2016 - 2017 AnnRpt-ASF & RcvEnvRpt

PREPARED BY: QUINSAM COAL CORPORATION

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GLOSSARY & ACRONYMS

B.C.	British Columbia
CALA	Calibration
CCR	Coarse Coal Reject
COPC	Contaminants of Potential Concern
DL	Detection Limit
DO	Dissolved Oxygen
EMS	Environmental Monitoring Station
EPT	Ephemeroptera, Plecoptera, and Trichoptera
Ha	Hectares
Hp	Horsepower
IDZ	Initial Dilution Zone
km	Kilometer
LLE	Long Lake Entry
LLPTS	Long Lake Seep Passive Treatment System
Masl	Metres above sea level
MDL	Mean Detection Limit
MEM	Ministry of Energy and Mines
MOE	Ministry of Environment
PAG	Potentially Acid Generating
PAH	Polyromantic Hydrocarbons
PEP	Provincial Emergency Program
PNC	Permit Non-compliance
QA/QC	Quality Assurance/Quality Control

QCC Quinsam Coal Corporation

RPD Relative Percent Difference

SQO Sediment Quality Objective for Long Lake

TDS Total Dissolved Solids

TSS Total Suspended Solids

VIO Vancouver Island Objective for phosphorus in streams

WQG British Columbia Water Quality Guidelines for Protection of Aquatic Life

WQO Water Quality Objectives for Middle Quinsam Lake Sub-Basin

Table of Contents

Glossary & Acronyms ii

Executive Summary xii

1.0 Introduction 1

2.0 Water Management Systems and Monitoring Locations 5

2.1 Mine Related Discharge 7

2.1.1 The North Water Management System 7

2.1.2 The South Water Management System 10

2.1.3 7-South Water Management System 13

2.2 Receiving Environment Sites 16

2.2.1 River, Stream & Lake Monitoring Sites 16

2.2.2 Groundwater Monitoring Sites 18

2.3 Additional Monitoring Programs 19

2.3.1 Baseline Monitoring Programs 20

2.3.2 Sediment and Benthic Monitoring 20

2.3.3 Long Lake Seep Passive Treatment System & Loading Assessment 22

2.4 Maintenance & Reclamation Activities 22

3.0 Chemical Reagents and Waste Storage 23

4.0 Incidents - Permit Limit Exceedances & Permit Non-Compliances 24

5.0 Materials and Methods: Environmental Monitoring Program 27

5.1 Water Quality Analysis 27

5.2 Environmental Monitoring Equipment 29

5.3 Quality Assurance/Quality Control 30

6.0 Hydrology 33

6.1 North Water Management System 33

6.1.1 Authorized discharge Rates at Settling Pond #4 (WD) E207409 33

6.2 South Water Management System 34
6.2.1 Authorized discharge Rates at Settling Pond #1 (SPD) E218582....34
6.2.2 Initial Dilution zone Monitoring Site, South Water Management System Entrance into Long Lake (LLE) E292130....36
6.2.3 Seep Monitoring Sites, Long Lake Seep (LLSM) – E292131....36
6.3 7-South Mining Operation Decant (7SSD) - E292069 37
6.4 Receiving Environment 40
7.0 Water Quality: In-Mine Mine Releases & Water Management Systems....41
7.1 North Water Monitoring Sites 43
7.1.1 Settling Pond #4 (WD) EMS #E207409....43
7.1.2 General Parameters....44
7.1.3 Culvert into Middle Quinsam Lake (WC) EMS #E207411....45
7.2 South Water Monitoring Sites 46
7.2.1 Settling Pond #1 (SPD) EMS #E218582 and Biocell Downstream (BDS)....46
7.2.2 Long Lake Entrance (LLE) EMS #E2922130 49
7.2.3 Long Lake Seep....52
7.3 7-South Water Monitoring Sites 53
7.3.1 7-South Settling Pond (7SSD) EMS #E292069....53
7.4 Middle Point Facility 56
7.5 Bioassays 57
8.0 Water Quality in the Receiving Environment....57
8.1 Lakes....59
8.1.1 Seasonal Trends....61
8.2 River and Stream Sites 71
8.2.1 Middle Quinsam Lake Inflow (WA) EMS #0126402 and Outflow (WB) EMS #0900504....73
8.2.2 No Name Outlet (NNO) EMS # E217017 and Long Lake Outlet (LLO) EMS # E219412 74

