00858	0.0135	0.0139	0.0309
Beryllium	mg/L					0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00142
Bismuth	mg/L					0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Boron	mg/L			0.2		*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
Cadmium	mg/L	0.000017	e			*0.000060*	*0.000121*	0.000005	0.000005	0.000008	0.000005	0.000007	0.000005	*0.000027*	0.000005	0.000016	*0.000042*	*0.00199*
Calcium	mg/L					4.70	4.69	7.59	8.06	8.11	8.21	7.61	8.21	6.97	6.91	14.5	17.0	30.3
Chromium	mg/L	0.001	f			0.0006	0.0006	0.0003	0.0004	0.0005	0.0004	0.0003	0.0004	0.0002	0.0002	0.0002	0.0001	*0.0023*
Cobalt	mg/L			9.E+04		0.000086	0.000301	0.000613	0.000108	0.000108	0.000115	0.000498	0.000117	0.000043	0.000050	0.000149	0.000120	0.138
Copper	mg/L	0.002	g		0.4	*0.00267*	*0.00271*	0.00155	0.00181	0.00197	0.00192	0.00148	0.00192	0.00188	0.00181	0.00093	0.00090	*0.0437*
Iron	mg/L	0.3				0.085	0.131	*0.761*	0.135	0.155	0.154	*0.433*	0.176	0.061	0.061	0.148	0.134	*0.994*
Lead	mg/L	0.001	h		0.4	0.000031	0.000061	0.000095	0.000020	0.000031	0.000020	0.000033	0.000018	0.000031	0.000011	0.000031	0.000027	*0.00377*
Lithium	mg/L					0.0005	0.0005	0.0006	0.0007	0.0007	0.0006	0.0006	0.0007	0.0005	0.0005	0.0007	0.0006	0.0121
Magnesium	mg/L					0.97	1.02	1.58	1.72	1.74	1.75	1.61	1.76	1.49	1.49	3.09	3.57	10.6
Manganese	mg/L					0.00082	0.00953	0.0352	0.00382	0.00381	0.00381	0.0239	0.00470	0.00646	0.00611	0.0307	0.0233	5.34
Mercury	mg/L	0.026	i			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	mg/L	0.073				0.00008	0.00007	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00009	0.00011	0.00007	0.00008	0.00005
Nickel	mg/L	0.025	j		0.6	0.00409	0.00423	0.00281	0.00257	0.00274	0.00274	0.00278	0.00276	0.00208	0.00206	0.00236	0.00219	*0.118*
Potassium	mg/L					0.77	0.75	0.77	0.69	0.70	0.71	0.80	0.73	0.70	0.70	0.62	0.66	0.89
Selenium	mg/L	0.001				0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00005	0.00004	0.00033
Silicon	mg/L					1.8	1.9	0.3	1.4	1.5	1.6	0.4	1.6	0.7	0.7	1.1	1.1	6.8
Silver	mg/L	0.0001				0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Sodium	mg/L					0.77	0.80	0.86	0.95	0.97	0.97	0.86	0.98	0.68	0.51	0.94	1.08	1.55
Strontium	mg/L					0.0139	0.0139	0.0222	0.0256	0.0247	0.0257	0.0236	0.0262	0.0221	0.0223	0.0595	0.0729	0.128
Thallium	mg/L	0.0008				0.000002	0.000002	0.000003	0.000002	0.000002	0.000002	0.000002	0.000003	0.000002	0.000002	0.000002	0.000002	0.000032
Tin	mg/L					0.00001	0.00001	0.00001	0.00001	0.00005	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002
Titanium	mg/L					0.0012	0.0011	0.0017	0.0007	0.0008	0.0006	0.0015	0.0010	0.0005	0.0005	0.0005	0.0005	0.0005
Uranium	mg/L			0.005		0.000121	0.000114	0.000084	0.000105	0.000106	0.000109	0.000076	0.000110	0.000065	0.000067	0.000091	0.000099	0.00306
Vanadium	mg/L			0.006		0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Zinc	mg/L	0.03			0.6	0.0012	0.0025	0.0007	0.0008	0.0024	0.0007	0.0013	0.0006	0.0013	0.0005	*0.0406*	0.0020	*0.117*
Zirconium	mg/L			0.004		0.0004	0.0004	0.0002	0.0003	0.0003	0.0003	0.0002	0.0003	0.0001	0.0001	0.0001	0.0001	0.0001

Foot Notes:

All units mg/L unless otherwise noted

a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2007

b) Minimum dissolved oxygen level for the protection of early life stages of cold-water biota (9.5 mg/L). A level of 6.5 mg/L is protective of older life stages of cold-water biota.

c) Main guideline value is expressed as nitrate (13 mg NO3-/L); the alternate value, expressed as N (2.9 mg as N/L), is presented

d) 0.005 mg/L at pH <6.5; 0.1 mg/L at pH ≥6.5

e) An alternative, hardness-dependent, site-specific guideline may be used in place of the generic value. The site-specific values at water hardnesses of 10 and 60 mg/L are 10 ^ {0.86[log(hardness)]-3.2} = 0.0046 and 0.021 ug/L, respectively.

f) The guideline value for Cr(VI) was conservatively applied to the measured total Cr concentration.

g) The guideline value varies with hardness. The value for a hardness of 0-120 mg/L as CaCO3 is presented. Other values are 3 ug/L and 4 ug/L at hardnesses 120-180 mg/L and >180 mg/L, respectively.

h) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 2 ug/L, 4 ug /L and 7 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.

i) The guideline value for inorganic mercury is presented. This value may not prevent accumulation of methylmercury in aquatic life. Use of the inorganic mercury guideline value for screening total mercury concentrations would not be appropriate if any information suggested that methylmercury was present at the site. The guideline value for methylmercury is approximately an order of magnitude lower, at 0.004 ug/L, but

j) The guideline value varies with hardness. The value for a hardness of 0-60 mg/L as CaCO3 is presented. Other values are 65 ug/L, 110 ug /L and 150 ug/L at hardnesses of 60-120, 120-180 and >180 mg/L, respectively.

*Average of sample and replicate

exceedence

non-detect

Appendix C

Benthos Taxonomic Results

Gartner Lee - Nunavut - Cullaton
2008 Jenifer Sarchuk
Collected: September 2008
Analysis by: Cordillera Consulting
Summerland,BC V0H 1Z6
250-494-7553
Taxonomist : Sue Salter
suesalter@shaw.ca
www.cordilleraconsulting.com

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Sample ID:		SW2-1	SW2-2	SW2-3	SW2-4	SW2-5	SW9-1	SW9-2	SW9-3	SW9-4	SW9-5	SW23-1	SW23-2	SW23-3	SW23-4	SW23-5	SW33-1	SW33-2	SW33-3	SW33-4	SW33-5	SW34-1	SW34-2
CC #:		080352	080353	080354	080355	080356	080357	080358	080359	080360	080361	080362	080363	080364	080365	080366	080367	080368	080369	080370	080371	080372	080373
Subsample:		ALL	ALL	ALL	ALL	ALL	ALL	1/4	1/2	3/8	7/16	1/8	ALL	ALL	3/4	ALL	ALL	3/4	ALL	1/2	ALL	ALL	ALL
Order: Ephemeroptera																							
Family: Baetidae	nymph (juv./dam.)			1																			
Baetis sp.	nymph						1																
Baetis tricaudatus	nymph										1				1	2							
Acerpenna sp.	nymph									1													
Family: Heptageniidae	nymph																						
Heptagenia sp.	nymph						1																
Epeorus sp.	nymph											1											
Order: Plecoptera	nymph (juv./dam.)	1			1			1									1						
Family: Chloroperlidae	nymph (juv./dam.)				1																		
Family: Nemouridae	nymph (juv./dam.)						4		2	1			7	2	3	3							
Nemoura sp.	nymph																						6
Order: Trichoptera	larvae (juv./dam.)												3	1	1	2							
Family: Hydropsychidae	larvae (juv./dam.)															1							
Family: Rhyacophilidae																							
Rhyacophila sp.	larvae											1											
Famly: Brachycentridae																							
Microsema sp.	larvae											3	5		1								
Family: Hydroptilidae																							
Oxyethira sp.	larvae						1					1	1	4	2	2							
Oxyethira sp.	pupae														2								
Family: Phryganeidae																							
Agrypnia sp.	larvae											1											
Family: Limnephilidae	larvae (juv./dam.)																				1		
Order: Coleoptera																							
Family: Carabidae	larvae						1																
Order: Diptera	pupae				1																		
Order: Diptera UID	larvae																		1				
Family: Tipulidae																							
Tipula sp.	larvae						1						1	1	1	1						1	
Family: Tabanidae	larvae																		1				
Family: Empididae																							
Chelifera/Metachela sp.	larvae											1	1			1							
Family: Ceratopogonidae																							
Bezzia/Palpomyia sp	larvae	1	1	1	1	1	6	10	3	2	5						1	9	12	8	6		
Family: Simuliidae	pupae									1	1					1							
Simulium sp.	larvae						4	3			7									1	1		
Family: Chironomidae	larvae																				167	17	88
Family: Chironomidae	pupae			1										1									
Subfamily : Orthocladiinae	larvae		8	20								90	15										
Chaetocladius sp.	larvae	53	34		31	9																	
Corynoneura sp.	larvae												3		2		5	9	2				
Cricotopus sp.	larvae		5																	4			
Eukiefferiella sp.	larvae											120				3							
Hydrobaenus sp.	larvae			1	6	1																	
Limnophyes sp.	larvae				1												30	90	12	75			
Orthocladius/Cricotopus sp.	larvae		1	19	27	10	17	24	13	17	13	83	11	12	23	22	14	15	11	10			
Parakiefferiella sp.	larvae												4										
Paraphaenocladius sp.	larvae	5	15		18							7											
Psectrocladius sp.	larvae																	8	34	130			
Pseudosmittia sp.	larvae	1	3		2												2						
Synorthocladius sp.	larvae											3		2		3							
Thienemaniella sp.	larvae			1																			
Tvetenia sp.	larvae												3			5							
Subfamily : Chironominae	larvae																						
Endochironomus sp.	larvae				1						1									1			
Tribe : Tanytarsini	larvae																						
Micropsectra sp.	larvae	67	52	29	45	21	855	356	320	290	240	30	260	37	135	75							
Rheotanytarsus sp.	larvae			3	4		5	1	4	3					4		3	5	5	8			
Subfamily : Diamesinae	larvae																						
Diamesa sp.	larvae	1			1																		
Pagastia sp.	larvae	1																					
Subfamily : Tanypodinae	larvae	1															9						
Ablabesmyia sp.	larvae																	36	25	9			
Thienemanimyia Group	larvae						35	22	7	15	16	11	7			6							
Procladius sp.	larvae																	1					
Order: Hemiptera																							
Family: Corixidae																	1						
Order: Collembola		1	4	11	10	5				1							7	4	2	2	3		
Class: Crustacea																				12			
Order: Ostracoda		57	48	41	80	10	12	13	16	9	16	40	12	5	73	39	5	20	33	1000	15	3	23
Order: Copepoda																							
Family : Calanoida		57	44	40	75	13	35	8	5	7	8	100	100	100	100	100	88	250	200	200	300	13	3
Family : Harpacticoida		10	3	3	6	3	5	2	1								7	60	50	50	75		
Family : Cyclopoida		20	5	13	11	3	10	2			2							175	150	150	200		
Order: Cladocera		1	14	26	15	4	50	62	39	31	27	500	100	50	200	500	100	1000	2000	750	2000	27	5
Phylum: Nematoda		3	32	1	2		2		3		35	11	9	7	37	28	4	4	55	7	6	4	4
Class: Turbellaria																							
Order: Tricladida					1								1										
Phylum: Annelida																							
Class: Oligochaeta		5	19	3			1	3		1	22	2	5		3	13		1					
Family: Lumbriculidae		7	1		15								3		1				1	1	4		
Family: Tubificidae					9	6		2	2	2			13	1	9					11	16		
Family: Naididae																	49	18	63	56	65	8	93
Class: Mollusca																							
Order: Gastropoda												2	5	1	16					1	3		
Family: Physidae															1			1					
Physa sp.																	1				2		
Family: Hydrobiidae							1																
Family: Planorbidae												2				1			1				
Family: Valvatidae												4	5	1	3	2							
Family: Lymnaeidae																			1				
Class: Hydrozoa									1			1	6	5	2	9						2	28
Phylum: Porifera				1 small piece																			
Order: Prostigmata	deutonymph	23	19	22	89	15	5	11	13	17	16		5	1		3	12	16	12	11	7		
Order: Prostigmata UID	adult				1																		
Family: Hygrobatidae																							
Hygrobates	adult											4	9	5	11	14							
Family: Sperchontidae																							
Sperchon	adult									1									1				
Sperchonopsis	adult												4	1									
Family: Lebertiidae																							
Lebertia	adult																			1	1		
Family: Aturidae																							
Brachypoda	adult			1																			
Family: Pionidae																							
Piona	adult	1																4					
Family: Hydrozetidae		2			7	3	2	1	6		1	7	5	1	4	4	2		6	5	5		2
TOTAL SUBSAMPLE		**318**	**308**	**237**	**461**	**104**	**1054**	**521**	**435**	**399**	**411**	**1025**	**603**	**238**	**635**	**840**	**341**	**1726**	**2678**	**2503**	**2877**	**75**	**252**

juv. = juvenile, dam. = damaged

FINANCIAL STATEMENTS :

Client Code :
Requsition Number(s) :
Sample Number(s) :

Sample Type / Level of Id.
BI / lowest/lowest

AECOM

Appendix D

Periphyton Taxonomic Results

Prepared by FRASER ENVIRONMENTAL SERVICES
Prepared for Gartner Lee Limited - AECOM
Periphyton Taxa and Abundance for Cullaton Lake

Inv. # 754

FES Sample Number			080443	080444	080445	080446	080447	080448	080449	080450	080451	080452	080453	080454	080455	080456	080457	080458	080459	080460	080461	080462	080463	080464
Sample Site			SW2	SW2	SW2	SW2	SW2	SW9	SW9	SW9	SW9	SW9	SW23	SW23	SW23	SW23	SW23	SW33	SW33	SW33	SW33	SW33	SW34	SW34
Replicate Number			1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2
Sampling Date			03-Sep-08	03-Sep-08	03-Sep-08	03-Sep-08	03-Sep-08	05-Sep-08	05-Sep-08	05-Sep-08	05-Sep-08	05-Sep-08	04-Sep-08	04-Sep-08	04-Sep-08	04-Sep-08	04-Sep-08	04-Sep-08	04-Sep-08	04-Sep-08	04-Sep-08	04-Sep-08	04-Sep-08	04-Sep-08
Sampling Time			15:26-16:30	15:26-16:30	15:26-16:30	15:26-16:30	15:26-16:30	11:30-12:30	11:30-12:30	11:30-12:30	11:30-12:30	11:30-12:30	11:16-12:20	11:16-12:20	11:16-12:20	11:16-12:20	11:16-12:20	17:21-18:30	17:21-18:30	17:21-18:30	17:21-18:30	17:21-18:30	16:10	16:35
Area Sampled (cm^2)																								
Phylum	Order	Genera and Species																						
Bacillariophycae	Centrales	*Cyclotella bodanica*											85.8	25.2	76.2	45.8	54.4							
		Cyclotella spp.				768.3							2557.8	749.8	2360.8	2045.7	810.4							
		Melosira spp.	<14.2	<7.4	15.2	198.0	21.2						7310.6	584.4	3541.2	1063.7	737.1							
		Stephanodiscus sp.												<12.6	79.2		<13.6							
	Pennales	*Achnanthes flexella*		<7.4									1329.2	25.2	158.4		54.4						<9.5	<11.0
		Achnanthes minutissima	<14.2	57.7	<3.8	1280.5	313.6	<22.9		<11.2			217413.0	4873.7	15345.2	2045.7	77798.4	453.8		<4.8	77.7	104.0	2834.0	1975.8
		Achnanthes spp.	<14.2		58.4	<33.0	40.8						30693.6	2624.3	16525.6	1363.8	6483.2		8.2	37.4	<3.3	52.0	1983.8	658.6
		Amphipleura pellucida																					95.0	856.0
		Amphora spp.					<5.3			<11.2			<42.9	<42.9	<39.6			29.3	1.1	4.8	6.6	6.7	38.0	44.0
		Anomoeoneis spp.						137.4		173.6	8.8		332.3	25.2	<39.6								<9.5	<11.0
		Asterionella formosa															13.6							
		Caloneis spp.	28.4		<3.8			<22.9		22.4		<5.9	171.6	50.4	158.4	<22.9		117.2	1.1			<6.7	57.0	44.0
		Caloneis sp.?				132.0	21.2	22.9			<4.4	<5.9								9.6			38.0	66.0
		Cocconeis placentula																58.6	<1.1	<4.8	<3.3	<6.7		
		Cymbella cf. cestaii	85.2	14.8	15.2	66.0	10.6	<22.9	36.4	<11.2	<4.4	<5.9	996.9	25.2	79.2	<22.9	81.6	58.6				<6.7	<9.5	<11.0
		Cymbella cistula												<12.6			<13.6							
		Cymbella lanceolata												<12.6	<39.6	<22.9	<13.6			<4.8				
		Cymbella lunata	<14.2		7.6		<5.3	183.2	54.6	44.8	17.6	<5.9	332.3	25.2	39.6	<22.9	108.8			4.8				
		Cymbella minuta		14.8		<33.0							3655.3	97.4	613.4	<22.9	1053.0	453.8	4.4	9.6	103.6	13.4	220.8	44.0
		Cymbella spp.	56.8	14.8	22.8	1024.4	122.4	45.8	18.2	<11.2	<4.4	<5.9	3836.7	749.8	2360.8	531.6	421.2	1134.5	41.0	299.2	155.4	67.0	73.6	171.2
		Denticula sp.													<39.6	<22.9			<1.1					
		Diatoma elongatum											429.0		<39.6			20956.8	25767.0	19282.6		29214.6	809.6	2305.1
		Didymosphenia geminata											85.8		<39.6		<13.6				33932.0			
		Diploneis spp.												<12.6	<39.6	<22.9	<13.6							
		Epithemia spp.											171.6	12.6	158.4	91.6	27.2							
		Eunotia spp.	550.0	115.4	116.8	512.2	255.6	889.0	91.0	434.0	136.4	11.8	5115.6	3374.1	5902.0	2045.7	2836.4	<13.6		<4.8				<11.0
		Fragilaria construens											7673.4	3749.0	15345.2	5455.2	7293.6	6985.6	252.0	2878.0	1197.6	1000.5		
		Fragilaria crotonensis			<3.8								7673.4											
		Fragilaria vaucheriae		443.8	337.5		627.2	<22.9	<9.1				332.3	97.4		531.6	105.3	6985.6	63.0	287.8	798.4	156.0		
		Fragilaria spp.	440.0	665.7	225.0	2048.8	313.6	177.8		86.8	34.1	<5.9	14067.9	4123.9	8262.8	8864.7	10535.2	1746.4	252.0	1295.1	898.2	2001.0	294.4	<11.0
		Frustulia sp.	<14.2		<3.8	33.0	<5.3	45.8		11.2	4.4	<5.9	42.9	12.6	158.4	<22.9	<13.6							
		Gomphonema acuminatum					<5.3						171.6	75.6	158.4	<22.9	54.4							
		Gomphonema truncatum											171.6	<12.6	<39.6	22.9	<13.6					<6.7		
		Gomphonema spp.	<14.2		<3.8	<33.0	<5.3						996.9	97.4	79.2	<22.9	<13.6	453.8	16.4	336.6	155.4	40.2		
		Meridion circulare											<42.9	<12.6	<39.6	<22.9	<13.6							
		Navicula cryptocephala	85.2	88.8	116.8	594.0	367.2	533.4	109.2	89.6	35.2	59.0	1329.2	126.0	920.1	137.4	81.6	117.2	4.4	74.8	103.6	26.8	38.0	22.0
		Navicula radiosa											257.4	50.4	158.4	45.8	27.2	<13.6	<1.1	9.6	3.3	<6.7	<9.5	<11.0
		Navicula spp.	28.4	14.8	15.2	1024.4	10.6	<22.9		22.4	8.8		1661.5	126.0	920.1	45.8	81.6	907.6	32.8	187.0	598.8	208.0	441.6	428.0
		Neidium spp.	<14.2		<3.8	<33.0	5.3	<22.9			<4.4		<42.9	<12.6	79.2	<22.9	27.2	<13.6		<4.8	<3.3	<6.7	<9.5	
		Nitzschia spp.	660.0	115.4	562.5	4927.5	1097.6	533.4	36.4	173.6	68.2	91.0	10231.2		7082.4	1363.8	3241.6	5239.2	252.0	1439.0	1796.4	1800.9	3117.4	2634.4
		Peronia sp.																						
		Pinnularia spp.	56.8	<7.4	<3.8	33.0	31.8	22.9	<9.1	11.2			85.8	1499.6	237.6	91.6		<13.6	<1.1	<4.8	3.3		<9.5	66.0
		Rhopalodia gibba											<42.9	<12.6			<13.6							
		Rhopalodia sp.													<39.6	<22.9								
		Stauroneis spp.	<14.2	<7.4	<3.8	<33.0	<5.3		<9.1	<11.2	<4.4		<42.9	<12.6	<39.6	<22.9	<13.6	<13.6	<1.1	19.2	13.2	<6.7	<9.5	11.0
		Stenopterobia delicatissima	<14.2					91.6	<9.1	<11.2		<5.9	<42.9											
		Stenopterobia sp.													<39.6									
		Surirella spp.									<4.4		<42.9	<12.6	<39.6					2302.4			<9.5	
		Synedra ulna		<7.4	3.8	<33.0	<5.3						257.4	100.8	396.0	137.4	27.2		<1.1			<6.7		
		Synedra spp.	2116.0	4881.8	6075.0	17739.0	8467.2	1066.8	18.2	694.4	341.0	182.0	58829.4	6748.2	25968.8	7500.9	12561.2	3492.8	2961.0	2302.4	3393.2	7203.6	5668.0	8561.8
		Tabellaria fenestrata	142.0	29.6	22.8	33.0	42.4	45.8	<9.1	44.8	4.4	11.8	664.6	584.4	3360.8	531.6	315.9	<13.6	22.0	523.6	155.4	93.8		
		Tabellaria flocculosa	9733.6	2884.7	3150.0	29565.0	9408.0	10264.5	3273.6	7009.8	2757.3	2975.0	6313.7	2624.3	5902.0	2303.6	947.7	<13.6	<1.1		19.8	<6.7		
		Tetracyclus sp.											<42.9											
		UID girdle view	28.4			512.2				22.4		11.8	85.8		39.6	45.8								171.2
Chlorophyta	Chaetophorales	*Chaetosphaeridium sp.*						91.6	18.2	44.8			<42.9				<13.6							
		Stigeoclonium sp.											772.2			<22.9	136.0							
		Stigeoclonium cf. polymorphum						<22.9																
		Chaetophorales UID													<39.6		<13.6			<4.8				
	Chlorococcales	*Ankistrodesmus falcatus*	6771.2	3106.6	4950.0	4927.5	10348.8	533.4	1636.8	667.6	131.3	136.5	332.3					1815.2	126.0	1582.9	698.6	4002.0	1983.8	1646.5
		Ankistrodesmus spp.	220.0	173.1	321.2	512.2	627.2	177.8	70.9	1335.2	262.6	136.5	332.3	12.6	<39.6	<22.9	<13.6	1134.5	1071.0	1726.8	1297.4	2401.2	38.0	171.2
		Askenasyella chlamydopus															163.2							
		Askenasyella sp.																						
		Botryococcus braunii			<3.8		<5.3			<11.2	<4.4		<42.9	<12.6			<13.6	<13.6	<1.1	134.4	414.4	<6.7		
		Coelastrum sp.					254.4								<39.6			468.8	<1.1	124.8	1243.2	520.0		
		Characium spp.	110.0		29.2		40.8	177.8		22.4			85.8	97.4			105.3		1.1		103.6	<6.7		
		Crucigenia spp.	56.8		<3.8		42.4						<42.9	<12.6			<13.6	<13.6	<1.1	76.8	52.8	<6.7	<9.5	88.0
		Desmatractum sp.																						
		Dictyosphaerium spp.					42.4												8.8	153.6	79.2	160.8		<11.0
		Elakatothrix spp.	56.8		<3.8	66.0	<5.3				8.8		257.4	176.4	<39.6	91.6	108.8	<13.6	6.6	76.8	499.0	<6.7		
		Euastropsis richteri												<12.6					98.4		259.0	364.0		
		Kirchneriella sp.																				80.4		
		Monoraphidium cf. griffithi	220.0			512.2	313.6	889.0										907.6	567.0	1870.7	1996.0	2401.2	19.0	<11.0
		Monoraphidium cf. irregulare																453.8	252.0	1439.0	3193.6	2801.4	73.6	22.0
		Oocystis spp.	14.2	173.1			40.8	45.8	70.9				332.3	<12.6	<39.6		54.4	58.6	24.6	224.4	181.3	260.0	95.0	44.0
		Pediastrum privum	340.8	29.6	144.4	264.0	286.2	183.2	36.4	<11.2		<5.9	171.6	100.8			<13.6							
		Pediastrum spp.			<3.8			91.6					<42.9	<12.6	<39.6			1758.0	729.8	1720.4	8383.2	4802.4	<9.5	
		Psuedoquadrigula / Quadrigula spp.																						
		Scenedesmus spp.	<14.2	29.6	182.4	660.0	652.8	711.2	72.8	173.6		<5.9	2658.4	<12.6	316.8	183.2	163.2	37547.6	4914.0	15829.0	20558.8	14807.4	294.4	1198.4
		Selanastrum spp.		22.2			122.4	<22.9										453.8	535.5	3165.8	3792.4	5602.8		
		Sorastrum sp.												<12.6										
		Sphaerocystis sp.	<14.2					<22.9			<4.4	<5.9		<12.6	<39.6		<13.6				<3.3	<6.7	76.0	<11.0
		Tetraedesmus wisconinensis																468.8	26.4	<4.8	798.4	416.0		
		Tetradron spp.	<14.2		<3.8		10.6	45.8	36.4		4.4				<39.6		105.3	226.9	441.0	1439.0	798.4	800.4	19.0	<11.0
	Euglenales	*Euglena / Eutreptia spp.*	28.4		<3.8		31.8			<11.2						<22.9	<13.6	<13.6		19.2	19.8	<6.7		
		Phacus spp.	14.2	7.4	<3.8		<5.3				<4.4							<13.6	<1.1					
		Trachelomonas spp.	142.0		<3.8	<33.0	63.6			<11.2	4.4		85.8		<39.6		<13.6	29.3	<1.1	<4.8	3.3			
		Urceolus sp.	<14.2																					
		UID Euglenales	<14.2	<7.4	<3.8		10.6										<13.6							
	Oedogoniales	*Bulbochaete sp.*	<14.2					91.6	<9.1	<11.2			772.2	50.4	237.6		2106.0							
		Oedogonium spp.	85.2	<7.4	45.6		<5.3	824.4	236.6	<11.2			4319.9	974.0	3088.8	366.4	3264.3	586.0	4.4	115.2	85.8	160.8		220.0
	Tetrasporales	*Tetraspora sp.*												7402.4	2376.0	<22.9	<13.6							
	Ulothricales	*Binuclearia sp.*	113.6	<7.4			63.6	<22.9		<11.2	<4.4													
		Geminella interrupta						45.8	<9.1	<11.2	<4.4		<42.9				<13.6							
		Microspora sp.						45.8	<9.1	<11.2				151.2		91.6					<3.3			
	Volvocales	*Chlamydomonas spp.*			<3.8		122.4	91.6												37.4				
		Chlamydomonas spp. ?	550.0	29.6	87.6	256.1	940.8	45.8		86.8	<4.4	11.8	85.8	<12.6		<22.9	27.2	<13.6		37.4	25.9	52.0		
	Zygnematales	*Actinotaenium sp.*											85.8	25.2	<39.6								<9.5	
		Arthrodesmus spp.	<14.2	<7.4	<3.8	<33.0	31.8			<11.2				<12.6						<4.8				
		Bambusina sp.	<14.2														<13.6							
		Closterium spp.	170.4	<7.4	15.2	<33.0	326.4	45.8	9.1	44.8	17.6	11.8	171.6	50.4	158.4	<22.9	27.2	<13.6	<1.1	19.2	13.2	26.8		<11.0
		Cosmarium spp.	198.8	59.2	116.8	66.0	775.2	533.4	54.6	347.2	<4.4	5.9	2326.1	194.8	920.1	354.4	315.9	527.4	16.4	448.8	233.1	67.0	57.0	66.0
		Cylindrocystis spp.		<7.4	<3.8	<33.0	10.6	711.2	<9.1	89.6											<3.3	<6.7		88.0
		Desmidium sp.																						
		Euastrum spp.	85.2	14.8	22.8	<33.0	74.2	137.4	18.2	<11.2		11.8	171.6	<12.6	158.4	45.8	27.2							<11.0
		Gonatozygon spp.	14.2		<3.8	<33.0	5.3				<4.4										<3.3			
		Hyalotheca sp.	<14.2											<12.6	<39.6		<13.6							
		Micrasterias spp.	14.2				<5.3																	
		Mougeotia spp.	113.6	44.4	30.4	528.0	42.4	<22.9	36.4	89.6	<4.4	<5.9	429.0	1159.2	396.0	687.0	1142.4	1172.0	65.6	710.6	233.1	468.0	19.0	<11.0
		Mougeotiopsis sp.											4984.5	126.0	4593.6	137.4	734.4							<11.0
		Netrium sp.	<14.2				<5.3	22.9		11.2							<13.6							
		Penium spp.	<14.2				<5.3													<4.8	<3.3			
		Spirogyra sp.															<13.6	117.2	<1.1		46.2	<6.7		
		Spondylosium planum																						
		Spondylosium sp.													<39.6									
		Staurastrum spp.	56.8	14.8	<3.8	<33.0	42.4	91.6	<9.1	<11.2		<5.9	<42.9	25.2	39.6	<22.9	27.2	<13.6	<1.1	19.2	26.4	<6.7	<9.5	
		Teilingia granulata	85.2	44.4	22.8		1254.4		<9.1	260.4	<4.4	<5.9	85.8	<12.6	<39.6		54.4							
		Tetmemorus sp.																						
		Xanthidium spp.	14.2				10.6			<11.2														
		Zygnema sp.											<42.9	<12.6			108.8	<13.6		76.8				
Chlorophyta		UID Chlorophyta flagellate	330.0				470.4			173.6				97.4				680.7	16.4	37.4	51.8	104.0		22.0
		UID Chlorophyta colonial	1320.0	118.4			652.8	<22.9	<9.1	<11.2	17.6	<5.9	343.2	389.6	1840.2	708.8	163.2	1588.3	32.8	299.2	399.2	107.2	<9.5	856.0
		UID Chlorophyta unicellular	2539.2	665.7	787.5	3942.0	1881.6	684.3	1091.2	3004.2	131.3	91.0	3836.4	1499.6	3541.2	3409.5	1620.8	5239.2	819.0	2014.6	3393.2	2801.4	850.2	1975.8
		UID Chlorophyta filamentous					<5.3	183.2		<11.2			858.0	100.8	554.4		163.2		<1.1					
Chrysophyta	Chromulinales	*Chrysococcus spp.*	2116.0	1553.3	900.9	6898.5	4704.0	2737.2	1091.2	1335.2	136.4	182.0	7673.4	3374.1	7082.4	4091.4	2431.2	907.6	16.4	74.8	51.8	156.0	566.8	987.9
	Heterococcales	*Ophiocytium sp.*	14.2		<3.8	<33.0								<12.6	<39.6	<22.9	<13.6			<4.8	3.3			
	Ochromonadales	*Dinobryon bavaricum*	28.4	14.8	53.2	256.1	42.4	45.8		<11.2	4.4	<5.9	85.8	25.2	<39.6		<13.6							
		Dinobryon cf. cylindricum	198.8	29.6	7.6		116.6	91.6	<9.1									117.2	3.3		13.2	13.4		<11.0
		Dinobryon divergens											514.8	2249.4	2360.8	1363.8	2836.4							
		Dinobryon cf. sertularia	<14.2		<3.8																			
		Dinobryon cf. utriculus		<7.4	<3.8			<22.9								<22.9	27.2				<3.3			
		Dinobryon spp.		<7.4	58.4			<22.9		86.8													<9.5	256.8
		Epixys sp.									<4.4													
		Hyalobryon spp.	113.6	14.8	116.8		81.6	684.3			34.1	45.5						<13.6						85.6
		Kephyrion sp.																						
		Kephyrion / Pseudokephyrion spp.	880.0	115.4	116.8	1536.6	285.6	2737.2	354.5	1001.4	102.3	227.5	<42.9	25.2				453.8		863.4	25.9	156.0	73.6	85.6
		Mallomonas sp.		634.7	900.0	512.2	122.4			<11.2														
		Pseudokephyrion sp.	28.4		7.6	66.0	81.6	177.8		260.4	68.2									74.8			19.0	
	Phaeothamniales	*Phaeoplaca thallosa*														<22.9								
	Rhizochrysidales	*Diceras sp.*		14.8	<3.8		<5.3	<22.9	18.2			5.9												
	Ulothricales	*Stipitococcus sp.*									<4.4													
		Stichogloea sp.					<5.3							<12.6	316.8	177.2	108.8					<6.7		
		Tribonema sp.			<3.8		<5.3	<22.9		<11.2			<42.9	327.6	<39.6	1053.4	217.6		<1.1	57.6				
Chrysophyta		UID Chrysophyte flagellate	110.0	57.7	29.2	256.1	2195.2		272.8	86.8	131.3	182.0				177.2	405.2							
		UID Chrysophyte unicellular	846.4		29.2	985.5	1568.0				8.8	45.5		97.4		681.9	1620.8	1746.4	16.4				147.2	85.6
		UID Chrysophyte cyst	1692.8	57.7	675.0	3942.0	2822.4	2737.2	818.4	667.6	262.6	136.5	5115.6	1124.7	16525.6	5455.2	3646.8	453.8	32.8	112.2	103.6	104.0	850.2	658.6
		UID Chrysophyte colonial																						
Cyanophyta	Chamaesiphonale	*Chamaesiphon spp.*						10948.8	27825.6	13685.8	787.8	1092.0	2557.8	5998.4	7082.4	23184.6	13776.8							
		Clastidium setigerum																						
		Clastidium sp.						1368.6	1909.6		131.3	45.5	1278.9				11345.6							
	Chroococcales	*Aphanocapsa spp.*	3520.0	1846.4	6750.0	23652.0	5017.6	1422.4	4364.8	18692.8	4201.6	2100.0	117658.8	17995.2	56659.2	19093.2	29174.4	34928.0	295.2	9785.2	1596.8	3201.6	11336.0	2739.2
		Aphanothece spp.	6600.0		1800.0	15768.0	979.2	4445.0	8729.6	24701.2	8928.4	4200.0	61387.2	4498.8	89710.4	16365.6	3790.8	34928.0	196.8	<4.8	7185.6	4802.4		2054.4
		Chlorogloea sp.												<12.6										
		Chroococcus spp.	113.6	230.8	700.8	<33.0	3136.0	22.9		694.4	26.4		1993.8	2999.2	28329.6	8182.8	4862.4	7260.8	378.0	2302.4	3193.6	800.4	588.8	2396.8
		Coelosphaerium sp.																	131.2					
		Gloeocapsa sp.							6547.2	12016.8	1575.6		15346.8	<12.6			<13.6	5445.6						
		Gloeothece sp.						47216.7		1335.2														
		Merismopedia spp.	568.0	<7.4	<3.8	<33.0	63.6	<22.9		89.6	<4.4		3987.6	<12.6	<39.6	<22.9	421.2	937.6	754.4	10936.4	4790.4	9204.6	2649.6	4108.8
		Gomphosphaeria spp.	1704.0	177.6	<3.8		1272.0						<42.9	604.8		<22.9	979.2	8168.4	852.8	8634.0	18363.2	14407.2	<9.5	1320.0
		Rhabdoderma sp.			<3.8			<22.9		44.8							<13.6							
		Synechococcus aeruginosus																117.2	6.6	48.0	39.6	13.4		<11.0
		UID Chroococcales	12696.0	1331.4	4275.0	10840.5	9408.0	10948.8	12245.2	14019.6	2626.0	2275.0	56271.6	11247.0	66102.4	31367.4	21070.4	17464.0	3843.0	10073.0	9780.4	6003.0	4534.4	2963.7
	Nostocales	*Anabaena sp.*	511.2	403.9	613.2		571.2			<11.2				1948.0	1226.8	1240.4	1579.5		<1.1	112.2	207.2	308.2		
		Anabaena sp. ?				660.0	448.8	<22.9	91.0	89.6			<42.9		396.0			410.2					<9.5	
		Calothrix sp.						205290.0	133584.0	172908.4	71689.8	43575.0												
		Calothrix sp. ?						3733.8		694.4	545.6	364.0	772.2	779.2	4907.2	1832.0							3459.2	3081.6
		Dichothrix sp.														<22.9								
		Nostoc sp. / Anabaena sp.	3190.0	692.4	3375.0	462.0	1387.2							974.0				3176.6	164.0		1596.8	3401.7	304.0	726.0
		Nostoc sp.	<14.2	<7.4		<33.0	693.6	4267.2	473.2	<11.2	<4.4		858.0		475.2	<22.9	<13.6		41.8					
		Rivularia sp.								<11.2				529.2	53118.0	46369.2	4422.6							
		Stigonema sp.											<42.9	151.2	<39.6	824.4	<13.6		<1.1			<6.7		
		Tolypothrix sp.						274.8		246.4			686.4	<12.6	1346.4	2061.0	1876.8							
		UID Nostocales					212.0	<22.9			1838.2	<5.9		1655.8		6137.1			98.4	523.6		884.0		220.0
	Oscillatoriales	*Lyngbya spp.*			116.8	256.1		15738.9		4005.6			1029.6		12574.7	2126.4	1579.5	<13.6				187.6	494.0	<11.0
		Homoeothrix sp.											117658.8	19494.8	99153.6	29321.7	9319.6							
		Oscillatoria spp.	1505.2	<7.4	258.4	15878.2	1101.6	1778.0	<9.1		852.5		51156.0	292.2	38953.2	5316.0	10214.1	1523.6		326.4	1036.0	214.4	228.0	286.0
		Plectonema sp.	7150.0	88.8	467.2	9987.9	530.4	322989.6	51763.8	171573.2	37551.8	118.0		579.6	3987.1	<22.9	136.0	1113.4	22.0		66.0	67.0	247.0	
		Pseudoanabaena spp.	5280.0	750.1	1138.8	12548.9	11289.6	3556.0	1063.5	3338.0	1050.4	1092.0	62666.1	8997.6	30690.4	2045.7	10130.0	3630.4	787.5	2878.0	4491.0	156.0	1104.0	941.6
		Schizothrix sp.						6400.8																
		UID Oscillatoriales	1760.0	2654.2	3600.0	8963.5	13328.0	20529.0	12821.6	13352.0	6171.1	728.0	43482.6	12371.7	74365.2	12956.1	12156.0	5445.6	1071.0	6907.2	4291.4	3848.0	441.6	4280.0
Pyrrhophyta	Cryptomonadales	*Chroomonas acuta*																	16.4	37.4	103.6	52.0		
		Cryptomonas spp.	220.0		7.6		627.2	<22.9	<9.1	<11.2		23.6							2.2	19.2	13.2	<6.7		
		UID Cryptomonadales	440.0	288.5	675.0	512.2	3136.0	91.6	54.6	89.6	8.8	35.4	85.8	25.2	79.2	45.8	27.2		4.4	1151.2	499.0	208.0		22.0
	Dinokontae	*Peridinium spp.*	<14.2				5.3					<5.9		<12.6										
		Peridinium / Glenodinium spp.						<22.9	<9.1	<11.2		<5.9			<39.6									
		UID Dinokontae		<7.4	<3.8		5.3			<11.2														
Rhodophyta	Nemalionales	*Batrachospermum sp.*											<42.9	11247.0	9201.0	320.6	924.8							
		UID flagellate	846.4	115.4	1350.0	985.5	4390.4	684.3			393.9			374.9		1772.0	105.3	1746.4	8.2	74.8	51.8	600.30		85.6
		UID colonial	440.0	<7.4	30.4	512.2	1568.0	27372.0	1091.2	2670.4	1313.0	91.0	7673.4	749.8	2360.8	6819.0	<13.6	680.7				208	220.8	513.6
		UID filamentous						274.8							<39.6							<6.7		<11.0
		UID unicellular	13542.4	1775.2	4950.0	15768.0	12230.4	24634.8	10575.4	10014.0	3939.0	1925.0	40924.8	7123.1	35412.0	12274.2	8914.4	11351.6	945.0	1726.8	3992.0	2401.2	2267.2	2963.7

AECOM

Appendix E

Fish Tissue Analytical Results

Your C.O.C. #: F117851

Attention: Jennifer Sarchuk
GARTNER LEE LTD.
6400 ROBERTS STREET
BURNABY, BC
Canada V5G 4L9

Report Date: 2008/09/24
This report supersedes all previous reports with the same Maxxam job number

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A846438
Received: 2008/09/08, 14:45

Sample Matrix: Tissue
Samples Received: 19

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Elements by CRC ICPMS (total) - Tissue	19	2008/09/18	2008/09/19	BRN SOP-00206	Based on EPA 200.8

* Results relate only to the items tested.

Encryption Key

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

ROB MACARTHUR, BBY Customer Service
Email: rob.macarthur@maxxamanalytics.com
Phone# (604) 444-4808 Ext:253

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CAEAL have approved this reporting process and electronic report format.

Total cover pages: 1

GARTNER LEE LTD.