8.2.3 Stream 1 – (7S) EMS # E292109 and Lower Wetland Outlet (LWO) EMS #E292112 75

8.2.4 Quinsam River Downstream Site 1 (QRDS1) EMS # E286930 & 7-South Quinsam River (7SQR) EMS # E292113....76

8.2.5 Iron River....77

9.0 Sediment Quality in the Receiving Environment....79

9.1 Lakes....79

9.1.1 Methods....79

9.1.2 Results....82

9.2 Lower Wetland....96

9.2.1 Methods....96

9.2.2 Results....96

9.3 Quinsam River....98

9.3.1 Methods....98

9.3.2 Results....98

10.0 Biota Monitoring in the Receiving Environment....102

10.1 Phytoplankton....103

10.1.1 Methods....103

10.1.2 Results....104

10.2 Zooplankton....112

10.2.1 Methods....112

10.2.2 Results....113

10.3 Benthic Invertebrates....117

10.3.1 Lakes....118

10.3.2 Results....122

10.3.3 Quinsam River....134

10.3.4 Results....135

10.4 Summary for River Stations 143
10.4.1 Comparison to Historical Data 143
10.4.2 Wetland Sites.....143
10.4.3 Results.....145
10.5 Summary for Wetland Stations 148
11.0 Summary and Watershed Health Evaluation 148
11.1 Summary of water quality results for receiving environment.....153
11.2 Summary of sediment quality results for receiving environment.....154
11.3 Summary of phytoplankton results for lakes.....158
11.4 Summary of zooplankton results for lakes.....159
11.5 Summary of benthic invertebrate results for lakes.....160
11.5.1 Summary of benthic invertebrate results for Quinsam River.....164
11.6 Conclusion.....166
11.7 Recommendations.....169
12.0 Closing 169

List of Tables within Report

Table 1: Description of Monitoring Sites: In-Mine Releases & Initial Dilution Zones 6
Table 2 : Receiving Water (Stream and Lake) Monitoring Sites 16
Table 3: Groundwater Wells and Underground Sumps Monitored in 2016-2017 19
Table 4: Sediment and Benthic Monitoring Sites.....21
Table 5: List of Monitoring Stations, Parameters and Statistics.....42
Table 6: Permit Limits Applied to Settling Pond #4.....43
Table 7: Permit Limits Applied to SPD and BDS 47
Table 8: Approved 30-day Average Water Quality Guideline for Sulpahte to Protect Aquatic Life 49

Table 9: Permit Limits Applied to 7SSD EMS #E292069 53

Table 10: Water Quality Prediction Model-Best and Worst Case Scenarios Compared to Measured Concentrations at 7SSD 55

Table 11: Water Quality Prediction Model-Best and Worst Case Scenarios Compared to Measured Concentrations at 7S 56

Table 12: Water Quality Guidelines and Objectives Applied to Receiving Environment Stations 58

Table 13: Summary of Water Quality Guideline Observations at Lake Monitoring Sites 60

Table 14: Summary of Water Quality Guideline Exceedances in the Streams and Rivers 72

Table 15: Sampling Stations for Biota Monitoring, Quinsam Lakes System, 2016 102

Table 16: Chlorophyll a Concentrations, 1 m Depth, Quinsam Lakes System, 2016 105

Table 17: Result of Statistical Analysis of Differences in Phytoplankton Chlorophyll a by Year and Lake 107

Table 18: Phytoplankton Abundance, Quinsam Lake System, 2016 108

Table 19: Result of Statistical Analysis of Differences in Phytoplankton Abundance by Year and Lake 110

Table 20: Phytoplankton Taxon Richness, Quinsam Lake System, 2016 110

Table 21: Predominant and Common Phytoplankton Taxa, Quinsam Lakes System, 2016 111

Table 22: Zooplankton Abundance, Quinsam Lake System, 2016 (vertical tow, 0 to 10 m) 113

Table 23: Result of Statistical Analysis of Differences in Zooplankton Abundance by Year and Lake 115

Table 24: Zooplankton Taxon Richness, Quinsam Lake System, 2016 (vertical tow, 0 to 10 m) 115

Table 25: Result of Statistical Analysis of Differences in Zooplankton Taxon Richness by Year and Lake 116

Table 26: General Benthic Habitat Characteristics, Quinsam Lakes System, 2016 119

Table 27: Classification of Lakes by Degree of Mine Influence for Statistical Testing 122

Table 28: Habitat Characteristics of Benthic Invertebrate Stations, Quinsam River, 2016 136

Table 29: In Situ Water Quality at Benthic Invertebrate Stations, Quinsam River, 2016 136

Table 30: Benthic Invertebrate Community Family-Level Indices, Quinsam River, 2016 137

Table 31: Benthic Invertebrate Community Composition, Quinsam River, 2016.....138

Table 32: Table 32: Quinsam River 2016 Assessments Based on Reference Condition Approach 138

Table 33: Benthic Invertebrate Metrics for the Quinsam River Sampling Sites and the BC Coastal Model Reference Group 3 Mean 142

Table 34: Benthic Invertebrate Density in the Lower Wetland, 2016.....146

Table 35: Taxon Richness in the Lower Wetland, 2016.....147

Table 36: Simpsons Diversity Index in the Lower Wetland, 2016 147

Table 37: Simpsons Evenness Index in the Lower Wetland, 2016 148

Table 38: Summary of Lake Benthic Community Metrics 162

List of Figures within Report

Figure 1: Water Movement and Flow Path in the North Management System..... 9

Figure 2: Water Movement & Flow Path in the South Water Management System 12

Figure 3: Water Movement and Flow Path at the 7-South Operation.....15

Figure 4: Settling Pond #4 Maximum Daily and Cumulative Discharge, 2016/2017.....34

Figure 5: Settling Pond #1 Maximum Daily and Cumulative Discharge, 2016/2017.....35

Figure 6: Groundwater and Mine Pool Water Elevations vs. Long Lake Seep Flow, 2016/201737

Figure 7: Monitoring Site 7S Stage Discharge Curve 38

Figure 8: 7SSD Discharge, 2016/2017.....39

Figure 9: Total Phosphorus at LLE, 2016 51

Figure 10: Chlorophyll a (µg/L) at 1 m Depth, Quinsam Lakes System, 2013 – 2016 106

Figure 11: Total Phytoplankton Abundance, 1 m Depth, Quinsam Lakes System, 2013 – 2016 109

Figure 12: Total Zooplankton Abundance (0 to 10 m Vertical Tows), Quinsam Lakes System, 2014 to 2016 114

Figure 13: Zooplankton Abundance by Group, Quinsam Lakes System, 2016 117

Figure 14: Average Density of Benthic Invertebrate Taxa at Inlet Stations, Quinsam Lakes System, 2016 124

Figure 15: Average Density of Benthic Invertebrate Taxa at Deep Stations 124

Figure 16: Average Density of Benthic Invertebrate Taxa at Seep Stations 125

Figure 17: Average Density of Benthic Invertebrate Taxa at Outlet Stations 126

Figure 18: Benthic Invertebrate Density in Lakes, 2016 127

Figure 19: Benthic Invertebrate Taxa Richness in Lakes, 2016 129

Figure 20: Benthic Invertebrate Diversity in Lakes, 2016 130

Figure 21: Benthic Invertebrate Evenness in Lakes, 2016 131

Figure 22: Benthic Invertebrate Community at WA Compared to the Reference Condition 139

Figure 23: Benthic Invertebrate Community at QRDS1 Compared to the Reference Condition 140

Figure 24: Benthic Invertebrate Community at 7SQR Compared to the Reference Condition . 141

Figure 25: Average Density of Common Taxa in the Lower Wetland, 2016 146

Figure 26: Mean Arsenic Concentrations in Sediment, Quinsam Lakes System, 2016 (Long Lake SQO = 927 mg/kg for whole lake, 89 mg/kg in west lake, and 1046 in east lake) 156

Figure 27: Mean Iron Concentrations in Sediment, Quinsam Lakes System, 2016 (Long Lake SQO = 155,000 mg/kg) 157

Figure 28: Mean Manganese Concentrations in Sediment, Quinsam Lakes System, 2016 (Long Lake SQO = 2,040 mg/kg) 157