Maxxam Job #: A846438
Report Date: 2008/09/24

ELEMENTS BY ATOMIC SPECTROSCOPY (TISSUE)

Maxxam ID		L55849	L55850	L55852	L55853	L55854	L55855	L55856	L55857	L55858		
Sampling Date		2008/09/04	2008/09/04	2008/09/04	2008/09/04	2008/09/04	2008/09/03	2008/09/03	2008/09/03	2008/09/03		
	Units	**CULLATON LK CHUB (MT2)-1**	**CULLATON LK CHUB (MT2)-2**	**CULLATON LK CHUB (MT2)-3**	**CULLATON LK CHUB (MT2)-4**	**CULLATON LK CHUB (MT2)-5**	**CULLATON LK ARCTIC GRAY-1**	**CULALTON LK ARCTIC GRAY-2**	**CULLATON LK ARCTIC GRAY-3**	**CULLATON LK ARCTIC GRAY-4**	**RDL**	**QC Batch**
Total Metals by ICPMS												
Total Aluminum (Al)	mg/kg	2	8	6	4	2	<1	5	3	2	1	2588385
Total Antimony (Sb)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	2588385
Total Arsenic (As)	mg/kg	0.02	0.02	0.05	0.01	0.02	<0.01	0.01	<0.01	0.01	0.01	2588385
Total Barium (Ba)	mg/kg	3.9	4.5	4.4	3.9	4.0	1.0	0.7	0.8	0.8	0.1	2588385
Total Beryllium (Be)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	2588385
Total Bismuth (Bi)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	2588385
Total Boron (B)	mg/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5	5	2588385
Total Cadmium (Cd)	mg/kg	0.05	0.05	0.04	0.09	0.04	<0.01	<0.01	<0.01	<0.01	0.01	2588385
Total Calcium (Ca)	mg/kg	9480	11200	13300	9560	9410	7710	7250	7700	6000	10	2588385
Total Chromium (Cr)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	2588385
Total Cobalt (Co)	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	2588385
Total Copper (Cu)	mg/kg	1.3	0.8	1.0	0.7	0.6	<0.5	0.5	<0.5	0.8	0.5	2588385
Total Iron (Fe)	mg/kg	26	47	36	33	32	<10	18	14	22	10	2588385
Total Lead (Pb)	mg/kg	0.02	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	0.01	2588385
Total Magnesium (Mg)	mg/kg	497	363	366	328	331	323	336	334	318	10	2588385
Total Manganese (Mn)	mg/kg	8.5	11.9	10.9	12.1	7.4	1.8	1.9	2.0	1.9	0.1	2588385
Total Mercury (Hg)	mg/kg	0.14	0.13	0.10	0.23	0.15	0.07	0.16	0.10	0.08	0.01	2588385
Total Molybdenum (Mo)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	2588385
Total Nickel (Ni)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.1	2588385
Total Phosphorus (P)	mg/kg	6950	8270	9280	6670	6980	6020	5840	6740	5370	10	2588385
Total Potassium (K)	mg/kg	2540	2580	2530	2650	2530	3380	3630	3580	3590	10	2588385
Total Selenium (Se)	mg/kg	0.35	0.30	0.29	0.28	0.23	0.26	0.22	0.21	0.17	0.01	2588385
Total Silver (Ag)	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2588385
Total Sodium (Na)	mg/kg	1030	874	831	984	774	529	546	562	390	10	2588385
Total Strontium (Sr)	mg/kg	10.5	11.5	15.5	9.6	11.6	6.9	5.5	5.7	6.4	0.1	2588385
Total Thallium (Tl)	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2588385
Total Tin (Sn)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	2588385
Total Titanium (Ti)	mg/kg	<1	1	1	<1	<1	<1	<1	1	<1	1	2588385
Total Uranium (U)	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2588385
Total Vanadium (V)	mg/kg	<2	<2	<2	<2	<2	<2	<2	<2	<2	2	2588385
Total Zinc (Zn)	mg/kg	34.9	34.5	35.2	31.4	35.9	16.0	18.3	16.2	17.8	0.1	2588385

RDL = Reportable Detection Limit

GARTNER LEE LTD.

Maxxam Job #: A846438
Report Date: 2008/09/24

ELEMENTS BY ATOMIC SPECTROSCOPY (TISSUE)

Maxxam ID		L55859	L55860	L55861	L55862	L55863	L55864	L55865	L55866	L55867		
Sampling Date		2008/09/03	2008/09/03	2008/09/03	2008/09/03	2008/09/03	2008/09/03	2008/09/03	2008/09/03	2008/09/03		
	Units	**CULLATON LK ARCTIC GRAY-5**	**CULLATON LK ARCTIC GRAY-6**	**LAKE CHUB (GO1)-1**	**LAKE CHUB (GO1)-2**	**LAKE CHUB (GO1)-3**	**LAKE CHUB (GO1)-4**	**LAKE CHUB (GO1)-5**	**LAKE CHUB (GO1)-6**	**LAKE CHUB (GO1)-7**	**RDL**	**QC Batch**
Total Metals by ICPMS												
Total Aluminum (Al)	mg/kg	7	4	3	9	13	1	10	7	5	1	2588385
Total Antimony (Sb)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	2588385
Total Arsenic (As)	mg/kg	0.02	<0.01	0.02	0.03	0.02	0.02	0.04	0.03	0.02	0.01	2588385
Total Barium (Ba)	mg/kg	0.7	1.0	3.8	3.4	7.0	3.7	3.8	5.8	3.3	0.1	2588385
Total Beryllium (Be)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	2588385
Total Bismuth (Bi)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	2588385
Total Boron (B)	mg/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5	5	2588385
Total Cadmium (Cd)	mg/kg	<0.01	0.01	0.15	0.05	0.07	0.02	0.09	0.09	0.04	0.01	2588385
Total Calcium (Ca)	mg/kg	8300	6470	8840	9110	11100	8420	8550	10700	7740	10	2588385
Total Chromium (Cr)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	2588385
Total Cobalt (Co)	mg/kg	<0.1	<0.1	<0.1	0.2	0.2	<0.1	<0.1	0.3	0.2	0.1	2588385
Total Copper (Cu)	mg/kg	0.5	<0.5	0.9	1.9	0.7	0.8	1.5	1.3	1.2	0.5	2588385
Total Iron (Fe)	mg/kg	30	16	44	110	89	24	110	95	52	10	2588385
Total Lead (Pb)	mg/kg	<0.01	<0.01	<0.01	0.01	0.02	<0.01	0.01	0.01	<0.01	0.01	2588385
Total Magnesium (Mg)	mg/kg	355	328	308	547	341	296	291	326	296	10	2588385
Total Manganese (Mn)	mg/kg	2.3	1.7	8.2	9.9	11.0	5.7	7.5	11.4	15.8	0.1	2588385
Total Mercury (Hg)	mg/kg	0.29	0.06	0.20	0.08	0.16	0.15	0.19	0.20	0.13	0.01	2588385
Total Molybdenum (Mo)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	2588385
Total Nickel (Ni)	mg/kg	<0.1	<0.1	<0.1	0.1	0.1	<0.1	0.1	0.1	0.1	0.1	2588385
Total Phosphorus (P)	mg/kg	7050	5610	6830	5460	7940	5970	5510	6370	5660	10	2588385
Total Potassium (K)	mg/kg	3600	3680	2590	2230	2220	2280	2170	2360	2300	10	2588385
Total Selenium (Se)	mg/kg	0.21	0.23	0.32	0.28	0.41	0.29	0.40	0.28	0.35	0.01	2588385
Total Silver (Ag)	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2588385
Total Sodium (Na)	mg/kg	485	411	760	759	761	643	704	741	597	10	2588385
Total Strontium (Sr)	mg/kg	5.6	6.3	9.4	11.1	12.0	9.8	10.2	10.7	8.6	0.1	2588385
Total Thallium (Tl)	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2588385
Total Tin (Sn)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	2588385
Total Titanium (Ti)	mg/kg	<1	<1	<1	<1	1	<1	<1	<1	<1	1	2588385
Total Uranium (U)	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	2588385
Total Vanadium (V)	mg/kg	<2	<2	<2	<2	<2	<2	<2	<2	<2	2	2588385
Total Zinc (Zn)	mg/kg	21.1	16.4	38.7	32.6	46.4	24.5	43.3	31.6	36.1	0.1	2588385

RDL = Reportable Detection Limit

GARTNER LEE LTD.

Maxxam Job #: A846438
Report Date: 2008/09/24

ELEMENTS BY ATOMIC SPECTROSCOPY (TISSUE)

Maxxam ID		L55868		
Sampling Date		2008/09/05		
	Units	**STICKLEBACK**	**RDL**	**QC Batch**
Total Metals by ICPMS				
Total Aluminum (Al)	mg/kg	4	1	2588385
Total Antimony (Sb)	mg/kg	<0.1	0.1	2588385
Total Arsenic (As)	mg/kg	0.06	0.01	2588385
Total Barium (Ba)	mg/kg	3.6	0.1	2588385
Total Beryllium (Be)	mg/kg	<0.1	0.1	2588385
Total Bismuth (Bi)	mg/kg	<0.1	0.1	2588385
Total Boron (B)	mg/kg	<5	5	2588385
Total Cadmium (Cd)	mg/kg	0.02	0.01	2588385
Total Calcium (Ca)	mg/kg	10200	10	2588385
Total Chromium (Cr)	mg/kg	<0.5	0.5	2588385
Total Cobalt (Co)	mg/kg	0.1	0.1	2588385
Total Copper (Cu)	mg/kg	57.7	0.5	2588385
Total Iron (Fe)	mg/kg	97	10	2588385
Total Lead (Pb)	mg/kg	0.04	0.01	2588385
Total Magnesium (Mg)	mg/kg	295	10	2588385
Total Manganese (Mn)	mg/kg	33.4	0.1	2588385
Total Mercury (Hg)	mg/kg	0.05	0.01	2588385
Total Molybdenum (Mo)	mg/kg	<0.1	0.1	2588385
Total Nickel (Ni)	mg/kg	0.2	0.1	2588385
Total Phosphorus (P)	mg/kg	6140	10	2588385
Total Potassium (K)	mg/kg	1850	10	2588385
Total Selenium (Se)	mg/kg	0.20	0.01	2588385
Total Silver (Ag)	mg/kg	<0.05	0.05	2588385
Total Sodium (Na)	mg/kg	676	10	2588385
Total Strontium (Sr)	mg/kg	8.1	0.1	2588385
Total Thallium (Tl)	mg/kg	<0.05	0.05	2588385
Total Tin (Sn)	mg/kg	4.3	0.1	2588385
Total Titanium (Ti)	mg/kg	<1	1	2588385
Total Uranium (U)	mg/kg	<0.05	0.05	2588385
Total Vanadium (V)	mg/kg	<2	2	2588385
Total Zinc (Zn)	mg/kg	32.9	0.1	2588385

RDL = Reportable Detection Limit

GARTNER LEE LTD.

Maxxam Job #: A846438
Report Date: 2008/09/24

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2588385	Total Arsenic (As)	2008/09/19	106	75 - 125	107	75 - 125	<0.01	mg/kg	NC	35	104	75 - 125
2588385	Total Beryllium (Be)	2008/09/19	94	75 - 125	105	75 - 125	<0.1	mg/kg	NC	35		
2588385	Total Cadmium (Cd)	2008/09/19	97	75 - 125	108	75 - 125	<0.01	mg/kg	NC	35		
2588385	Total Chromium (Cr)	2008/09/19	98	75 - 125	102	75 - 125	<0.5	mg/kg	NC	35	99	75 - 125
2588385	Total Cobalt (Co)	2008/09/19	97	75 - 125	102	75 - 125	<0.1	mg/kg	NC	35	103	75 - 125
2588385	Total Copper (Cu)	2008/09/19	93	75 - 125	102	75 - 125	<0.5	mg/kg	NC	35	89	75 - 125
2588385	Total Lead (Pb)	2008/09/19	90	75 - 125	103	75 - 125	<0.01	mg/kg	NC	35		
2588385	Total Mercury (Hg)	2008/09/19	94	75 - 125	106	75 - 125	<0.01	mg/kg	1.4	35	93	75 - 125
2588385	Total Nickel (Ni)	2008/09/19	95	75 - 125	101	75 - 125	<0.1	mg/kg	NC	35	95	75 - 125
2588385	Total Selenium (Se)	2008/09/19	99	75 - 125	104	75 - 125	<0.01	mg/kg	4.0	35	102	75 - 125
2588385	Total Uranium (U)	2008/09/19	93	75 - 125	102	75 - 125	<0.05	mg/kg	NC	35		
2588385	Total Vanadium (V)	2008/09/19	100	75 - 125	100	75 - 125	<2	mg/kg	NC	35		
2588385	Total Zinc (Zn)	2008/09/19	NC	75 - 125	111	75 - 125	<0.1	mg/kg	0.9	35	98	75 - 125
2588385	Total Iron (Fe)	2008/09/19					<10	mg/kg	NC	35	103	75 - 125
2588385	Total Manganese (Mn)	2008/09/19					<0.1	mg/kg	9.0	35	104	75 - 125
2588385	Total Aluminum (Al)	2008/09/19					<1	mg/kg	NC	35		
2588385	Total Antimony (Sb)	2008/09/19					<0.1	mg/kg	NC	35		
2588385	Total Barium (Ba)	2008/09/19					<0.1	mg/kg	7.2	35		
2588385	Total Bismuth (Bi)	2008/09/19					<0.1	mg/kg	NC	35		
2588385	Total Boron (B)	2008/09/19					<5	mg/kg	NC	35		
2588385	Total Calcium (Ca)	2008/09/19					<10	mg/kg	5.0	35		
2588385	Total Magnesium (Mg)	2008/09/19					<10	mg/kg	1.1	35		
2588385	Total Molybdenum (Mo)	2008/09/19					<0.1	mg/kg	NC	35		
2588385	Total Phosphorus (P)	2008/09/19					<10	mg/kg	11.8	35		
2588385	Total Potassium (K)	2008/09/19					<10	mg/kg	0.06	35		
2588385	Total Silver (Ag)	2008/09/19					<0.05	mg/kg	NC	35		
2588385	Total Sodium (Na)	2008/09/19					<10	mg/kg	1.2	35		
2588385	Total Strontium (Sr)	2008/09/19					<0.1	mg/kg	6.9	35		
2588385	Total Thallium (Tl)	2008/09/19					<0.05	mg/kg	NC	35		
2588385	Total Tin (Sn)	2008/09/19					<0.1	mg/kg	NC	35		
2588385	Total Titanium (Ti)	2008/09/19					<1	mg/kg	NC	35		

N/A = Not Applicable
NC = Non-calculable
RPD = Relative Percent Difference

Maxxam Analytics Inc.

8577 Commerce Court
Burnaby, BC V5A 4N5
www.maxxamanalytics.com

Phone: (604) 444-4808
Fax: (604) 444-4511
Toll Free: 1-800-440-4808

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

PAGE ___ OF ___

MAXXAM JOB #: A846438

ANALYSIS REQUEST

F 117851

COMPANY NAME: GARTNER LEE

PH. #:
E-mail:
FAX #:

COMPANY ADDRESS:

CLIENT PROJECT ID: (#)

SAMPLER NAME (PRINT):

PROJECT MANAGER: JENNIFER S

LAB USE ONLY

	FIELD SAMPLE ID	MATRIX: GROUND WATER	SURFACE WATER	SOIL	DRINKING WATER	OTHER	# CONTAINERS	SAMPLING: DATE DD/MM/YY	TIME	HEADSPACE VAPOUR	BTEX / LH	BTEX / VPH	MTBE	VOC's / VPH	EPH	TEH	PAH	LEPH/HEPH	CCME-PHC (FRACTIONS 1-4 PLUS BTEX)	CCME-PHCS (FRACTIONS 2-4)	CCME BTEX (FRACTION 1 PLUS BTEX)	PHENOLS BY 4AAP	PHENOLS BY GCMS	TOTAL O&G	MINERAL O&G	Dissolved Metals	Field Filtered? YES / NO	Field Preserved? YES / NO	Total Metals Field Preserved? YES / NO	NITRATE	NITRITE	AMMONIA	CHLORIDE	FLUORIDE	SULPHATE	TOTAL SUSPENDED SOLIDS (NFR)	CYANIDE SAD	WAD	LEACHABLE LEAD (AA) (TCLP)	LEACHABLE BTEX (AA) (TCLP)	HOLD
1																																									
2																																									
3																																									
4																																									
5																																									
6																																									
7																																									
8																																									
9																																									
10																																									
11																																									
12																																									

TAT (Turnaround Time)

5 DAY TAT MUST HAVE PRIOR APPROVAL

some exceptions apply please contact lab

STANDARD 5 BUSINESS DAYS ☐
RUSH 3 BUSINESS DAYS ☐
RUSH 2 BUSINESS DAYS ☐
URGENT 1 BUSINESS DAY ☐

OTHER BUSINESS DAYS ___

CUSTODY RECORD

P.O. NUMBER / QUOTE NUMBER:

SPECIAL DETECTION LIMITS / CONTAMINANT TYPE:

☐ CCME
☐ CSR
☐ ALBERTA TIER 1
☐ OTHER

ACCOUNTING CONTACT:

SPECIAL REPORTING OR BILLING INSTRUCTIONS:

JARS USED:

LAB USE ONLY

ARRIVAL TEMPERATURE °C:

DUE DATE:

LOG IN CHECK:

RELINQUISHED BY SAMPLER: DATE: DD/MM/YY TIME: RECEIVED BY:

RELINQUISHED BY: DATE: DD/MM/YY TIME: RECEIVED BY:

RELINQUISHED BY: DATE: 08/09/08 TIME: 14:45 RECEIVED BY LABORATORY: JF

COCFORM - BC - 05/08

ORIGINAL - MAXXAM YELLOW - MAXXAM

AECOM

Appendix F

Northwest Hydraulic Consultants Water Balance of Tailings Pond 1 and Shear Lake Report

nhc
northwest hydraulic consultants

memorandum

9819 – 12th Avenue S.W.
Edmonton, AB
T6X 0E3, Canada
Tel: 780-436-5868
Fax: 780-436-1645
email: eyaremko@nhc-edm.com

To:	Rick Palmer, Jennifer Sarchuk	**Date:**	11-Feb-2009
From:	Gene Yaremko, P. Eng	**No. Pages:**	4
CC:		**Project No.:**	7151
		Ref. No.:	

Re: **Cullaton Lake Mine Closure**
Water Balance, Tailings Pond No. 1 and Shear Lake

1 BACKGROUND

Two elements that are part of the Cullaton Lake "Final Mine Abandonment and Restoration Plan" have been identified as having potential long term water quality concerns. These are:

- Tailings Pond No. 1 (TP1) – a tailings empoundment where it appears that the tailings cover at the beach/water interface is insufficient to limit oxidation of the underlying tailings material; and,
- Shear Lake – the issue is lake and lake outflow water quality in response to runoff from a nearby encapsulated mine waste rock pile.

In both cases, the concern has to do with geochemical risks primarily associated ARD/ML impacts.

2 STUDY OBJECTIVES AND APPROACH

To address the above concern, a water balance assessment was undertaken for each water body. Additional field information was collected during summer 2008. The primary objective was to obtain sufficient information to enable generation of a stage versus outflow relationship for each water body.

The water balance equation upon which the water balance model was based is given as follows:

(Inflow (I) – Outflow (O)) Δt = Change in Storage (ΔS), where:

I = average monthly inflow (m^3):

- surface runoff from upstream basin;
- precipitation falling directly on pond/lake

O = average monthly outflow (m^3), where:

- evaporation from pond/lake
- seepage from pond/lake
- spillway flow

(ΔS) = increase or decrease in pond/lake storage in a month (m^3)

The open water runoff season was assumed to be the five month period June through October.

Annual basin runoff was assumed to be 60% of annual precipitation, with monthly distribution based on Water Survey of Canada Station 06HD001, "Kognak River below Mountain Lake". An 80% runoff coefficient was adopted for mine waste rock piles. **Table 1** summarizes the monthly precipitation (mm) amounts for 37 years of climate record for the Ennadi Lake climate station. Corresponding runoff amounts (mm) are also provided for each of the two runoff coefficients. Runoff volumes equal these runoff depths times the corresponding basin contributing area. Contributing areas (CA) used are as follows:

- Tailings pond No. 1: CA = 0.045 km^2; pond area = 0.093 km^2
- Shear Lake: CA = 2.54 km^2; lake area = 0.093 km^2

Estimated average annual precipitation for the Cullaton Lake sites is 292 mm.

The set of annual precipitation amounts for **Table 1** was analyzed on the basis of a log-Normal frequency distribution. The frequency curve is shown in **Figure 1** and high and low frequencies are provided in **Table 3**. Note that the 100-year wet and low annual runoff depths are 131 and 563 mm, respectively.

Annual and monthly lake evaporation amounts (**Table 2**) were computed for the same time period provided in **Table 1**. These estimates were based on the climate station data for Ennadai Lake and calibration with recorded evaporation at the Churchill climate station. Note that evaporation amounts have not been provided for October as evaporation for this month would be small. Estimated average annual lake evaporation for the Cullaton Lake sites is 333 mm.

Tailings pond No. 1 storage and surface areas for a range of pond levels is provided in **Table 4** – this table has been based on the pond contour plan shown in **Figure 2**. The corresponding values for Shear Lake are provided in **Table 5**, which have been based on the lake contour plan for Shear Lake shown in Figure 3.

The equations for the stage versus outflow curve for the tailings pond and Shear Lake were based on the broad-crested weir equation given by:

$$Q = 1.7(w)h^{1.5}; \text{ where:}$$

Tailings pond No. 1: w = 10 m, and

Shear Lake: w = 0.5 m

The adopted crest level of the spillway outlet for the tailings pond was Elev. 93.3 m.

The outlet width for Shear Lake was estimated using the above weir equation combined with measured water levels and discharges.

The tailings pond water balance model assumed an annual seepage amount of 10,000 m^3 at high lake levels and diminishing with lower lake levels.

3 TAILINGS POND NO. 1

The water balance model for this pond was used to estimate monthly pond levels for the 37 years of runoff shown in **Table 1**. A plot of the results is provided in **Figure 4**; the starting lake level was the outflow sill level of Elev. 93.3 m. The results indicate the following:

- It appears that a series of low runoff years for the period 1955-1961 would have seen the pond level declining to as low as Elev. 92.7 m.
- In subsequent years, runoff would have been generally higher, with pond levels being in the range of elev's 93.1 m to 93.3 m.
- The pond level would have reached Elev. 92.9 m during the low runoff year of 2007.
- Given the combination of a small contributing basin area and wide outlet width, outflow levels will never rise much above sill level.

The model was then used to compute pond levels arising from a few years of extreme low (drought) runoff – a 100-year low runoff year was followed by 50- and 10-year low runoff years. The results are shown in **Figure 5**. The outcome would be a lowering of the pond to Elev. 92.5 m, or 0.8 m below sill level.

An annual seepage volume of 5000 m^3 was inserted into the water balance model and pond levels appear to be somewhat insensitive to seepage amounts.

4 SHEAR LAKE

The water balance model for Shear Lake was run for the 37 years of estimated annual runoff based on **Table 1**. Although a higher runoff coefficient was adopted for the waste rock pile, its small area relative to the contributing basin area would have no significant impact on lake levels. **Figure 6** provides a plot of the model output and it is shown that:

- in every year the winter level would likely return to the assumed outlet sill level of Elev. 100.00 m;
- the lake would rise to a maximum level of Elev. 100.22 m, or .22 m above sill level – these levels have been based on monthly average inflows, so it is possible that levels could become somewhat higher in response to local rainfall storms.

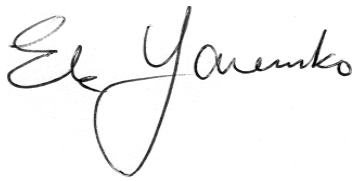
5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Tailings Pond No. 1. Because of the small contributing area compared to the pond area, it can be expected that pond levels will never rise much above the outlet sill level of Elev. 93.3 m but could fall below the sill by perhaps as much as 0.8 m to Elev. 92.5 m during a severe drought period.

5.2 Shear Lake – Lake levels will typically return to the outlet sill level at the end of every summer period, even during a severe drought period. Water quality modeling to evaluate the impact of runoff from the mine waste rock pile should be based on the **Table 1** runoff depths for a 0.8 runoff coefficient times the pile area, versus the dilution provided by the **Table 1** basin runoff depths for a 0.6 runoff coefficient.

Respectfully submitted

northwest hydraulic consultants



E.K. Yaremko, P. Eng

Table 1: Monthly Precipitation and Runoff (mm)

Year	Jun	Jul	Aug	Sep	Oct	Annual Precipitation	Runoff Coefficient 0.60	Runoff Coefficient 0.80
1953	97	71	37	29	21	254	153	204
1954	91	66	34	27	19	237	142	190
1955	97	71	37	29	21	254	153	203
1956	94	68	36	28	20	245	147	196
1957	85	61	32	25	18	221	133	177
1958	120	87	45	36	26	314	188	251
1959	71	52	27	21	15	187	112	150
1960	108	79	41	32	23	284	170	227
1961	135	98	51	40	29	353	212	282
1962	100	72	38	30	21	261	156	209
1963	126	92	48	38	27	331	198	265
1964	125	91	48	37	27	328	197	263
1965	141	103	54	42	30	370	222	296
1966	151	110	57	45	32	397	238	317
1967	125	91	47	37	27	327	196	262
1968	170	124	64	51	36	445	267	356
1969	78	57	29	23	17	204	122	163
1970	128	93	48	38	27	334	201	268
1971	92	67	35	27	20	240	144	192
1972	171	124	65	51	36	447	268	357
1973	110	80	42	33	23	288	173	230
1974	102	74	39	31	22	268	161	215
1975	135	98	51	40	29	355	213	284
1976	135	99	51	41	29	355	213	284
1977	133	97	51	40	29	350	210	280
1978	94	69	36	28	20	247	148	198
1979	99	72	37	29	21	258	155	207
1998	103	75	39	31	22	270	162	216
1999	130	95	50	39	28	342	205	273
2000	74	54	28	22	16	195	117	156
2001	160	117	61	48	34	420	252	336
2002	70	51	27	21	15	184	110	147
2003	71	52	27	21	15	186	111	148
2004	73	53	28	22	16	192	115	154
2005	164	119	62	49	35	429	257	343
2006	125	91	47	37	27	327	196	262
2007	45	33	17	13	10	117	70	94
Mean	**112**	**81**	**42**	**33**	**24**	**292**	**175**	**234**
%	38%	28%	14%	11%	8%			

Note: Tailings Pond #1: Drainage Area 0.045 km^2, Pond Area 0.093 km^2

Shear Lake: Drainage Area 2.5 km^2, Lake Area 0.019 km^2

Table 2: Monthly Lake Evaporation (mm)

Year	Jun	Jul	Aug	Sep	Sum
1953	46	91	95	39	270
1954	80	138	97	55	371
1955	117	157	112	68	454
1956	66	125	85	48	324
1957	53	101	129	56	340
1958	60	105	94	50	308
1959	56	122	91	60	329
1960	92	121	114	50	376
1961	97	118	104	43	362
1962	52	112	86	54	304
1963	109	104	93	34	340
1964	72	143	99	50	364
1965	69	88	78	46	281
1966	87	120	131	48	385
1967	81	130	115	70	395
1968	64	95	89	43	291
1969	47	119	96	43	305
1970	115	128	93	45	380
1971	68	146	102	63	379
1972	78	98	100	43	320
1973	98	158	134	74	464
1974	135	125	97	47	404
1975	79	133	107	68	387
1976	105	165	114	60	445
1977	105	111	72	47	334
1978	69	83	97	42	291
1979	72	129	95	44	341
1995	83	67	64	29	243
1996	45	89	53	54	242
1997	66	107	80	32	285
1998	75	125	108	36	345
1999	85	104	70	43	301
2000	60	113	86	41	300
2001	55	42	31	35	163
2003	58	114	98	42	311
2004	53	108	59	46	266
2005	69	99	89	32	290
2006	124	104	95	52	374
Mean	**77**	**114**	**94**	**48**	**333**

Table 3: Frequency Analysis of Annual Precipitation (mm)

Return Period	Annual Precipitation
100-year low	131
50-year low	142
20-year low	162
10-year low	181
5-year low	208
2-year	271
5-year high	353
10-year high	405
20-year high	454
50-year high	517
100-year high	563

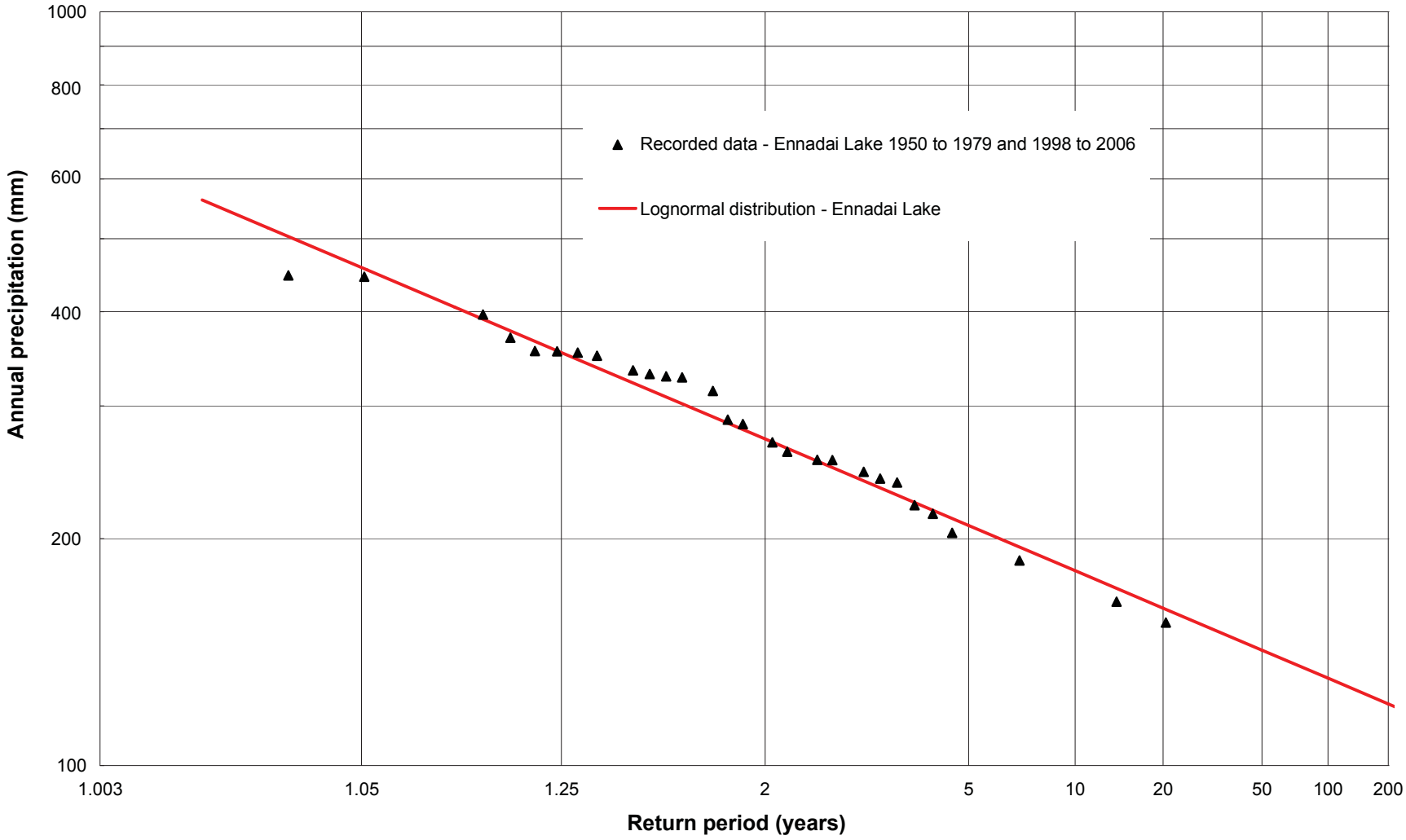
Table 4: Storage Curve - Tailings Pond #1

Elevation	Volume (m^3)	Surface Area (m^2)
91.0	0	0
91.5	5350	18881
92.0	20604	39549
92.5	51444	70862
93.0	90323	84563
93.5	135902	97850
94.0	188039	110929
94.5	247128	124889
95.0	312805	137787
95.5	387302	154881
96.0	467845	164982

Table 5: Storage Curve - Shear Lake

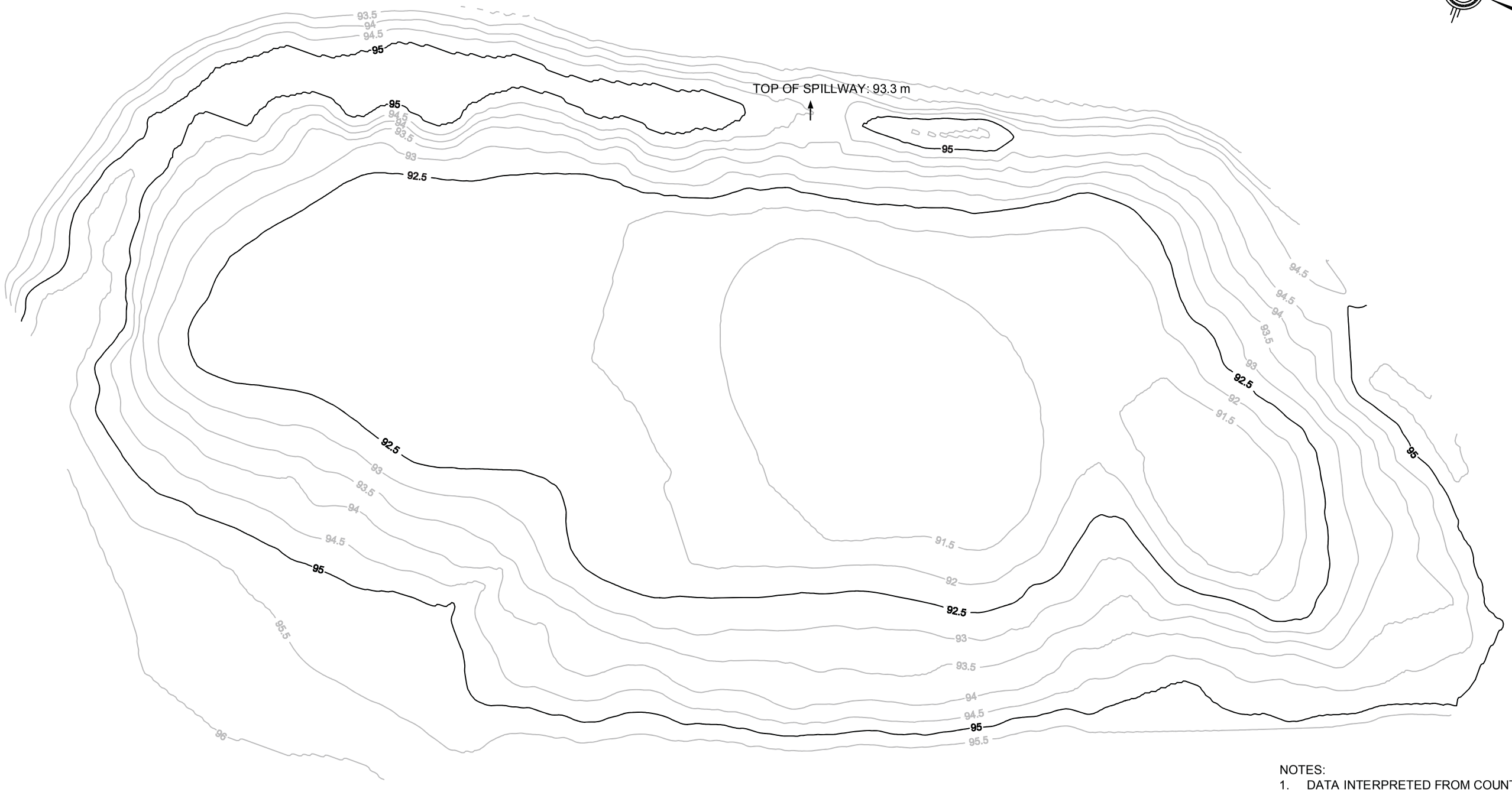
Elevation	Volume (m^3)	Surface Area (m^2)
95.5	0	0
96.0	16	76
96.5	298	1261
97.0	1263	2564
97.5	2880	3973
98.0	5387	6048
98.5	9081	8811
99.0	14204	11647
99.5	20721	14452
100.0	28753	18907
100.5	38853	23763

Frequency Analysis Annual Precipitation Ennadai Lake



nhc northwest hydraulic consultants

AECOM		
WATER BALANCE MODEL		
Frequency Analysis Annual Precipitation Ennadai Lake		
File #7151	04-Feb-09	Figure 1
northwest hydraulic consultants ltd.		



0 20 40 60 80 100 120 140 160 m

SCALE 1:2,000

NOTES:
1. DATA INTERPRETED FROM COUNTER MAP, PREPARED BY TROW CONSULTING ENGINEERS LTD., 1995
2. BENCHMARK IS LOCATED ON CONCRETE SLAB AT NORTH-EAST CORNER OF MILL BUILDING. ASSUMED ELEVATION: 100.00 m
3. ALL ELEVATIONS ARE SHOWN IN METERS

AECOM

TAILINGS POND CONTOURS

Dwg. 7151-101	4 February 2009	**Figure 2**

northwest hydraulic consultants ltd.

nhc northwest hydraulic consultants

Filename: C:\Users\DHotzel\Documents\Projects\7151 Callaton Lake\3d model\7151 Cotours.dwg 11/02/2009 9:08:10 AM

NOTES:
1. DATA INTERPRETED FROM SURVEY DATA, PROVIDED BY AECOM
2. ASSUMED ELEVATION OF TOP OF OUTLET: 100.00 m
3. ALL ELEVATIONS ARE SHOWN IN METERS

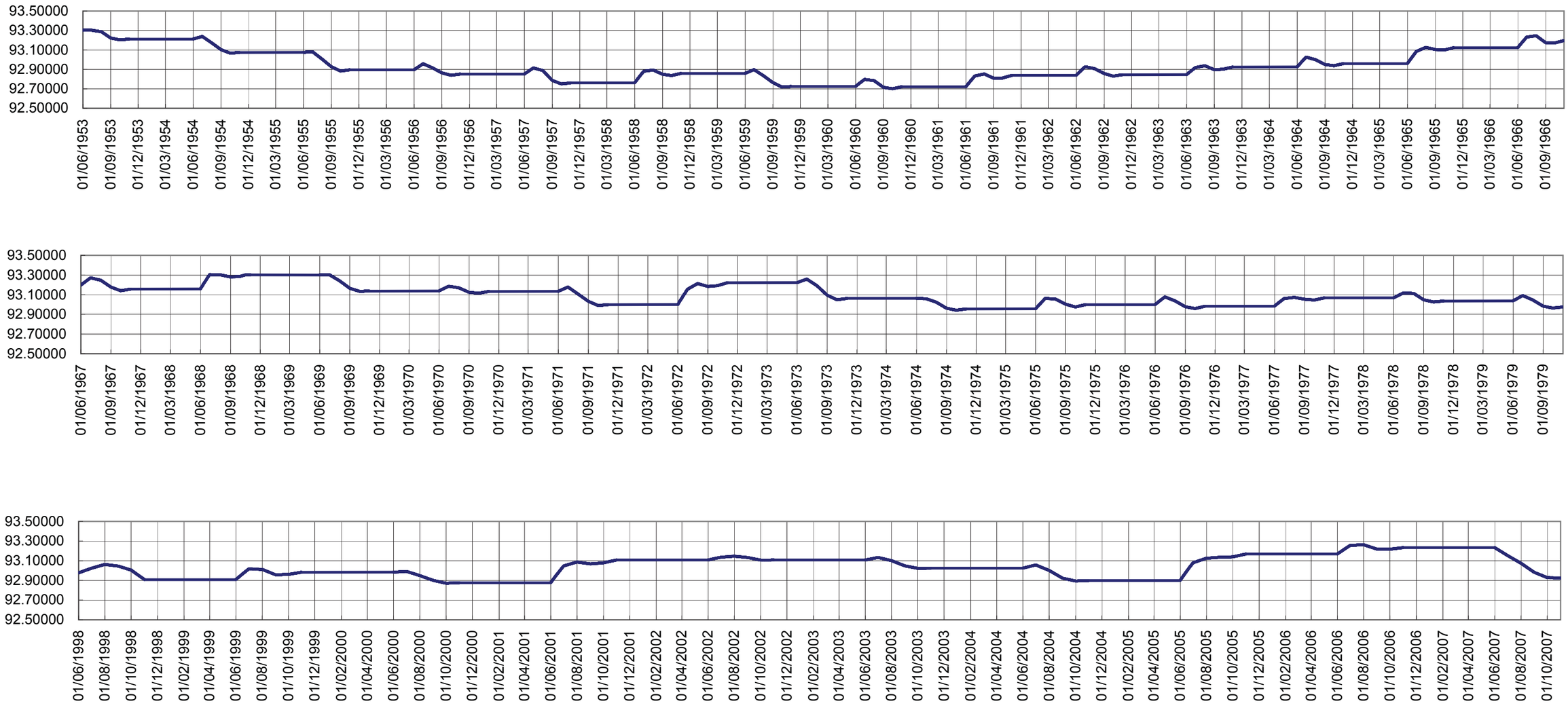
0 10 20 30 40 50 60 70 80 m

SCALE 1:1,000

nhc northwest hydraulic consultants

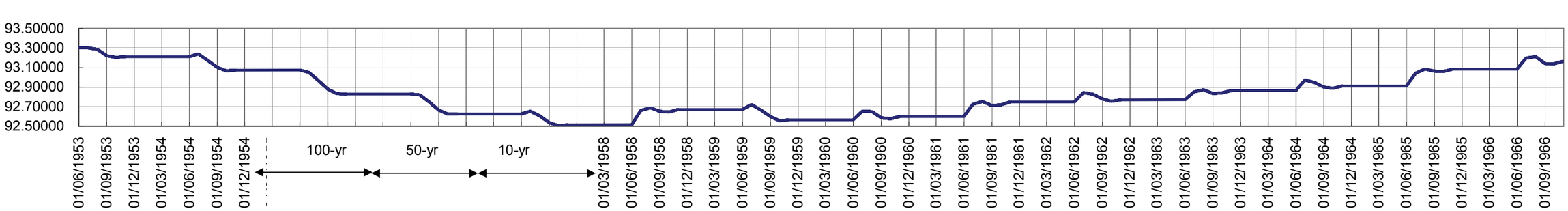
AECOM		
CULLATON LAKE		
SHEAR LAKE CONTOURS		
Dwg. 7151-101	4 February 2009	**Figure 3**
northwest hydraulic consultants ltd.		