List of Appendices

APPENDIX I – Tables for Physical and Chemical Water and Sediment Quality Required under PE-7008

APPENDIX II – Graphs of Key Monitoring Locations and Parameters of Interest PE-7008

APPENDIX III –Bioassay Results - Settling Pond #'s 1 and 4, 7-South Surface Decant (7SSD), Stream 1 (7S) and WC

APPENDIX IV Phytoplankton and Zooplankton Analytical Results for Lakes, 2016

1-Chlorophyll table 2013-2016
2-Stantec reports for 2016
3-Fraser Environmental Reports for 2016

APPENDIX V Benthic Invertebrates

1- Cordillera QAQC Report
2 -Raw Data
3-Summary Statistics for Community Metrics
4-Results of Statistical Tests
5-Quinsam River CABIN Field Data

APPENDIX VI Quinsam Coal Corporation Sediment and Biological Monitoring Plan 2016

APPENDIX VII – Exceedances / Spill Reports for 2016-2017

APPENDIX VIII – ETRC Agency Meeting Minutes & Follow-up

APPENDIX IX – 2016-2017 Annual Groundwater Monitoring Report

APPENDIX X - Annual Status Form 2016-2017

APPENDIX XI – Site Maps and Figures for Sediment- Benthic Sample Locations

APPENDIX XII- Long Lake Seep Passive Treatment System and Annual Loading Assessment

EXECUTIVE SUMMARY

In accordance with Effluent Permit PE-7008 issued under the *Environmental Management Act*, Quinsam Coal Corporation (QCC) operates water management systems designed to mitigate effects of mining activities on the Middle Quinsam Sub-Basin and Iron River watershed(s). This effluent permit provides the framework for the comprehensive monitoring program along with allowable levels of Parameters of Interest (POI) within water released from the permitted management systems. In addition to surface water quality monitoring within management systems and receiving environments, local groundwater, sediment and biological monitoring was conducted at numerous stations for a more comprehensive understanding of effects within the mine footprint.

Following the indefinite suspension of coal production in January 2016, all operations through this monitoring period were defined as "*care and maintenance*" activities. Care and maintenance consisted of fundamental maintenance to core systems, reclamation and protection of assets. In addition, all environmental monitoring obligations as per Effluent Permit 7008 (PE-7008) remained unchanged and were carried out as necessary.

The main objective of this report is to inform governing bodies and stakeholders on the effectiveness of the management systems and compliance with the effluent permit for the 2016-2017 monitoring year including:

- Description of mine-site operations and their respective environmental management systems
- Report on environmental performance along with compliance with the Effluent Permit PE-7008
- Provide updates on receiving environment water, sediment and biological integrity
- Incorporate groundwater monitoring, Long Lake Seep Passive Treatment System (LLST) performance and aggregate loading into Long Lake as part of this report
- Provide insight and recommendations for future monitoring and best environmental practices

Mine discharges released from the permitted locations were within permitted levels for the majority of samples obtained this monitoring period. The only permit limit exceedances encountered were:

- A Dissolved phosphorus exceedance was observed at BDS (applied to discharge limits at SPD of 0.05 mg/L) with a reported result of 0.0608 mg/L. This exceedance was driven by LLST discharges and was determined to be an isolated event with no additional exceedances observed in the year.
- TSS exceedances occurred at 7SSD on two occasions in October (7th and 16th) as significant precipitation was received at the mine site. The exceedances (27.3 and 35.0 mg/L respectively) were marginal but were a direct result on high sediment transport from local drainage.
- Numerous TSS exceedances were observed WD from October to January and were the result of storm events and dewatering the 2-North mine. Although these events were considered the most significant permit non-compliance throughout this monitoring year, TSS levels at the downstream site WC prior to entry of MQL were all within acceptable limits.

Spill reports can be found in Appendix VII including description of the spill, follow up and mitigative techniques.

Numerous water quality guideline (WQG) exceedances across the receiving environment were observed this monitoring year. Majority of the exceedances were anomalous and inconsistent, not attributed to any point source discharges from the mine.