Filename: C:\Users\DHotopp\Documents\Projects\7151 Cullaton Lake\3d model\7151 Contours.dwg 11/02/2009 9:08:10 AM



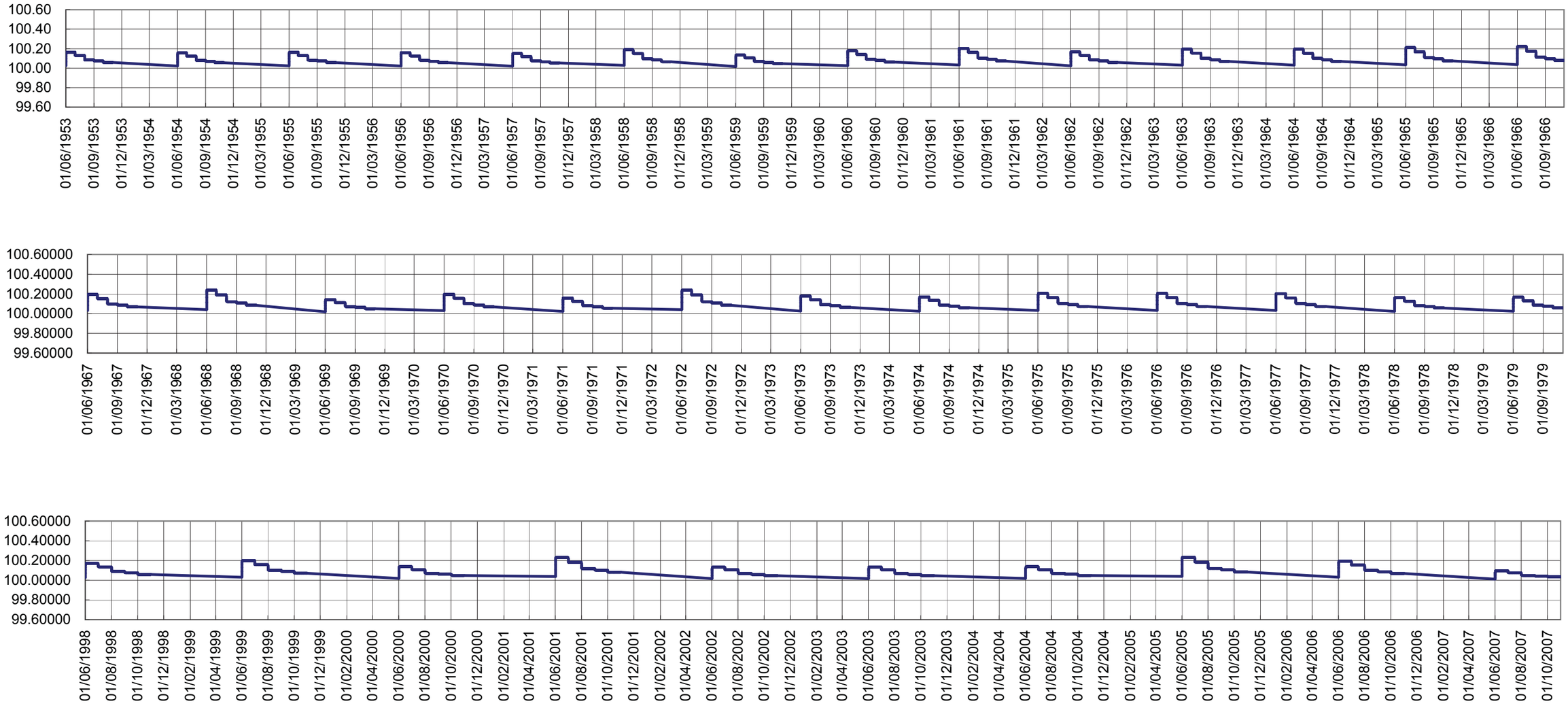
nhc northwest hydraulic consultants

AECOM		
WATER BALANCE MODEL		
Tailingspond #1 - Simulated Water Level from 1953 to 1979 and 1998 to 2007		
File #7151	04-Feb-09	Figure 4
northwest hydraulic consultants ltd.		



nhc northwest hydraulic consultants

AECOM		
WATER BALANCE MODEL		
Tailingspond #1 - Simulated water level 1953,1954, 100yr, 50yr, 10yr, 1958 - 1966		
File #7151	04-Feb-09	Figure 5
northwest hydraulic consultants ltd.		



nhc northwest hydraulic consultants

AECOM		
WATER BALANCE MODEL		
Shear Lake - Simulated Water Level from 1953 to 1979 and 1998 to 2007		
File #7151	04-Feb-09	Figure 6
northwest hydraulic consultants ltd.		

AECOM

Appendix G

Lorax Environmental Geochemical Considerations of Tailings and Waste Rock for Cullaton Lake Mine Report

Barrick Gold Inc.
AECOM Canada Ltd.

Geochemical Considerations of Tailings and Waste Rock Cullaton Lake Mine

March 2009

LORAX ENVIRONMENTAL

Suite 603-140 Water Street
St. John's, NL A1C 6H6
CANADA
(709) 687-8782

2289 Burrard St.
Vancouver, BC V6J 3H9
CANADA
(604) 688-7173
www.lorax.ca

Table of Contents

Table of Contents

LIST OF FIGURES

LIST OF TABLES

1. Introduction

1. Introduction

Barrick Gold Corporation (Barrick) owns the closed mine facilities of the Cullaton Lake Gold Mines property in Nunavut, Canada. During the mine operational period of 1981 to 1985, underground mining occurred in two separate ore zones: the B-Zone and Shear Zone. International Corona Corporation (Corona) acquired the Cullaton Lake property in 1985 and immediately put the property into a care and maintenance status. Decommissioning and reclamation activities were initiated in 1990. Homestake Canada Inc. (Homestake) took over Corona in 1992 and continued reclamation and decommissioning activities until 2003. A Final Abandonment and Restoration Plan (Final A&R) was prepared by Homestake and accepted by the Northwest Territories Water Board in March 1996.

Through its purchase of Homestake in 2001, the Cullaton Lake property became wholly owned by Barrick. In 2005, after reviewing historical water quality and closure activities, Barrick considered that the decommissioning responsibilities and objectives, as described in the approved 1996 Final A&R Plan, had been adequately met. Barrick indicated to the Nunavut Water Board (NWB) that it was their objective to ultimately return the mining and surface leases back to the Crown once sign off on the Final A&R Plan had occurred. The NWB initially responded by requesting input from Indian and northern Affairs (INAC), since the property was originally leased from INAC. .

In response to the NWB request, INAC commissioned BGC Engineering Inc. (BGC) in 2006 to complete a desk top assessment of Barrick's progress toward achieving the objectives of the Final A&R Plan. BGC concluded that "the reclamation work completed to date has not yet achieved the objective of ensuring that there would be no long term environmental impacts." Suspected acid rock drainage and metal leaching (ARD/ML) impacts in the Shear Lake mine area, and at the tailings impoundment were identified as liabilities associated with the mine site.

In order to address the recommendations and deficiencies identified by BGC, Barrick commissioned AECOM Canada Ltd. (AECOM) in 2008 to conduct an aquatic risk assessment associated with the closed mine facilities at Cullaton Lake as a means of further evaluating the success of the previous reclamation activities. AECOM commissioned Lorax Environmental Services Ltd. (Lorax) to address the outstanding geochemical issues and questions concerning closure of the Cullaton mine site.

Lorax developed a geochemical sampling program to address the concerns raised by BGC in the 2006 review. The following report presents the results from the geochemical sampling program conducted at Cullaton Lake from August 5 to August 8, 2008. The program complemented additional environmental studies being completed by AECOM Canada Ltd. at the site as part of a larger risk evaluation for the closed operations. Geochemical sampling focused on three (3) main areas:

- Tailings Area #1;
- Shear Lake Waste Rock; and
- Airstrip

Following this introduction, Chapter 2.0 provides a detailed description of the field sampling methods and laboratory methods. The study results and discussion are presented in Chapter 3.0 and provides a detailed discussion of tailings, waste rock and airstrip material geochemical characteristics; tailings porewater characteristics; results of a preliminary risk evaluation on future exposure of submerged tailings materials and analysis of existing waste rock seepage conditions. The most salient conclusions of the report are presented in Chapter 4.0.

2. Methods

2. Methods

The following sections summarize the methods employed to obtain geochemical samples and analyses of Cullaton Lake mine waste material. Samples of tailings solids, tailings porewaters, Shear Lake waste rock and material from the Cullaton airstrip were collected during various sampling campaigns during the summer of 2008. Waste rock and airstrip material were collected in June 2008 and tailings solids and porewater samples were collected in early August 2008.

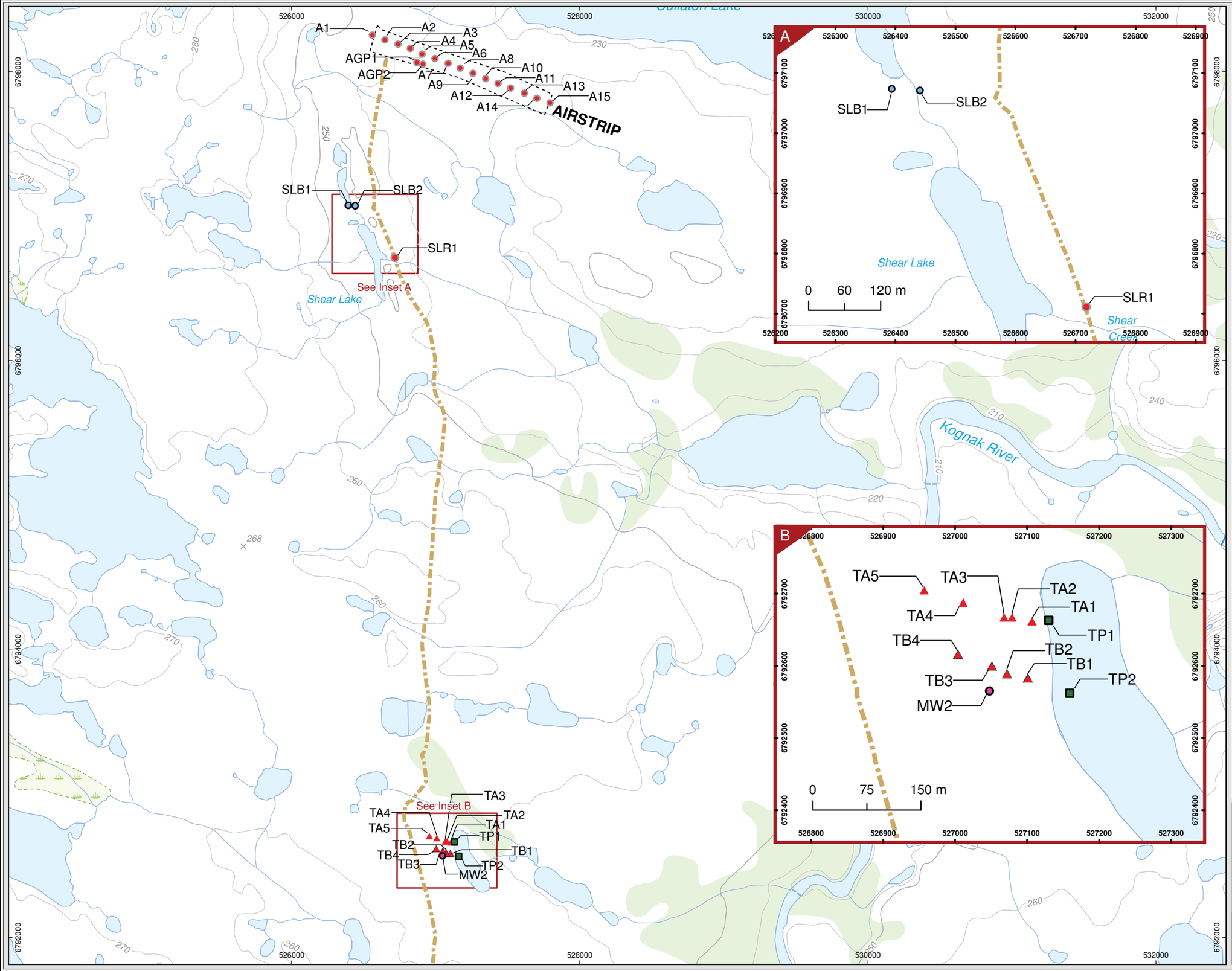
2.1 Sampling Locations

Figure 2-1 illustrates the geochemical sampling locations at the Cullaton Mine site area. Detailed insets are provided on the figure to highlight sampling locations adjacent to Shear Lake and Tailings Area #1. A more detailed description of the sample locations for each of the areas is provided below.

2.1.1 Tailings Area #1

Two sampling transects to collect tailings and porewater samples were completed in Tailings Area #1 (Figure 2-1 and Figure 2-2). Stations were selected at increasing distance, upgradient of the tailings pond. In general, stations were established approximately 30 m apart. Transect A consisted of five sampling locations (TA-1 to TA-5) and Transect B consisted of 4 sampling locations (TB-1 to TB-4). Five stations could not be completed along transect B as the presence of excessive waste rock prevented subsurface sampling. Transect A was dominated by Shear Zone tailings material, while Transect B was within B-Zone tailings material.

Sampling of historically installed piezometer also occurred at MW-2 (Figure 2-2). The piezometer was not functioning as a groundwater well, although saturated B-Zone tailings material was present in the PVC standpipe.



Legend

- Airstrip and Road Samples
- Shear Lake Wate Rock Samples
- Tailings Transects
- Tailings Pond Transect
- Previous Sampling Locations

Base Mapping

Contours
- Index (50m)
- Intermediate (10m)

Hydrology
- Waterbody
- Watercourse

- Vegetation
- Wetland
- Road (decommissioned)

N W E S

0 0.25 0.5 0.75 1 Km

1:25,000
UTM Zone 14N, NAD 83

Map Sources/Notes:
- Base data: National Topographic Database (NTDB) compiled by Natural Resources Canada (NRCan), The Government of Canada, at 1:50,000 scale
- Sampling performed by Gartner Lee Ltd., June 2008
- Road GPS-tracked by Gartner Lee Ltd., June 2008
- Airport footprint approximate; for reference purposes only

Barrick Gold
Project: Cullaton Lake Project
Location: Nunavut

2008 Lorax Waste Rock and Tailings Sampling Locations

File Name: 861Map20090330.mxd
Date Issued: Mar, 2009
Project Number: J861

LORAX ENVIRONMENTAL

Figure 2-1

File Location: \\pst\Home\Public\Projects-Active\861 (Cullaton Lake)\GIS Files\861Map20090330.mxd
Date Revised: March 30, 2009
Date Plotted: March 30, 2009

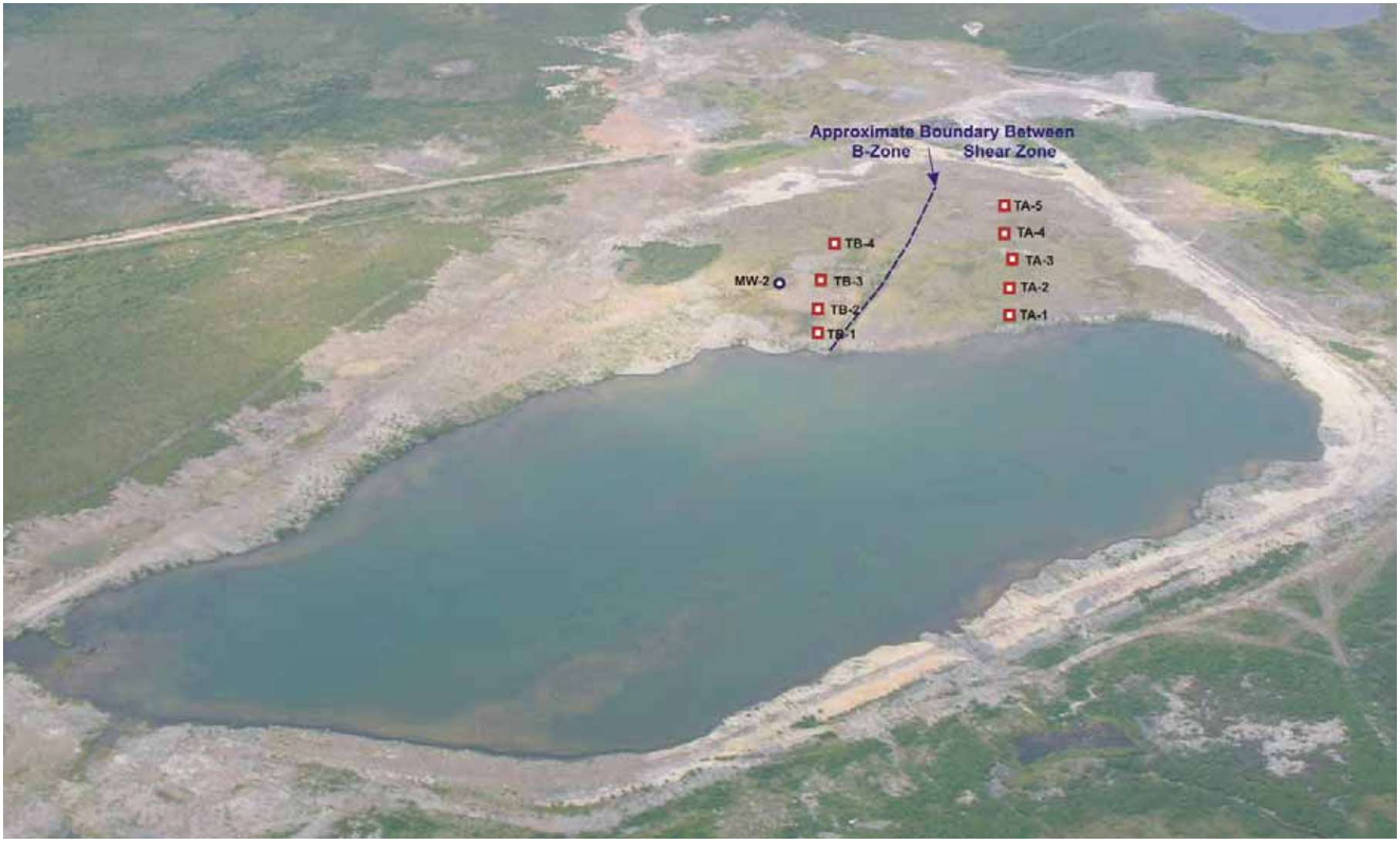


Figure 2-2: Detail of Sampling Transects within Tailings Area #1

2.1.2 Shear Lake Waste Rock and Airstrip

Sampling of waste rock material in the vicinity of Shear Lake occurred in June 2008. Samples of waste rock within the relocated dump was not possible; however, exposed waste rock used to build the road and causeway, separating Shear Lake and the small upgradient lake, was sampled. A total of three locations, adjacent to Shear Lake were used to sample waste rock for geochemical characterization (Figure 2-1 and Figure 2-3).

Figure 2-3: Detail of Waste Rock Sample Locations Adjacent to Shear Lake

In addition, a transect along the crest of the covered waste rock dump was completed in order to sample till cover material for moisture content analysis (Figure 2-1).

A total of 15 sample locations were established on the Cullaton Lake airstrip, with material collected for solid-phase analyses (Figure 2-1).

2.2 Field Sampling Methods

Descriptions of the field sampling methods employed during the geochemical characterization program are provided below.

2.2.1 Tailings Area #1

Cullaton Lake subaerial tailings are covered by approximately 0.6 to 1.0 m of glacial till. In order to obtain samples of tailings material for solid phase analysis and to potentially extract porewaters, coring was employed. A description of the coring process is described below.

2.2.1.1 Coring for Solid Phase and Porewater Collection

A gas-powered Pionjar, equipped with 1 m length of steel-casing and a butyrate core sleeve was used for the collection of *in-situ* tailings samples (Figure 2-4). The Pionjar collected a continuous core until refusal, although significant material compression was noted in each core.

Figure 2-4: Operation of Pionjar Core Sampler at Station TA-1 at the Tailings Impoundment

Core samples were logged, labeled and immediately placed into a cooler filled with dry-ice and frozen immediately (Figure 2-5).

Split-spoon sampling was also performed using the Pionjar and was employed to obtain additional sample of solid-phase material, to provide sub-surface access for oxygen measurements and to provide a depth indication of permafrost location (Figure 2-6). The split-spoon sampling device is more durable than the butyrate coring sampler and could be advanced a slightly greater depth into the top of the permafrost without risk of shattering.

Figure 2-5: Example of Tailings Core Collected at Station TA-4 Prior to Freezing. Reddish Brown Tailings Indicate Shear Zone Material Between 6 cm and 40 cm. Dark Grey B-Zone Tailings at Base of Core; Till Material is above 40 cm.

Figure 2-6: Example of Tailings Material Collected with Split-Spoon Sampler at TA-5. Shear Zone Tailings are Visible as Reddish Brown Tailings.

Tailings material was also collected from within piezometer MW-2. The piezometer had been lifted, presumably through permafrost heave such that the piezometer could be easily removed from the installation. Upon removal of MW-2, a significant amount of tailings material was extracted from the base of the piezometer (Figure 2-7). This material was immediately placed in a polyethylene sample bag and frozen immediately.

Figure 2-7: B-Zone Tailings Material Collected from MW-2.

2.2.1.2 Oxygen Profiling

For the measurements of oxygen, a mini-electrode (model MI-730; Figure 2-8) and meter (model OM-4; Figure 2-9) were used. The oxygen electrode consists of an internal silver reference electrode to which an acrylic housing (containing an electrolyte) with a Teflon membrane is attached. The oxygen electrode has a total length of 8.6 cm and a diameter of 3 mm. The sensitivity of the electrode is 1,700 pA in air at 25 ^{o}C. The O_2 consumption rate in air at 25 ^{o}C is $2.5 \cdot 10^{-4}$ µL/hr.

Prior to use in the field, the oxygen electrode was checked and calibrated with humidified gasses using nitrogen (0% O_2) to zero the meter and air (21% O_2) to calibrate the meter. Repeated measurements of the O_2 concentration indicated that the precision of the measurements is ± 0.5% O_2.

Figure 2-8: Oxygen Mini-electrode

Figure 2-9: Set-up of Oxygen Meter Profile Apparatus

To prevent damage to the mini-electrode when inserted into the till or tailings material, a stainless steel probe tip that holds the electrode assembly was designed (Figure 2-10). A close-up of the stainless steel probe with solid tip and two air access holes at opposite sides is shown in Figure 2-11. The probe is screwed onto a 1-m steel extension rod that holds the electrode cable that is connected to the oxygen meter.

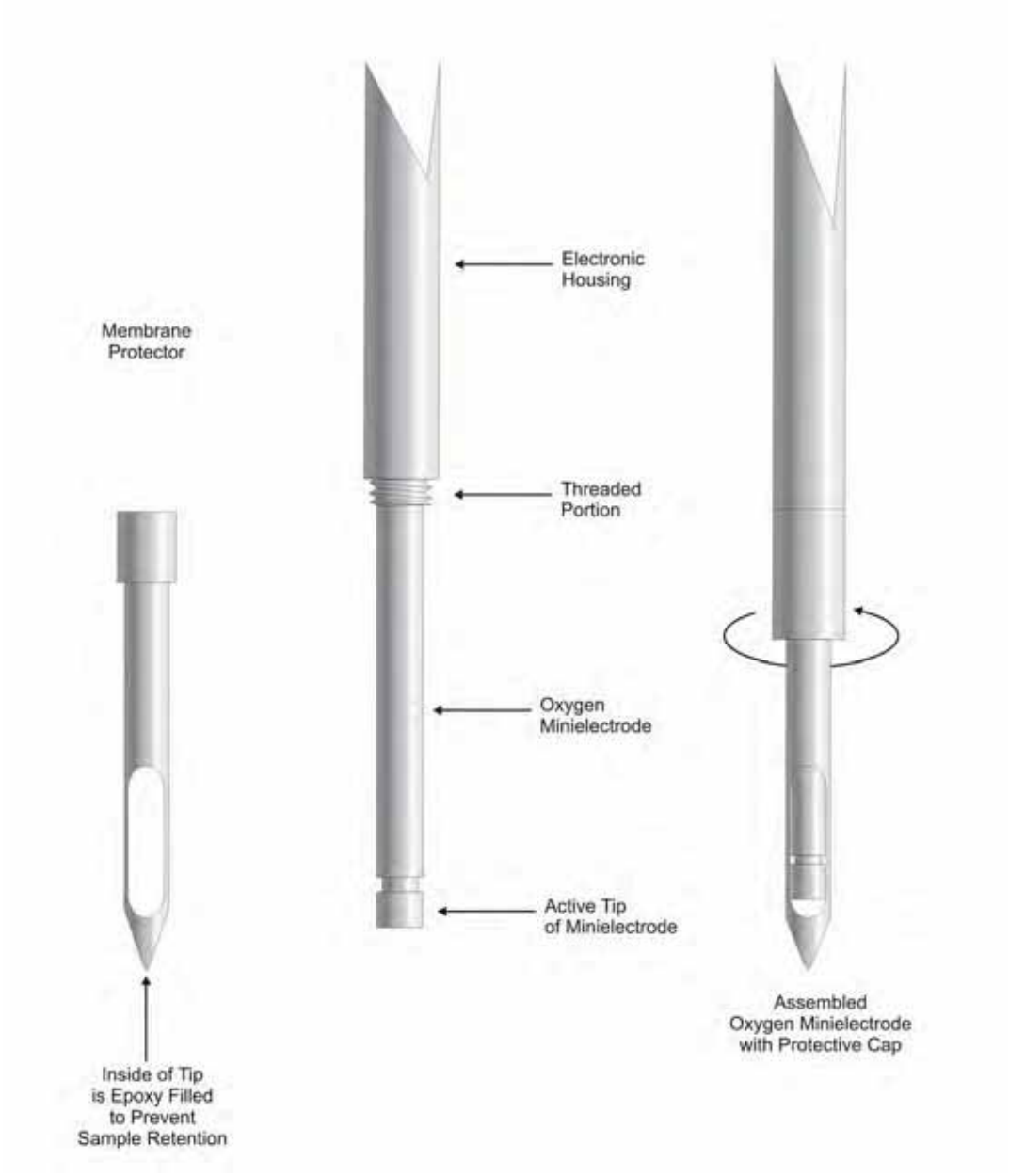


Figure 2-10: Oxygen Mini-electrode Assembly

Figure 2-11: Tip of Mini-electrode Assembly

At each measurement site the probe with the electrode assembly was calibrated using ambient air (21% O_2). The oxygen concentration within till and tailings material was measured at specific depth intervals, generally up to a maximum depth of 1 m. For each measurement depth, the hole was prepared by using the Pionjar equipped with a split-spoon sampler. The split-spoon was drilled to the desired depth and the core removed allowing the oxygen probe system to be lowered into the hole. The probe was pushed a little further down and once the oxygen readings stabilized (approximately 10 minutes), the oxygen concentration was recorded. Oxygen profiling occurred at stations TA-1, TA-3, TA-5, TB-1 and TB-3; profiling was not possible at the other stations owing to rock material present in the till preventing insertion of the probe.

2.2.2 Shear Lake Waste Rock and Airstrip

Waste rock samples immediately adjacent to Shear Lake, along the cause-way and road, as well as along the Cullaton airstrip were collected by hand using a shovel. Approximately 4 kg of sample material (less than 1 cm) at each location was collected and filled into polyethylene sample bags and shipped to Vancouver, BC.

2.3 Laboratory Methods

2.3.1 Porewater Extraction from Tailings

Collection of porewater samples from frozen core material was performed back in the laboratory of the offices of Lorax in Vancouver. Core samples containing B-Zone and Shear Zone tailings material were placed inside a nitrogen-filled glove bag to prevent potential oxidation artifacts within the samples. Tailings material was permitted to thaw completely prior to sectioning. The extraction of porewaters was attempted on tailings samples collected from each core; however, only sufficient porewater was produced from combining TA-2 and TA-4 (oxidized Shear Zone tailings) and tailings from within MW-2 (B-Zone tailings).

About 250 g of combined tailings from TA-2 and TA-4 were placed in a 250 ml Nalgene bottle in a nitrogen filled glove bag. The bottle was sealed then centrifuged at full speed (~2500 rpm) for 30 minutes. Approximately 5 mL of water extracted and decanted into an acid washed syringe fitted with a 0.45 µm filter, filtered into 10 mL acid-washed Nalgene bottle, and preserved with 50 µL of concentrated, ultra-pure HNO_3. Sample from TA-4 was analyzed for dissolved metals at Maxxam Analytics in Vancouver.

Approximately 1 kg of tailings from the piezometer was used. Four, 250 mL Nalgene bottles were filled and spun at full speed (~2500 rpm) for 30 minutes. From this, only approximately 6 mL of water could be decanted. The sample decanted into an acid washed syringe fitted with a 0.45 µm filter, filtered into 10 mL acid-washed Nalgene bottle, and preserved with 50 µL of concentrated, ultra-pure HNO_3. The sample, MW-2 was analyzed for dissolved metals at Maxxam Analytics in Vancouver.

2.3.2 Static Testing

This section outlines the analytical procedures used by SGS – CEMI for static testing. Static testing includes analysis for paste pH, inorganic carbon concentration, total sulphur concentrations, sulphide sulphur concentration, sulphate sulphur concentration, insoluble sulphur concentration, siderite corrected neutralizing potential measurements, and solid phase metals.

Sample Preparation

The samples were air dried and mixed but not crushed. Each sample was mixed by passing through a ½ inch splitter box and recombining. A 250 g split was taken for shake flask extraction on the original material. A 200 g split was made and pulverized in a ring pulverizer to 80% -200 mesh. Splits of the pulverized sample were then submitted for analysis.

Paste pH

Paste pH was conducted according to the procedure by Sobek A., *et. al.,* 1978 "Field and Laboratory Methods Applicable to Overburdens and Minesoils" (Report EPA-600/2-78-054).

Siderite Corrected Neutralization Potential

Acid base accounting was conducting according to Method 3: Modification of Conventional EPA Neutralization Potential Determination by Addition of Hydrogen Peroxide. The procedure is outlined in MEND Project 1.16.1c, 1991.

Total Sulphur and Carbon

Inorganic carbon was determined by Acme using a direct analysis method. In this procedure a known weight of sample is placed in a closed vessel with hydrochloric acid and heated to approximately 90^{o}C to evolve carbon dioxide from the sample. The gas is then purged into a Leco analyzer where the concentration of CO_2 is determined by an infrared detector.

Sulphate Sulphur

Sulphate-sulphur was determined by IPL Labs Ltd. by the procedure outlined in ASTM D2492-02, "Standard Test Method for Forms of Sulfur in Coal". In this procedure sulphate sulphur is dissolved with hydrochloric acid and measured gravimetrically after precipitation of barium chloride.

Sulphide Sulphur

Sulphide sulphur was also determined by IPL Labs Ltd. The residue from the sulphate-sulphur determination was leached with 1:7 nitric acid to water, according to the procedure by Sobek, 1978. The oxidized sulphide was then determined gravimetrically after precipitation with barium chloride.

Insoluble Sulphur

Insoluble-S is acid insoluble and is determine by the difference between total-S and the other measured forms of sulphur:

Insoluble-S (%) = Total-S (%) – (Sulphate-S (%) +Sulphide-S (%))

Solid Phase Metals

Total metals were conducted at Acme on the pulverized sample by digesting 0.500 g in aqua regia at 95oC for one hour. The extract is then diluted to 10.0 mL and analysed for metals by inductively coupled plasma – mass spectrometry (ICP-MS).

Shake Flask Extraction

The shake flask extraction was conducted according to the procedure by Price, W. A. "Draft Guidelines and Recommended Methods for the Prediction of Metal Leaching and ARD at Minesites in British Columbia". A 250 g split of original uncrushed material was agitated on a gyratory shaker for 24 h with 750 mL of nanopure water. The leachate was then filtered through 0.45 micron filter paper and analysed for metals by ICP-MS and mercury by cold vapour AA. Sulphate and pH were also determined. Sulphate was determined by the turbidimetric method as outlined in "Standard Methods for the Examination of Water and Wastewater" 20th Edition, APHA, 1998.

2.3.3 Dissolved Metal Analysis in Porewaters

All porewater analyses were conducted using small-volume methods at Maxxam Analytics. Metal analysis were performed according to procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Determinations of metal concentrations in the in porewaters were performed using inductively-coupled plasma mass spectrometry (ICP-MS). Pure (99.998%) ICP-grade argon was used as the plasma and carrier gas. Operating conditions were optimized daily to obtain maximum sensitivity. Concentrations of the respective metals were calculated using a linear calibration curve derived from certified metal standards.

3. Results and Discussion

3. Results and Discussion

The following chapter presents the results of the geochemical sampling program at Cullaton Lake and provides a discussion of the three primary areas evaluated including the Tailings Area #1, Shear Lake waste rock area and the airstrip.

3.1 Tailings Area #1

Results from the sampling and investigations within the Tailings Area #1 are discussed in this section. An initial description of the key physical observations of the tailings impoundment, including observed till cover thickness, depth to permafrost and oxygen concentration profiles are provided. A discussion of the solid-phase chemistry results precedes a description of the porewater results for the B-Zone and Shear Zone tailings. Finally, a preliminary risk evaluation is performed which calculates loadings to the tailings impoundment considering a scenario in which the elevation of the tailings pond is lowered substantially, exposing uncovered tailings material along the impoundment perimeter. The assumptions used in the evaluation and the predicted pond chemistry are provided.

3.1.1 Physical Characteristics

Coring within the subaerial tailings along two transects was conducted to collect *in-situ* tailings samples as well as to evaluate the physical characteristics of the reclaimed covered tailings. Split-spoon coring and sampling was performed and permitted determinations of cover thickness, depth to permafrost and oxygen concentrations in the cover and unsaturated tailings.

Consistent with the information provided in BGC (2006) the measured thickness of the till cover material is variable and appeared to be on the order of 0.6 to 0.9 m thick (Table 3-1). The depth to permafrost, as determined by coring refusal depths, was highly consistent across the impoundment area at approximately -1.6 m depth (Table 3-1). While refusal did occur occasionally when rock was encountered in the till; all determinations of permafrost depth were confirmed by the presence of frozen tailings material at the tip of the split spoon and the reported depths are considered reliable.

Table 3-1:
Summary of Physical Characteristics of Tailings Cover

Station	Cover Thickness (m)	Depth to Refusal (m)	Thickness of Unfrozen Tails	Reading Depth (cm)	% O_2
TA-1	~0.5	-1.65	1.15	-10 -20 **-30** -40 -50 **-60** -70	 15.9 15.4
TA-3	~0.9	-1.63	0.73	-10 -20 **-30** -40 -50 **-60** -70 -80 **-90**	 15.4 13 9.5
TA-5	~0.8	-1.61	0.81	-10 -20 **-30** -40 -50 **-60** -70 -80 **-90**	 13.2 11 8.4
TB-1	~0.6	-1.66	1.06	-10 -20 **-30** -40 -50 **-60** -70	 16.3 10.5
TB-3	~0.8	-1.61	0.81	-10 -20 **-30** -40 -50 **-60** -70 -80 **-90**	 12.5 12 saturated

till cover
tailings

The most recent determinations were made in early August 2008 and it may be that the complete summer thaw depth had not yet been reached. However, these more recent data are in general agreement with historical observations made by Trow in September 1990, where permafrost was interpreted to be encountered at approximately -1.4 m depth (BGC, 2006 pg 22). The Trow data were collected prior to any reclamation activity on the site and approximately five years post cessation of tailings deposition in 1985.

While a significant depth of tailings remain unfrozen (~0.8 to 1.0 m), the depth to permafrost would appear to be notably shallower than the last measurements made immediately following cover placement in the mid-1990's which observed frozen conditions at approximately 2.3 m depth (BGC, 2006).

Oxygen profiling at five sampling stations revealed that, while oxygen concentrations in the till cover and tailings decreased from atmospheric levels, the till cover does not significantly limit oxygen penetration to the underlying tailings. These measurements are consistent with the general scientific consensus surrounding oxygen-limiting, low permeability dry cover systems: that the cover systems are generally not effective at limiting the ingress of oxygen to levels sufficiently low to inhibit sulphide oxidation.

3.1.2 Acid-Base Accounting

Acid-base accounting (ABA) involves a suite of static tests that are utilized as predictors for acid drainage potential. Measurements included in ABA static tests are acid potential (AP) and neutralizing potential (NP) of a sample. An accounting technique is used to compare the AP and NP with standard criteria thereby giving an indication of a sample's theoretical acid generation potential.

In order to facilitate the accounting technique used, both AP and NP are reported in comparable and consistent units of kg $CaCO_3$/tonne of rock or tailings. Since the generation of acid is predominantly by the oxidation of sulphide minerals, the amount and form of sulphur-bearing mineralization needs to be determined. The oxidation of pyrite produces acid, by the following net reaction,

$$FeS_{2(s)} + 15/4\,O_{2(g)} + 7/2\,H_2O \longrightarrow Fe(OH)_{3(s)} + 4H^+ + 2SO_4^{2-}$$

Acid produced by the above reaction is neutralized by calcite following the reaction,

$$CaCO_{3(s)} + 2H^+ \longrightarrow Ca^{2+} + H_2O + CO_2$$

The two reactions listed above indicate that the 2 moles of acid generated per mole of sulphur in pyrite is neutralized by 1 mole of calcite. If calculated on a weight basis, the acid produced by 1 g of S is neutralized by 3.125 g of calcite. Therefore, since sulphur concentrations are usually reported as a weight percent, neutralization of a material containing 1% acid generating sulphur is reported as 31.25 kg $CaCO_3$ per tonne of acid generating equivalents. In other words:

AP = [Sulphur content (wt. %)] x [31.25 kg $CaCO_3$/tonne rock]

Solid phase acid base accounting (ABA) results for B-Zone and Shear Zone tailings are presented in Table 3-2.

Table 3-2:
Summary of Acid Base Accounting Results for B-Zone and Shear Zone Tailings

Sample ID	Tailings Material	Paste pH	TIC %	$CaCO_3$ NP	C(T) %	S(T) %	$S(SO_4)$ %	S(S-2) %	Insoluble S %	Theoretical Sulphide-S	AP	MEND NP	Net NP	NPR
MW2 Piezo	**B-Zone**	7.47	1.17	97.5	1.38	2.24	0.04	1.44	0.76	2.20	68.8	45.3	-23.5	0.7
TA2+TA4 UN		7.27	2.15	179.2	2.42	3.86	0.15	2.06	1.65	3.71	115.9	118.8	2.9	1.02
TA5-UN		6.65	2.01	167.5	2.36	2.74	0.59	1.34	0.81	2.15	67.2	77.7	10.5	1.16
TB1-UN		7.77	1.65	137.5	1.88	2.2	0.07	1.83	0.30	2.13	66.6	95.8	29.2	1.44
TA3-OXI	**Shear Zone**	7.51	0.08	6.7	0.17	0.42	0.04	0.38	<0.01		11.9	5.1	-6.8	0.43
TA4-OXI		7.25	0.07	5.8	0.16	0.46	0.08	0.38	<0.01		11.9	4.1	-7.8	0.35

Note:

AP = Acid potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material. AP is determined from (Total S - Sulphate-S)*31.25

NP = Neutralization potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material. Acid addition based on TIC content.

NET NP = NP - AP

Carbonate NP is calculated from TIC originating from carbonate minerals and is expressed in kg $CaCO_3$/tonne.

Sulphate Sulphur determined by 25% HCL with Gravimetric Finish

S(S-2) determined by Sobek 1:7 Nitric Acid with Gravimetric Finish. Targets measurement of pyritic sulphur

Insoluble S is acid insoluble S (Total S - (Sulphate S + Sulphide S)).

3.1.2.1 Paste pH

Paste pH values are useful in that they provide information on the amount and availability of neutralizing potential in a sample by indicating whether or not a sample was actively producing net acidity prior to sampling. Paste pH values for B-Zone tailings ranged from 6.6 to 7.7 and from 7.2 to 7.5 for Shear Zone tailings, indicating that no samples were actively generating acid prior to sample collection.

3.1.2.2 Sulphur Speciation

As mentioned in the introduction, acid base accounting is a method used to determine the balance between NP, which is typically composed of carbonates and, to a lesser extent aluminosilicate minerals, and AP, which is based on the sulphur content of a sample. However, when considering the acid rock drainage (ARD) potential of a geological material it is important to not only consider the amount of sulphur, but also the forms of sulphur present. There are four forms that sulphur can be present in geological materials, namely: sulphate, sulphide, organic, and native (or elemental). Since acidic drainages at mine sites are typically generated from the oxidation of sulphide minerals, total sulphur measurement is not always an accurate way to predict the acid generating potential of a sample. The estimation of total acid potential (AP), as determined by the total sulphur in a sample, assumes that all sulphur measured is in the form of pyrite and would oxidize completely, forming sulphate and iron hydroxide [$Fe(OH)_3$]. However, when a significant portion of the total sulphur measured is present as non-acid generating forms of sulphur, sulphide sulphur provides a more accurate estimation of acid generating capacity.