Sulphate concentrations at depth in Long Lake have continued to be a focal point for receiving environment water quality as elevated levels have persisted throughout past monitoring. In 2016, levels increased when compared to previous monitoring years and have saw WQG exceedances through all 5 in 30 monitoring periods averaging 133, 134 and 131 mg/L respectively. The LLST has been effective at reducing sulphate concentrations from mine pool water, however; it is difficult to determine whether this system has a positive effect with respect to sulphate concentrations within Long Lake.

Groundwater monitoring has become increasing important for the understanding of cumulative mine inputs into undisturbed areas and receiving environments. Sulphate, iron, manganese and

arsenic (to name a few) are key parameters to monitor as they are most attributed to coal mining operations. Currently, no inputs are known to have significant detrimental effects on receiving environments but future monitoring will be an effective means to identify and determine changes.

The first comprehensive sediment and benthic monitoring program completed internally by Quinsam staff has been completed this monitoring year as required by the effluent permit. This monitoring program evaluated key areas throughout the watershed to determine composition of sediments with respect to mining operations and any effects that may be present within biologic communities that inhabit them along with data from previous studies completed by external consultants. Section 9 through 11 discusses the findings with Appendix I Tables 167 through 254 containing analytical results. Appendix V contains the benthic results, analytical methods and quality control procedures from Cordillera Consulting; Appendix VI describes the study design and Appendix XI Figures 1 through 18 display the sampling locations and parameters of interest compared to previous studies for the lakes.

1.0 INTRODUCTION

The Quinsam Mine is located in the Quinsam River Watershed, approximately 28 kilometers (km) by road southwest of Campbell River. The land reserved by the Quinsam mining operation consists of approximately 283 hectares (ha) and is owned and operated by Quinsam Coal Corporation (QCC). Active mining operations were suspended in mid-January 2016 due to ongoing poor market conditions and a decreased demand for thermal coal. The mine had transitioned into a "Care and Maintenance" program shortly after focusing on maintenance, asset protection and reclamation, specifically the 242 area and the 1 – 4 and 7-South areas. The mine obtained new ownership in June 2017 with the prospect of restarting mine operations in the near future.

The Quinsam Mine produces High Volatile "A" Bituminous thermal coal. Coal is processed at an onsite preparation plant, transported by B-train highway trucks to the Middle Point Barge Terminal north of Campbell River. Coal is then shipped via barge, to local customers and to Texada Island.

Due to the mine's location, adjacent to Middle Quinsam Lake, the Quinsam River, No Name Lake, and Long Lake, which drain into Lower Quinsam Lake, the operational permits issued by the Ministry of Environment (MOE) and Ministry of Energy and Mines (MEM) established stringent effluent quality standards. Accordingly, QCC has maintained an environmental management system defined by the requirements of Effluent Permit PE-7008 and defined in the C-172 *Mines Act* permit. The mine has collaborated with regulators and stakeholders on key management aspects to minimize mine related effects in the receiving environment.

Sulphate concentrations in surface waters of the receiving environment (e.g. Long Lake) continued to be a focus for the QCC monitoring program. Although PE-7008 lists only one sulphate limit for effluent (500 mg/L at 7SSD), sulphate is routinely monitored at designated sites on the mine site and in the receiving environment. Quinsam continues to assess sources of sulphate and management options to mitigate concentrations in mine related discharge(s).

On-Site Water Quality and Activities

The North, South, and 7-South water management systems represent the cumulative mine related discharges to the Quinsam watershed. As such, strategic operation of management

structures is designed for discharge waters to meet permit requirements and be of suitable quality for discharge into the receiving environment. Permit limits for parameters of interest have been established and are closely monitored to ensure environmental protection.

Surface disturbance was limited to the South mining area, close to the 3-South pit, where an engineered outlet channel was constructed (total surface disturbance area of 0.88 ha). The channel will provide a permanent overflow connecting the 3-South sub-aqueous PAG-CCR disposal site to the drainage channel connecting No Name Lake to Long Lake. This will eliminate the need for mechanized pumping to maintain water levels in the 3-South PAG-CCR pit, and is part of the closure plan for the Quinsam Coal Mine Site.

There were no additional surface disturbances during this report period with all efforts focused on reclamation mostly in the 2-3 South areas.