B-Zone and Shear Zone tailings samples were analyzed for their pyritic sulphur content (Table 3-2). If sulphate and pyrite were the only two forms of sulphur present in the tailings samples, then their sum should equal total sulphur. However, this is not the case for the B-Zone tailings since there is an apparent residual, or insoluble, sulphur content in the four tailings samples. While mineralogic data is not available for the B-Zone tailings samples, geological reports do not indicate any native sulphur at Cullaton Lake. However, other sulphide minerals such as arsenopyrite and chalcopyrite are known to occur in the tailings deposits. Therefore, given that there is very little sulphate sulphur, and based on the assumption that there is no elemental or organic forms of sulphur present, a theoretical sulphide sulphur content for B-Zone tailings samples was calculated by subtracting sulphate sulphur from the total sulphur. The results of this calculation are reported in Table 3-2. The calculated sulphide sulphur concentration is most likely a more realistic measure of the AP of the B-Zone samples. However, while still capable of generating acidity, many non-pyrite sulphide minerals have a reduced acid generating

potential relative to pyrite. Therefore, since calculation of AP (= sulphide S % * 31.25 kg $CaCO_3$/t) assumes that all sulphide sulphur is present as pyrite, it should be noted that the use of calculated sulphide sulphur values provides a conservative estimate of the acid generation potential of the B-Zone tailings samples.

For the Shear Zone tailings, no residual "insoluble" sulphur was present and AP was determined by use of the pyritic sulphur (S (S-2).

Consistent with data collected by others, the B-Zone tailings contain approximately 2.0 to 3.0% total sulphur, whereas of which roughly 1.3% to 2.0% exists as pyritic-sulphur. A significant quanitity of insoluble sulphur exists in the B-Zone samples. In contrast, Shear Zone tailings contain notably less total sulphur (0.45%), although most of the sulphur can be accounted for as sulphide-sulphur (0.38%).

3.1.2.3 Neutralization Potential

In sulphide-bearing rock or tailings undergoing weathering, ARD will result only if there is insufficient production of neutralizing alkalinity (*i.e.* an imbalance between acid generating and alkalinity-producing reactions). The neutralizing potential (NP) of weathering materials is dependent on the content of minerals that dissolve when exposed to acidic conditions and act to buffer acidity. While many mineral dissolution reactions can be thought of as acid buffering, the minerals most typically responsible for acid neutralization are fast dissolving carbonates. However, slower dissolving silicate or aluminosilicate minerals may also contribute to the total neutralizing capacity.

Both MEND and carbonate NP values were determined for the tailings samples. MEND NP is obtained by titration using the method of Sobek et al. (1978) modified with the addition of hydrogen peroxide, while the carbonate NP (CaNP) is obtained by converting the inorganic carbon content of a sample to an equivalent amount of $CaCO_3$ per tonne of rock. This calculation assumes that all the inorganic carbon is present as calcite. It is important to note that MEND NP values provide information on the bulk NP of a sample and are not mineral specific, whereas CaNP values provide information on the specific contribution of carbonate minerals to the neutralization potential of a sample. Therefore, if a significantly more amount of NP is indicated to be present from MEND NP values than from CaNP values, it is important to determine the identity and amount of the minerals contributing to a higher bulk NP, as well as their dissolution kinetics.

<u>MEND NP</u>

Table 3-2 indicates that the majority of B-Zone tailings samples contain moderate to very high (40 to >70 kg $CaCO_3$/t) amounts MEND NP; whereas Shear Zone tailings have very low to non-existent quantities (~5 kg $CaCO_3$/t) of MEND NP. The B-Zone data are

generally consistent with what has been reported elsewhere by CANMET; however, the present dataset contains samples with much higher NP. The MEND NP values measured in Shear Zone samples are consistent with previous observations of this material.

While it is important to determine the minerals that comprise the AP of a sample, it is equally, if not more important to gain an understanding of the minerals responsible for the NP of a sample because it is the dissolution kinetics of specific minerals that determines a samples ability to neutralize acid in the short and long term. For example, carbonate minerals, which are very reactive, are effective at immediately neutralizing acid while aluminosilicate minerals, which are slower reacting, may help to neutralize acidity in the long term. Therefore, in order to more fully understand the long-term behavior of tailings at Cullaton Lake, it is important to consider the NP mineralization in these materials.

CaNP

The effectiveness of carbonates in neutralizing the acidity generated from the oxidation of sulphide minerals varies with carbonate-mineral composition. For example, Fe(II)-bearing carbonate minerals, such as siderite and ankerite, are much less effective at neutralizing acid than calcite or dolomite. This is due to the fact that the Fe^{2+} liberated as these minerals dissolve is oxidized to Fe^{3+}, which then precipitates as $Fe(OH)_3$ producing acidity in the process. Therefore, although Fe-bearing carbonate minerals contribute to the neutralizing potential of a sample, the net capacity of a sample to neutralize acid decreases as the amount of Fe-bearing carbonates increases. As a result, not only is it important to determine the amount of carbonate present in a sample, but it is also important to determine the types of carbonate minerals present, if possible.

Table 3-2 illustrates that very high amounts of CaNP (e.g. greater than 100 kg $CaCO_3$/t) are present in B-Zone tailings, with little to no CaNP present in Shear Zone tailings. For the B-Zone tailings samples, significantly greater CaNP was measured as compared to MEND NP. These data indicate that other carbonate minerals, such as Fe-bearing carbonate minerals ankerite and siderite, are present which are not contributing fully to the measured NP. These data are consistent with previously published information from Trow (1991) whom indicated that non-sulphide gangue minerals included quartz, magnetite, siderite, ankerite, iron silicates and chert.

3.1.2.4 Net Potential Ratio

The net potential ratio (NPR) is often used to assess the likelihood of a sample to generate acid. The NPR is calculated by dividing the neutralizing potential (NP) of a sample by its acid potential (AP). ABA screening criteria from two regulatory agencies

have been included in this discussion to provide insight on what is considered acid generating by the British Columbia Ministry of Energy and Mines and Indian and Northern Affairs Canada.

The province of British Columbia has developed and adopted a scheme to evaluate the likelihood that a sample will generate acid, based on its NPR value (Table 3-3).

Table 3-3:
British Columbia Acid-Base Accounting Screening Criteria (from Price, 1997)

Potential for ARD	Criteria	Comments
Likely	NPR < 1	Likely ARD generating unless sulphide minerals are non-reactive
Possibly	1 < NPR < 2	Possibly ARD generating if NP is insufficiently reactive or is depleted at a faster rate than sulphides
Low	2 < NPR < 4	Not potentially ARD generating unless significant preferential exposure of sulphides along fracture planes, or extremely reactive sulphides in combination with insufficiently reactive NP
None	NPR > 4	

The Department of Indian Affairs and Northern Development issued draft guidelines for ARD prediction in the North (DIAND, 1992) which state that samples with a neutralization potential 3 times greater than the acidity potential can be considered acid consuming. Samples with less than a 1:1 ratio are likely to generate acidity. However, samples with ratios within the range of 1:1 to 3:1 are neither clearly acid generating nor acid consuming due to other factors that influence acid generation potential.

While these screening criteria are generally accepted for waste rock, the nature of mill tailings suggests slightly less stringent criteria could be applied. Because tailings are considered to be finer grained and more homogeneous, with both acid producing minerals and acid consuming minerals in close association, cut-off criteria in the range of 1.2 to 1.5 are often suggested NPR values that represent the low likelihood for developing acidic conditions in mill tailings.

As discussed in Section 3.1.2.2, B-Zone tailings samples contain an “insoluble” form of sulphur that is not amenable to detection using the methods utilized in this investigation. Therefore, based on mineralogic and geologic observations of the presence of non-pyrite sulphide mineralization and the lack of native sulphur, it has been assumed that this “insoluble” sulphur is present as sulphide minerals including arsenopyrite and chalcopyrite. Therefore, in calculating the NPR, theoretical sulphide sulphur (= total sulphur – sulphate sulphur) contents, rather than pyritic sulphur contents, have been used to calculate AP. As well, it has been established that the NP of B-Zone tailings samples

are comprised of significant amounts of Fe-bearing carbonates. As such, to maintain conservative estimates of acid generation potential in B-Zone tailings, MEND NP values are used in the calculation of NPR. The same calculations were also applied to Shear Zone tailings samples.

The NPR values for B-Zone tailings samples ranged from 0.7 to 1.4, suggesting that a portion of the deposited B-Zone samples would be considered likely to be acid generating at some point in time. The data also suggest that some of the B-Zone tailings would likely not be net acid generating. The very low NPR values (less than 0.5) for Shear Zone samples indicates this material to have the likely potential of being acid generating.

In the absence of kinetic data, it is not possible to determine if the B-Zone samples collected would be acid generating at some point in time; however, the onset to NP depletion would likely take a significant period of time given the climate conditions at Cullaton Lake. In direct contrast, Shear Zone tailings do not have readily available forms of neutralization potential available to neutralize acidity generated from sulphide oxidation.

3.1.3 Solid Phase Metals

Data obtained from aqua-regia leach of tailings samples are used to provide information on identify which metals are enriched in a given sample, which can be used in combination with ABA data to help estimate the geochemical properties of tailings from Cullaton Lake. Table 3-4 presents B-Zone and Shear Zone tailings metal abundances obtained from aqua-regia digestion. An indicator of significant solid-phase enrichment is assigned arbitrarily herein to be values greater than or equal to three times the crustal abundance. These values are indicated as shaded cells in Table 3-4. However, solid-phase metal concentrations well above crustal abundance do not conclusively indicate that the metal will be leached at a high rate from the material. The rate of metal leaching is related to the metal's mineralogical association and the aqueous geochemistry of the infiltrating waters. Thus, metal concentrations that are elevated above crustal abundance may still be released at low or undetectable rates.

Solid phase metal concentrations between the two tailings types are significantly different for certain parameters (Table 3-3). For example, B-Zone tailings contain very elevated concentrations of As (700 to 1500 mg/kg), whereas Shear Zone tailings contain considerably less As (~50 mg/kg). Both tailings types are considered to be enriched in As and the very high As concentrations in the B-Zone tailings are consistent with the presence of arsenopyrite.

Table 3-4:
Summary of Solid Phase Metal (mg/kg) Results for B-Zone and Shear Zone Tailings

Sample ID	Tailings Material	As ppm	Sb ppm	Cd ppm	Cu ppm	Co ppm	Cr ppm	Fe %	Pb ppm	Mo ppm	Mn ppm	Hg ppm	Ni ppm	Se ppm	Ag ppm	U ppm	Zn ppm
MW2 Piezo	B-Zone	1263.6	0.9	<0.1	47.8	12.1	82	14.82	96.1	2.7	807	<0.01	24.1	1.9	0.4	0.4	22
TA2+TA4 UN		1508.2	0.9	0.1	48.2	11.6	53	18.02	103.5	2.2	1116	0.01	28.1	2	0.1	0.3	27
TA5-UN		1563.7	0.8	<0.1	47.9	11.1	83	16.29	76.7	2.2	1349	0.01	26.7	1.7	0.2	0.3	26
TB1-UN		709	0.8	0.1	56.1	13.7	84	12.21	198.6	2.7	1010	<0.01	30.4	1.4	0.2	0.6	34
TA3-OXI	Shear Zone	64.6	0.9	<0.1	18.2	11.1	121	2.45	82.2	3.2	222	<0.01	14.3	0.6	<0.1	0.8	7
TA4-OXI		43.6	1	<0.1	18.6	13.4	159	2.67	124.4	4.4	209	0.01	16.2	0.5	<0.1	1.2	7
Average Crustal Abundance		**1.8**	0.2	0.15	60	25	102		**12.5**	1.5	950	**0.08**	84	**0.05**	0.075	**2.7**	70

reported value 3x in excess of crustal abundance

Average crustal abundance values from Price (1997), except for **bold** values, which are from Demayo (1951).

The data presented in Table 3-4 indicate that the elements that are most consistently elevated in both B-Zone tailings and Shear Zone tailings are As, Sb, Pb and Se. Concentrations of total Cu, Ni and Se are also higher in B-Zone tailings as compared to Shear Zone tailings. The concentration of U in Shear Zone tailings (~1.0 mg/kg) is approximately 2 times greater than observed for B-Zone tailings (~0.5 mg/kg).

3.1.4 Tailings Porewater Chemistry

Small volumes of tailings interstitial (porewater) were extracted from Shear Zone and B-Zone tailings. Table 3-5 presents a summary of the metal and sulphate data generated from this analysis.

Table 3-5:
Summary of Porewater Chemistry for
Shear Zone and B-Zone Tailings

Parameter	Shear Zone Porewater		B-Zone Porewater
Al	0.002		0.002
Sb	<0.0005		<0.0005
As	0.0037		0.0102
Cd	0.00018		0.00001
Cr	<0.001		<0.001
Co	0.0527		0.0025
Cu	0.0013		0.0006
Fe	0.017		0.131
Pb	0.0003		<0.0002
Mn	6.7		0.712
Hg	<0.00002		<0.00002
Mo	0.009		<0.001
Ni	0.162		0.009
Se	0.0007		0.0072
Ag	0.00002		0.00002
Tl	0.00031		0.00031
U	0.0655		0.0013
V	<0.005		<0.005
Zn	<0.005		<0.005
SO_4	2865		540

Note: All units in mg/L ; metals as dissolved

The two tailings types produce significantly different porewater chemistries. Shear Zone porewater was characterized by elevated sulphate, Co, Mn and U concentrations; dissolved Cd was also slightly elevated. Interstitial water from B-Zone tailings material also generated elevated sulphate concentrations (540 mg/L), although these

concentrations were approximately 5 times lower than Shear Zone interstitial sulphate concentrations. The concentrations of dissolved As in B-Zone porewaters were higher (0.0102 mg/L) as compared to that measured in Shear Zone porewaters (0.004 mg/L); however, the concentrations are not considered to be particularly elevated when considering the solid phase inventory of As present (1500 mg/kg) in the B-Zone tailings. Clearly, As in both tailings materials is not particularly soluble under current conditions, irrespective of active sulphide oxidation.

Dissolved Fe and Mn concentrations were also elevated in B-Zone porewater; however, the Mn levels in B-Zone porewater was roughly an order of magnitude lower than observed in Shear Zone porewaters. Similar to As, B-Zone tailings contain a much greater inventory of solid phase Mn as compared to Shear Zone tailings.

Collectively, the dissolved constituents measured in porewaters clearly indicate that sulphide oxidation is occurring in the unfrozen tailings beneath the till cover. The oxygen profiles measured during this sampling campaign provide additional support for the observed sulphide oxidation (as determined by metabolites in porewater) below the till cover. It is not however clear from the data that acid generation is occurring. The very small volumes of porewater extracted from each tailing type did not permit routine measurements of pH and/or alkalinity as all sample volume had to be preserved for metals determination. However, distilled water leach of each tailings type (Appendix A) indicated significant quantities of alkalinity in Shear Zone tailings extract (30 to 50 mg/L $CaCO_3$) and B-Zone tailings extract (30 to 80 mg/L $CaCO_3$). Similarly, the pH of tailings extracts were all circumneutral, even for the Shear Zone material with minimal available NP. It may be that the overlying till cover provides alkalinity to infiltration waters; however, this posit is not currently supported by any direct evidence.

Although some metal parameters are elevated in tailings porewaters, all measured concentrations were well below the MMER Water License limits for those parameters with published criteria (e.g., As, Cu, Pb, Ni and Zn).

3.1.5 Risk Evaluation

In the BGC (2006) mine closure review and evaluation of the reclamation status of Cullaton Lake Mine, the concern was raised that a risk of exposure to atmospheric oxygen of uncovered tailings exists within the tailings pond. Specifically, reviewers noted that the existing till/waste rock cover has a limited subsurface extent over the subaerial tailings (Figure 3-1). It was postulated that natural changes to the water balance, that result in a reduction in the pond water level, could also potentially result in the direct exposure of tailings and the potential for acid generation of the tailings with concomitant water quality degradation within the tailing pond.

Figure 3-1: Subaqueous Boundary Between Uncovered Tailings and Cover Apron

No data appear to exist for the fully acid generating condition of Shear Zone or B-Zone tailings at Cullaton Lake; however direct measurements of tailings porewater chemistry following approximately 20 years of sulphide oxidation (1985 to present) are available from the present study. These data therefore provide a reasonable proxy for possible concentrations that could be observed emanating from exposed tailings resulting from excessive dry periods causing water level reductions.

As presented elsewhere, Northwest Hydraulics Consultants (nhc) was engaged to prepare a water balance for Tailings Pond #1. A component of this program was to prepare a water balance model for Tailings Pond #1 and to use the model to perform a sensitivity analysis to evaluate potential water level reductions assuming extreme dry climate conditions. Specifically, the model was used to compute pond levels arising from three consecutive years of extreme low (drought) runoff – a 100 year low, followed by consecutive 50 year low and 10 year low flow periods. The model results indicated that a lowering of the pond to Elev. 92.5 m, or 0.8 m below the current pond elevation was possible.

Based on the lowered pond elevation, Tailings Pond #1 bathymetry was used to estimate the surface area of exposed, uncovered tailings. Assuming a water elevation of 92.5 m, approximately 13,700 m^2 of tailings would be exposed above the pond water elevation.

To estimate the potential impacts to pond water chemistry, a loading assessment was performed. Based on average precipitation values for Cullaton Lake (e.g. 292 mm/annum), the volume of tailings-impacted water was calculated as:

$$0.292 \text{ m} * 13{,}700 \text{ m}^2 = 4{,}000 \text{ m}^3$$

This volume was then assumed to contain metal concentrations at the highest observed values in porewaters in order to calculate metal and sulphate loadings to the tailings pond. Resultant tailings pond concentrations were then calculated assuming a reduced tailings volume of 51,444 m^3 containing metals and sulphate at pre-loading concentrations equal to the values measured in the 2008 program. The 4,000 m^3 of tailings-affected water was instantaneous loaded into the tailings pond, with all parameters assumed to behave conservatively. The results of this simple modeling approach are summarized in Table 3-6 below and are compared to various water quality criteria.

Table 3-6:
Summary of Predicted Tailings Pond #1 Concentrations Following Exposure of Subaerial Tailings

Parameter	Highest Measured Porewater	Existing Tailings Pond Concentration	Predicted Concentration	CCME[A] PWQO	Water Licence Limits
Al	0.002	0.0186	0.0188	0.1	
Sb	0.0005	0.00007	0.00011	0.02	
As	0.0102	0.00236	0.0032	0.005	0.3
Cd	0.00018	0.000007	0.000021	0.000021	
Cr	0.001	0.0001	0.00018	0.001	
Co	0.0527	0.00148	0.0056	0.0009	
Cu	0.0013	0.00113	0.0012	0.004	0.2
Fe	0.131	0.079	0.09	0.3	
Pb	0.0003	0.000452	0.00048	0.001	0.2
Mn	6.7	0.0165	0.54		
Hg	0.00002	0.00001	0.00001	0.000026	
Mo	0.009	0.00056	0.0013	0.073	
Ni	0.162	0.00095	0.0135	0.15	0.3
Se	0.0072	0.00004	0.0006	0.001	
Ag	0.00002	0.000006	0.00001	0.0001	
Tl	0.00031	0.000003	0.00003	0.0008	
U	0.0655	0.000457	0.0055	0.005	
V	0.005	0.0002	0.0006	0.006	
Zn	0.005	0.0011	0.0015	0.03	0.3
SO_4	2865	190	413		

Note: All units in mg/L

A: Value is the most stringent of CCME or PWQO

The loading assessment indicates that only the parameters Co and U would be predicted to be in excess of the most stringent of CCME or Provincial Water Quality Objectives for Ontario. All parameters regulated by MMER would be present at concentrations well

below Water License criteria. It would appear from this risk evaluation that the potential for short-term degradation of water quality in Tailings Pond #1 would be low.

3.2 Shear Lake Waste Rock

Results from the sampling and investigations of the Shear Lake area waste rock are presented in this section. Acid-base accounting results, solid phase metal analysis and results from distilled water leaching are presented and compared to actual measurements of water quality from seepage water collected during the 2008 sampling campaign.

3.2.1 Acid Base Accounting

3.2.1.1 Paste pH

Paste pH values are useful in that they provide information on the amount and availability of neutralizing potential in a sample by indicating whether or not a sample was actively producing net acidity prior to sampling. Paste pH values Shear Lake waste rock ranged from 3.2 to 3.4, indicating samples were acidic prior to sampling (Table 3-7).

3.2.1.2 Sulphur Speciation

Shear Lake waste rock samples contain relatively low concentrations of total sulphur and ranged from 0.06% to 0.16%, with a significant quantities of sulphate sulphur (0.03% to 0.12%). Little to no sulphide sulphur or insoluble sulphur was present in the waste rock samples (Table 3-7).

3.2.1.3 Neutralization Potential

Consistent with previously reported data, Shear Lake waste rock does not contain any available neutralization potential (Table 3-7). Most MEND NP values were negative and less than detection concentrations of CaNP were observed.

3.2.2 Solid Phase Metals

In contrast to tailings material, Shear Lake waste rock samples generally contain low concentrations of total metals (Table 3-8). Only SLR-1 sample contained slightly elevated As concentrations above typical crustal abundance values; however concentrations of 5 mg/kg to 50 mg/kg are routinely observed in agricultural soils. Total Cr was the only parameter consistently observed above typical crustal abundance values although the values were not considered to be elevated.

Table 3-7:
Summary of Acid Base Accounting Results for Shear Lake Waste Rock

Sample ID	Paste pH	TIC %	$CaCO_3$ NP	C(T) %	S(T) %	$S(SO_4)$ %	S(S-2) %	Insoluble S %	Theoretical Sulphide S	AP	NP	NPR
SLB 1	3.44	0.01	0.8	0.08	0.06	0.05	<0.01	0.01	0.01	0.3	-0.6	-1.9
SLB 2	3.37	<0.01	<0.8	0.16	0.06	0.03	0.02	0.01	0.03	0.9	-0.5	-0.5
SLR 1	3.23	<0.01	<0.8	0.2	0.14	0.12	0.02	<0.01	0.02	0.6	-1.0	-1.6

Note:

AP = Acid potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material. AP is determined from (Total S - Sulphate-S)*31.25

NP = Neutralization potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material. Acid addition based on TIC content.

NET NP = NP - AP

Carbonate NP is calculated from TIC originating from carbonate minerals and is expressed in kg $CaCO_3$/tonne.

Sulphate Sulphur determined by 25% HCL with Gravimetric Finish

S(S-2) determined by Sobek 1:7 Nitric Acid with Gravimetric Finish. Targets measurement of pyritic sulphur

Insoluble S is acid insoluble S (Total S - (Sulphate S + Sulphide S)).

Table 3-8:
Summary of Solid Phase Metal (mg/kg) Results for Shear Lake Waste Rock

Sample ID	As ppm	Sb ppm	Cd ppm	Cu ppm	Co ppm	Cr ppm	Fe %	Pb ppm	Mo ppm	Mn ppm	Hg ppm	Ni ppm	Se ppm	Ag ppm	U ppm	Zn ppm
SLB 1	3.1	0.1	<0.1	3	2.5	174	0.67	7.1	4.2	16	0.01	5.1	<0.5	0.3	0.1	1
SLB 2	2.5	0.2	<0.1	5.2	1.6	185	0.53	4.2	4	23	<0.01	5.2	<0.5	0.3	0.3	2
SLR 1	6.9	0.3	<0.1	9.2	4.2	169	1.61	7.4	3.6	48	0.01	8.7	<0.5	0.2	0.4	5
Ave. Crustal Abundance	**1.8**	0.2	0.15	60	25	102		**12.5**	1.5	950	**0.08**	84	**0.05**	0.075	**2.7**	70

reported value 3x in excess of crustal abundance

Average crustal abundance values from Price (1997), except for **bold** values, which are from Demayo (1951).

3.2.3 Distilled Water Leachable Metals

While an aqua-regia digestion is useful to show the metals that are available to be leached under acidic conditions, much like during ARD conditions, a distilled water leach is useful because it provides information on the metals that will be potentially solubilized when in contact with natural waters. All three Shear Lake waste rock samples were subjected to a 24-hour leach using nano-pure water at a 3:1 liquid to solid ratio. The results of these tests are summarized in Table 3-9. These data are compared to actual waste dump seep water collected by AECOM in September 2008 as well as MMER Water License limits.

Table 3-9:
Summary of Distilled Water Leach Data for Shear Lake Waste Rock

Parameter	Water Extraction			Mean Extraction Value	Waste Dump Seeps	MMER Guidelines
	SLB 1	SLB 2	SLR 1			
pH	3.02	3.05	2.84	**2.97**	**3.5**	**6.5 to 9.0**
Conductivity	444	507	924	**625**	**690**	
Sulphate	73	104	262	**146**	**186**	
Aluminum	2.03	5.49	15.3	**7.6**	**6.5**	
Arsenic	0.00072	0.00087	0.00108	**0.0009**	**0.0007**	**0.3000**
Cadmium	0.000372	0.00316	0.000501	**0.0013**	**0.0014**	
Chromium	0.0202	0.0073	0.0255	**0.018**	**0.009**	
Cobalt	0.0291	0.0686	0.118	**0.072**	**0.131**	
Copper	0.0376	0.161	0.107	**0.102**	**0.085**	**0.200**
Iron	7.29	10.4	18.8	**12.2**	**11.2**	
Lead	0.00324	0.00583	0.00514	**0.0047**	**0.0010**	**0.2000**
Manganese	0.18	1.18	1.62	**0.99**	**8.34**	
Nickel	0.026	0.0421	0.0944	**0.054**	**0.104**	**0.300**
Zinc	0.0325	0.073	0.0781	**0.061**	**0.113**	**0.300**

Note: all units in mg/L, except pH and conductivity (uS/cm)

Interestingly, distilled water extraction data for the three waste rock samples produced sulphate and metal concentrations in solution which were nearly identical to measured concentrations in actual waste dump seepage water (Table 3-9). Concentrations of sulphate, Al, As, Cd, and Fe in extracts were generally within 10% of concentrations observed in waste dump seepage water. The sole exception was Mn, which had notably higher concentrations in actual seepage water (e.g. 8.34 mg/L) as compared to extract water (0.99 mg/L). Collectively, the data do indicate that rapid dissolution of metal and sulphate occurs from waste rock material and concentrations quickly come into equilibrium. The very close agreement between laboratory extractions, at the 3:1 solution to solids ratio, to actual waste dump seepage concentrations, indicates that waste rock

seepage chemistry is independent of the quantity of solids being flushed. As such, the extraction data provide a good proxy for waste rock seepage quality.

The seepage chemistry measured in the field and in laboratory extractions appears to represent both the current condition as well as the future condition. The lack of remaining acid generating sulphide in the waste rock (Table 3-7) indicates that the measured seepage chemistry is not likely to deteriorate further. It is important to note, that apart from pH, all metal concentrations measured from waste rock seepage are below their respect MMER limits.

Loadings to Shear Lake appear to be derived largely from the waste rock used to build the causeway separating Shear Lake and a smaller un-named lake to the north, as well as waste rock used to cover the adit area that has also entered the lake. Seepage from the covered, reclaimed waste rock dump does not enter into Shear Lake.

Concentrations of Al, Cd, Co, Cu, Fe, Mn and SO_4 are observed to increase from the upstream un-named lake to Shear Lake, after passing through the waste rock causeway. However, the measured concentrations do not appear to have changed substantially from values measured in September, 2000 (URS, 2003) for those parameters that had reasonable detection limits at that time (*i.e.* Al, Fe and SO_4) (Table 3-10). These data support the tenet that conditions in the waste rock adjacent to Shear Lake and the current loadings to Shear Lake have not, and are not, expected to deteriorate further.

Table 3-10:
Comparison of Water Quality in Un-Named Upstream Lake, Shear Lake and Historical Shear Lake Water Chemistry

Parameter	Upstream Lake 2008 mean		Shear Lake 2008 mean	Shear Lake Sept. 2000
Al	0.107		0.239	0.3
Sb	0.00003		0.00003	<0.200
As	0.0004		0.00049	<0.200
Cd	0.000038		0.00013	na
Cr	0.0004		0.0007	<0.01
Co	0.00023		0.0036	<0.01
Cu	0.0018		0.006	<0.01
Fe	0.253		0.602	0.83
Pb	0.00004		0.000850	<0.050
Mn	0.0186		0.158	0.075
Hg	0.00001		0.00001	<0.050
Ni	0.0026		0.0077	<0.050
Se	0.00004		0.00008	na
Zn	0.0011		0.0071	<0.005
SO_4	1.8		27	15

Note: All units in mg/L

3.3 Airstrip

Results from the sampling of the Cullaton Lake airstrip are presented in this section. Acid-base accounting results, solid phase metal analysis and results from distilled water leaching are presented.

3.3.1 Acid Base Accounting

3.3.1.1 Paste pH

Paste pH values measured in airstrip samples ranged from 4.9 to 7.6, with the majority of the samples producing circumneutral paste pH values (Table 3-11). The data indicate that the material placed on the Cullaton Lake airstrip was not generating acidity prior to sampling.

3.3.1.2 Sulphur Speciation

Airstrip rock material had total sulphur concentrations that were typically at or below the analytical detection limit of 0.01%. One sample, AGP-1 had measureable total sulphur of 0.16%. All samples had sulphate sulphur concentrations at or below the detection limit of 0.01%. Little to no sulphide sulphur or insoluble sulphur was present in the airstrip samples (Table 3-11).

3.3.1.3 Neutralization Potential

Very low NP values were measured in airstrip samples. MEND NP values ranged from 1.9 to 9.4 kg $CaCO_3$/tonne.

3.3.2 Solid Phase Metals

Airstrip samples generally contain low concentrations of total metals (Table 3-12) and most samples contained metals at concentrations well below their respective crustal abundance values. Only two samples contained slightly elevated As concentrations above typical crustal abundance values; however concentrations of 5 mg/kg to 50 mg/kg are routinely observed in agricultural soils.

Table 3-11:
Summary of Acid Base Accounting Results for Airstrip Samples

Sample ID	Paste pH	TIC %	$CaCO_3$ NP	C(T) %	S(T) %	$S(SO_4)$ %	S(S-2) %	Insoluble S %	AP	NP	Net NP
A1	5.88	<0.01	<0.8	0.71	0.01	<0.01	<0.01	0.01	<0.3	7.2	7.2
A2	6.27	<0.01	<0.8	0.38	0.01	<0.01	<0.01	0.01	<0.3	3.8	3.8
A3	7.19	<0.01	<0.8	0.18	<0.01	<0.01	<0.01	<0.01	<0.3	6.1	6.1
A4	6.58	<0.01	<0.8	0.14	0.01	<0.01	<0.01	0.01	<0.3	3.6	3.6
A5	7.76	<0.01	<0.8	0.06	<0.01	<0.01	<0.01	<0.01	<0.3	7.2	7.2
A6	5.94	<0.01	<0.8	0.45	<0.01	<0.01	<0.01	<0.01	<0.3	5.3	5.3
A7	7.19	<0.01	<0.8	0.1	0.01	<0.01	<0.01	0.01	<0.3	6.5	6.5
A8	4.97	<0.01	<0.8	0.91	0.01	<0.01	<0.01	0.01	<0.3	4.2	4.2
A9	7.65	<0.01	<0.8	0.06	0.01	<0.01	<0.01	0.01	<0.3	6.8	6.8
A10	7.69	<0.01	<0.8	0.06	0.01	<0.01	<0.01	0.01	<0.3	6.2	6.2
A11	6.49	<0.01	<0.8	0.25	<0.01	<0.01	<0.01	<0.01	<0.3	6.0	6.0
A12	6.58	<0.01	<0.8	0.18	0.01	<0.01	<0.01	0.01	<0.3	6.5	6.5
A13	7.35	0.03	2.5	0.13	0.01	<0.01	<0.01	0.01	<0.3	9.4	9.4
A14	6.92	<0.01	<0.8	0.21	0.01	<0.01	<0.01	0.01	<0.3	6.2	6.2
A15	6.18	<0.01	<0.8	0.25	<0.01	<0.01	<0.01	<0.01	<0.3	6.7	6.7
AGP 1	6.48	0.03	2.5	0.07	0.16	0.01	0.12	0.03	3.8	2.4	-1.4
AGP 2	6.13	<0.01	<0.8	0.03	0.04	<0.01	0.03	0.01	0.9	1.9	0.9

Note:

AP = Acid potential in tonnes CaCO3 equivalent per 1000 tonnes of material. AP is determined from sulphide sulphur content.

NP = Neutralization potential in tonnes CaCO3 equivalent per 1000 tonnes of material. Acid addition based on TIC content.

NET NP = NP - AP

Carbonate NP is calculated from TIC originating from carbonate minerals and is expressed in kg CaCO3/tonne.

Sulphate Sulphur determined by 25% HCL with Gravimetric Finish

Sulphide Sulphur determined by Sobek 1:7 Nitric Acid with Gravimetric Finish

Table 3-12:
Summary of Solid Phase Metal (mg/kg) Results for Airstrip Samples

Sample ID	As ppm	Sb ppm	Cd ppm	Cu ppm	Co ppm	Cr ppm	Fe %	Pb ppm	Mo ppm	Mn ppm	Hg ppm	Ni ppm	Se ppm	Ag ppm	U ppm	Zn ppm
A2	3.1	0.2	<0.1	7.8	3.4	106	1.58	2.8	1.5	72	<0.01	9.3	<0.5	<0.1	0.7	9
A6	3.2	0.2	<0.1	7.7	3.2	100	1.5	2.5	1.5	72	<0.01	11.9	<0.5	<0.1	0.7	10
A10	2.3	0.1	<0.1	10.1	4.5	119	1.44	3.2	3.5	126	<0.01	15.6	0.6	<0.1	0.9	12
A13	13	0.1	<0.1	10.4	4.9	118	1.69	3.1	1.9	127	<0.01	16	<0.5	<0.1	0.8	12
AGP 1	16.9	0.3	<0.1	8.1	4.2	162	1	5.3	3.6	106	<0.01	7.6	<0.5	0.2	0.4	4
AGP 2	3.3	0.6	<0.1	10.3	3	173	0.82	7.7	4.7	80	<0.01	8.2	<0.5	0.2	0.3	4
Ave. Crustal Abundance	**1.8**	0.2	0.15	60	25	102		**12.5**	1.5	950	**0.08**	84	**0.05**	0.075	**2.7**	70

reported value 3x in excess of crustal abundance

Average crustal abundance values from Price (1997), except for **bold** values, which are from Demayo (1951).

3.3.3 Distilled Water Leachable Metals

Two airstrip samples were subjected to a 24-hour leach using nano-pure water at a 3:1 liquid to solid ratio. The results of these tests are summarized in Table 3-13. Metal and sulphate dissolution produced leachate chemistry very similar to background water quality concentrations observed in the area. While Al is elevated at (0.18 mg/L), these concentrations are routinely observed in project area streams and lakes unimpacted by mining disturbance.

Table 3-13:
Summary of Distilled Water Leachable Metals for Airstrip Material

		A6	A10
Parameter	**Units**		
pH		6.59	6.97
Conductivity	uS/cm	25	15
Total Acidity (to pH 8.3)	mg CaCO3/L	4.6	2.8
Alkalinity	mg CaCO3/L	2.2	2.9
Sulphate	mg/L	8	6
Dissolved Metals			
Hardness CaCO3	mg/L	8.7	5.3
Aluminum Al	mg/L	0.188	0.109
Antimony Sb	mg/L	0.00003	0.00003
Arsenic As	mg/L	0.00048	0.00032
Cadmium Cd	mg/L	0.00003	0.000053
Calcium Ca	mg/L	1.95	1.61
Chromium Cr	mg/L	0.0019	0.0006
Cobalt Co	mg/L	0.00128	0.00009
Copper Cu	mg/L	0.00446	0.0017
Iron Fe	mg/L	0.213	0.262
Lead Pb	mg/L	0.000132	0.000393
Magnesium Mg	mg/L	0.93	0.3
Manganese Mn	mg/L	0.0308	0.00506
Mercury Hg	ug/L	<0.01	<0.01
Molybdenum Mo	mg/L	0.00009	0.00006
Nickel Ni	mg/L	0.00289	0.00125
Selenium Se	mg/L	0.00007	0.00004
Silver Ag	mg/L	0.00001	<0.000005
Uranium U	mg/L	0.000233	0.000046
Vanadium V	mg/L	0.0005	0.0006
Zinc Zn	mg/L	0.0015	0.0021

Collectively, the acid base accounting results, solid phase metal analysis and distilled water leach data indicate there is little environmental risk posed by the material used to construct the Cullaton Lake airstrip.

4. Conclusions

4. Conclusions

A geochemical sampling program was performed at the Cullaton Lake property during August 5 to August 8, 2008. The program complemented additional environmental studies being completed by AECOM Canada Ltd. at the site as part of a larger risk evaluation for the closed operations. Geochemical sampling focused on three (3) main areas:

- Tailings Area #1;
- Shear Lake Waste Rock; and
- Airstrip

Summaries of the most salient findings for each of the study areas are discussed below.

4.1 Tailings Area #1

Geochemical sampling in the tailings impoundment involved the collection of core samples to obtain information on the following:

- Thickness of till/waste rock cover;
- Depth to permafrost;
- Oxygen profiles through the till cover and into the tailings;
- In-situ tailings samples for ABA and total metals analysis; and
- Core material for centrifugation to obtain tailings interstitial (porewater) waters;

Coring of the tailings facilitated the determination of cover thickness, depth to permafrost as well as the opportunity to obtain in-situ oxygen measurements. The most important observations are as follows:

- Consistent with information provided in BGC (2006), the measured thickness of the till cover material is less than the proposed 1.4 m. Most measurements indicated a till cover thickness to be on the order of 0.6 to 0.9 m thick.
- The depth to permafrost, as indicated by both coring refusal and the presence of frozen tailings at the tip of the split spoon, was highly consistent across the impoundment area at approximately -1.6 m depth. While a significant depth of tailings remain unfrozen (~0.8 to 1.0 m), the depth to permafrost would appear to be notably shallower than the last measurements made immediately following cover placement in the mid-1990's which observed frozen conditions at approximately 2.3 m depth. The data collected as part of this study are in general agreement with observations made following the cessation of operations, but prior

to any reclamation activity, where permafrost was interpreted to be encountered at approximately -1.4 m depth in 1990.

- Oxygen profiling revealed that, while oxygen concentrations in the till cover and tailings decreased from atmospheric levels, significant concentrations of oxygen penetrate the cover. The observations are consistent with the general scientific consensus that cover systems are generally not effective at limiting the ingress of oxygen to levels sufficiently low to inhibit sulphide oxidation

Acid-base accounting of B-Zone and Shear Zone tailings indicated that B-Zone tailings had an uncertain potential to generate acidity; while Shear Zone tailings do not contain sufficient quantities of neutralizing minerals to fully offset the acid potential of the material. However, none of the tailings samples tested were currently net acid generating. B-Zone tailings appear to contain appreciable quantities of arsenopyrite as noted by total solid phase As concentrations in excess of 1,000 mg/kg.

Porewater samples from tailings were able to be extracted in the laboratory following collection of cores. The key observations from analysis of the tailings porewaters are:

- Elevated sulphate concentrations were observed in porewaters from both tailings samples. Shear Zone porewater contained sulphate concentrations in excess of 2,000 mg/L; B-Zone sulphate concentrations were less at approximately 550 mg/L.
- Dissolved Fe and Mn concentrations were also elevated in Shear Zone and B-Zone porewaters; however, the Mn levels in B-Zone porewater was roughly an order of magnitude lower than observed in Shear Zone porewaters.
- Collectively, the dissolved constituents measured in porewaters clearly indicate that sulphide oxidation is occurring in the unfrozen tailings beneath the till cover.
- Some other metals were elevated in porewaters including Cd, Co, Ni, Se and U, whereas most other metals, including Al, As, Sb, Cu, Pb, Hg, Mo, Ag and Zn were not elevated.
- Although some metal parameters are elevated in tailings porewaters, all measured concentrations were well below the MMER Water License limits for those parameters with published criteria (e.g., As, Cu, Pb, Ni and Zn).
- A preliminary risk evaluation was performed to address the concerns raised by INAC regarding exposure of currently submerged tailings. The loading assessment indicates that only the parameters Co and U would be predicted to be in excess of the most stringent of CCME or Provincial Water Quality Objectives for Ontario. All parameters regulated by MMER would be present at concentrations well below Water License criteria. It would appear from this risk evaluation that the potential for short-term degradation of water quality in Tailings Pond #1 would be low.

4.2 Shear Lake Waste Rock

Sampling of the Shear Lake area waste rock was performed and samples submitted for ABA, solid phase metal analysis and distilled water leaching. The most salient findings include the following:

- Consistent with previous reports, Shear Lake waste rock samples contain relatively low concentrations of total sulphur, with significant quantities of sulphate sulphur present. Little to no sulphide sulphur was observed.
- Shear Lake waste rock does not contain any available neutralization potential. Most MEND NP values were negative and less than detection concentrations of CaNP were observed.
- Shear Lake waste rock samples generally contain low concentrations of total metals.
- Distilled water extraction data for the waste rock samples produced sulphate and metal concentrations in solution which were nearly identical to measured concentrations .in actual waste dump seepage water.
- The very close agreement between laboratory extractions, at the 3:1 solution to solids ratio, to actual waste dump seepage concentrations, indicates that waste rock seepage chemistry is independent of the quantity of solids being flushed.
- The seepage chemistry measured in the field and in laboratory extractions appears to represent both the current condition as well as the future condition. The lack of remaining acid generating sulphide in the waste rock indicates that the measured seepage chemistry is not likely to deteriorate further.
- Apart from low pH levels measured in the leachate extracts, all metal concentrations measured from waste rock seepage are below their respect MMER limits.
- Metal and sulphate concentrations in Shear Lake, as measured in 2008, do not appear to be notably different from concentrations measured in 2000.

4.3 Airstrip

Airstrip rock material had total sulphur concentrations that were typically at or below the analytical detection limit of 0.01%. While little to NP is present in the airstrip material, the absence of acid generating sulphide suggests that the risk of ARD from these materials is very low. Distilled water leaching of airstrip materials resulted in metal and sulphate concentrations in leachate that are similar to background water quality observed in streams and lakes in the area. Collectively, the acid base accounting results, solid phase metal analysis and distilled water leach data indicate there is little risk to the receiving environment posed by the Cullaton Lake airstrip.