Bioassays

Rainbow Trout 96-hour bioassays were performed on water collected from Settling Ponds #1 and 4 and 7SSD each of these passed with 100% survival. A 7-day *Ceriodaphnia dubia* chronic toxicity test performed on water from collected Stream 1, 7S also passed with 100% survival.

Receiving Water Quality

Water quality attainment in the Middle Quinsam Sub-Basin remains a key management objective at QCC. Comparison to provincial WQGs and Middle Quinsam Sub-Basin water quality objectives (WQOs) is used to evaluate receiving water quality, aquatic health, and overall operational performance.

Monitoring sulphate concentrations continues to act as a essential practice to evaluate mine impacts as it is a key parameter traced back to coal mining. Sulphate concentrations are compared to an average WQG of 128 mg/L, are calculated using a background hardness of 30 mg/L for the Middle Quinsam Sub-Basin. Sulphate results averaged over five weekly samples collected over 30 days (5 in 30) were compared to the WQO. Other parameters of interest for the receiving environment are total arsenic, copper, iron, manganese, and zinc and dissolved iron and aluminum. Elevated dissolved aluminum and total copper, and zinc concentrations are associated with high rainfall events (elevated TSS) and may not be associated with mine related discharges; however, elevated concentrations are considered in the context of aquatic effects.

Monitoring at sites upstream of mine influences (e.g., IR1 in the Iron River) indicates naturally elevated concentrations of dissolved aluminum during high flow events. These metals and other parameters that are higher than WQGs or WQOs are discussed below. Total phosphorous concentrations are compared to the Vancouver Island Objective (VIO) for streams (a maximum of 0.01 mg/L and average of 0.005 mg/L) at sites No Name Lake Outlet, Long Lake Outlet, Middle Quinsam Lake Outlet and 7-South Quinsam River, 7SQR & one wetland Long Lake Entry (LLE).

Groundwater Quality

QCC maintains a comprehensive groundwater monitoring program to characterize water quality associated with mining development. There are a total of 37 groundwater wells including underground sumps located in-situ (disturbance footprint) and ex-situ (outside of mine workings) that are monitored. In the absence of groundwater well samples, underground sump samples are used for comparison. Results for ex-situ wells are compared to Contaminated Sites Regulations Standards for Protection of Aquatic Life (CSR-AW) and those for in-situ wells are and sumps are compared to source terms derived for particular mining areas. Groundwater quality is influenced by bedrock chemistry, an example being the presence of realgar (arsenic sulphide) in the Dunsmuir Sandstone overlying the No. 4 coal zone, resulting in dissolved arsenic in the south area groundwater being naturally higher than the CSR-AW. Parameters of interest for groundwater are those with concentrations higher than the CSR-AW: arsenic, chloride, fluoride, hydrogen sulphide as (H_2S) and sulphate. Overall, in-situ groundwater at Quinsam Coal is generally within the water quality prediction scenarios and ex-situ groundwater typically trends below the CSR-AW guidelines. The two exceptions to the aforementioned is groundwater influenced by host geological formations (e.g. Dunsmuir Member sandstones, Cumberland Member No.1 Coal seam and mudstones) with naturally elevated concentrations of parameters of interest and by weathering processes (i.e. mine wall oxidation and flushing) of disturbed materials within the mine footprint.

Receiving Water Sediment and Biota

QCC conducted a comprehensive biological monitoring program in 2016, as stipulated in Section 4.2.4 and 4.2.7 of the effluent permit. The August through October program involved sediment and benthic invertebrate monitoring at 23 locations in the watershed (at five lakes, one wetland, and three locations on the Quinsam River). In the four lakes exposed to mine influences, samples were collected at inlets, deep sites, seeps, and outlets.

Sediment results were compared to generic Canadian Council of Ministers of Environment (CCME) Interim Sediment Quality Guidelines (ISQG) and Probable Effect Levels (PEL) and to site-specific sediment quality objectives (SQOs) developed for Long Lake that reflect the naturally elevated background levels of some metals. The SQOs were derived from studies completed prior to mining influence in Long Lake (pre-1987). Where background levels are lower than ISQG's, the ISQGs are used for comparison. Primary parameters of interest for sediment are arsenic, iron, manganese and total polycyclic aromatic hydrocarbons (PAH), identified based on concentrations, relative toxicity, and findings in previous reports. Most of the elevated concentrations are related to geology (host rock formations), although mining has contributed inputs.

Water quality in the Middle Quinsam Sub-Basin and Iron River generally meets WQGs and WQOs and is considered suitable for aquatic life. Throughout the monitoring period, Quinsam has demonstrated that mine water management system(s) and procedure(s) are an effective tool in reducing parameters of interest loading in the receiving environment.

Benthic invertebrate samples from lakes and the wetland were analyzed for community metrics (density, taxon richness, diversity, evenness, major taxonomic groups), and for ecologically relevant and statistically significant differences among sites. Quinsam River sites were sampled and analyzed using the Canadian Aquatic Biomonitoring Network (CABIN) method.

Phytoplankton and zooplankton samples collected once per sampling event on all four lakes as a routine requirement of PE-7008s. Samples were analyzed for count, identification and species abundance.

Long Lake Seep Passive Treatment System-

The Long Lake Seep Passive Treatment System (LLST) consists of a series of treatment cells designed to receive mine-water pumped from the 2-South underground workings to reduce Parameters of Interest (POI) concentrations including dissolved sulphate and iron. This system was initiated as part of a remediation plan to limit localized mine-water seepage on the south-side of Long Lake as a result of subsidence caused by mining within close proximity and establishing an evident hydrologic connection.

The Long Lake Passive Treatment System (LLTS) continues to demonstrate reduction in sulphate concentrations throughout the system. Higher reduction is observed during warmer

conditions, with reduction efficiencies of upwards of 300 mg/L. The addition of molasses (carbon source) has shown some capability to increase performance within the system.

2.0 WATER MANAGEMENT SYSTEMS AND MONITORING LOCATIONS

Settling ponds, sumps and ditches have been constructed to manage and treat mine contact water to help mitigate any negative effects on the receiving environment. Water management at the Quinsam Mine is divided into three discrete areas: North, South, and 7-South. Appendix XI, Site Map, displays underground mine locations, groundwater wells and surface monitoring sites. Table 1 below describes the within-mine releases monitoring sites and associated initial dilution zones.

Table 1: Description of Monitoring Sites: In-Mine Releases & Initial Dilution Zones

EMS ID #	Monitoring Sites	Station Code	*Type of Water (MW, FW,GW or IDZ)
North Coal Mining Operation			
E207409	**Settling Pond #4 Decant**	**WD**	**Discharge (MW)**
E207411	Culvert, at Middle Quinsam Lake Road	WC	MW & FW
E283433	2-North Portal Sump (Adit Sump)	2NPS	MW
E207412	2-North Pit Sump CCR Cover	WP	PAG-CCR Water Cover - MW
E292126	South Dyke Sump	SDS	MW
South Coal Mine			
E218582	**Settling Pond #1 Decant**	**SPD**	**Discharge (MW)**
E217014	Culvert, Downstream End at Access Road	SPC	MW & FW
E217015	South Pit Main Sump Water	3S	PAG-CCR Water Cover (MW & FW)
E292127	2-South Pit In Pit Water Cover (2-South Standpipe)	2S	PAG-CCR Water Cover (MW & FW)
E292128	1977 Bulk Sample Pit	3S77	MW & FW
E292129	Culvert Downstream of 4 South Access Road	4S-Lo	**MW & FW**
7-South Mining Operation			
E292069	**7-South Surface Decant**	**7SSD**	**Discharge (MW & FW)**
E292110	7-South Adit Sump	7SPS	MW
Seep Monitoring Sites			
E292131	Long Lake Seeps	LLS & LLSM	MW
	Small seep near the plant (PDS) & groundwater surface near road entering MQL (PDSR)	PDS & PDSR	GW & MW
Long Lake Seep Passive Treatment System			
N/A	Groundwater well (2-South Mine Pool) Influent to the treatment system	QU11-11 (INF-EFF)	MW
N/A	Bio Cell Reactor	BCR-EFF	MW
N/A	Sulphide Polishing Cell	SPC-EFF	MW
N/A	Aeration Lagoon	AL-EFF	MW
N/A	Settling Pond Effluent	SP-EFF	**Discharge MW**
Authorization to Bypass the Works			
N/A	Sampling location 35 m downstream of discharge from the treatment system (SP-EFF) and Settling Pond #1. Discharge is compared to SPD permit limits.	BDS	**Discharge MW**
Initial Dilution Zone (IDZ) Monitoring Sites			
E292130	Long Lake Entrance (South end water entering Long Lake)	LLE	IDZ
E292109	Road Crossing Bridge on Stream 1 above the Lower Wetland (Downstream of 7SSD). The site name is Stream 1, 7S.	7S	IDZ

*** MW= Mine Water, FW= Freshwater, GW =Groundwater IDZ = Intial Dilution Zone**

2.1 MINE RELATED DISCHARGE

2.1.1 *THE NORTH WATER MANAGEMENT SYSTEM*

The north water management system is designed to collect mine related runoff from the north disturbed surface areas and pumped water from the 2-North underground mine operations. This system includes catchment sumps and ditches, pipelines, a subaqueous storage facility for potentially acid generating (PAG) coarse coal reject (CCR) and Settling Pond # 4 (WD) EMS #E207409.

The 2-North subaqueous PAG-CCR facility (WP) EMS #E207412 contains waste rock from 5 South Mine coal processing and is stored with at least 1.50 m of water cover to inhibit acid generation from the stowed material. This water cover is sourced from underground pumps and maintained by QCC personnel.

Based on hydrogeology of the area and mine workings depth, the 2-North mine must be dewatered to allow operations underground. A series of underground pumps move water to surface as needed. The underground dewater wells 1 and 5 Mains are both equipped with 2 X 200 horsepower (HP) surface pumps capable of pumping approximately 1500 gallons per minute collectively. The 6 Mains 2-North dewatering system was decommissioned in June 2016 consists of three pumps also capable of pumping1500 gallons per minute, collectively.

Settling Pond # 4 collects gravity fed water from Brinco Brook, which includes disturbed surface runoff, tailings dam seepage, and underground water collected at 2-North Portal Sump (2NPS) EMS #E283433. The underground dewatering wells 1 and 5 Mains discharge directly into Brinco Brook and mix with the water from 2NPS. Settling Pond # 4 acts as the final collection point before discharge into a meadow/biomass system where it flows into a culvert at Middle Quinsam Lake road sampling location (WC) EMS #E207411, prior to entering another extensive wetland that flows into the inlet of Middle Quinsam Lake.

Settling Pond #4 encompasses approximately 2.4 ha of marshland with an average depth of 1.5 m and a storage capacity of approximately 30,000 m^3. It has been designed to receive a 1 in 10 year flood event and has an emergency spillway to prevent structure failure during extreme flood events. Water from Settling Pond #4 is pumped to the wash plant for use in coal processing.

Used wash plant water is pumped to the tailings dam at the pump site CPP collection ditch, where it filters through the north side of the tailings dam to 2NPS. Water in the 2NPS is used for underground equipment, dust suppression, and emergency firefighting. Excess water in the 2NPS sump is pumped with a 65 HP pump through a 12 inch pipe along the 2-North high wall then discharged into Brinco Brook. South Dyke Sump (SDS) EMS #E292126 collects seepage water from the south side of the tailings dam and pumps it back to the tailings dam (the seepage does not report to the Quinsam River or Middle Quinsam Lake from this location).

Below the wash plant is a natural drainage where groundwater surfaces and flows towards Middle Quinsam Lake. There are two surface monitoring locations here and two nested (deep and shallow) groundwater wells. The plant ditch seep (PDS) is groundwater that surfaces and flows intermittently through the year, drying up in the summer; the water surfaces at the Plant Ditch Seep at the Road (PDSR) prior to entering Middle Quinsam Lake near the inlet end. These sites are monitored monthly when there is flow at surface. Deep and shallow nested groundwater wells MW00-1 (S and D) and MW00-6 (S and D) represent the groundwater below the collection ditch and processing plant. These wells were installed to monitor seepage from the plant site collection ditch. Historically, the plant site collection ditch was used to transport fine tailings from the processing of coal to WP, which was used as a fine tailings settling pond, with excess water pumped into Brinco Brook and gravity feed into Settling Pond # 4.

Figure 1 provides a flow chart describing the flow paths of water in the 2-North Water Management System.

NORTH WATER MANAGEMENT SYSTEM: WATER MOVEMENT

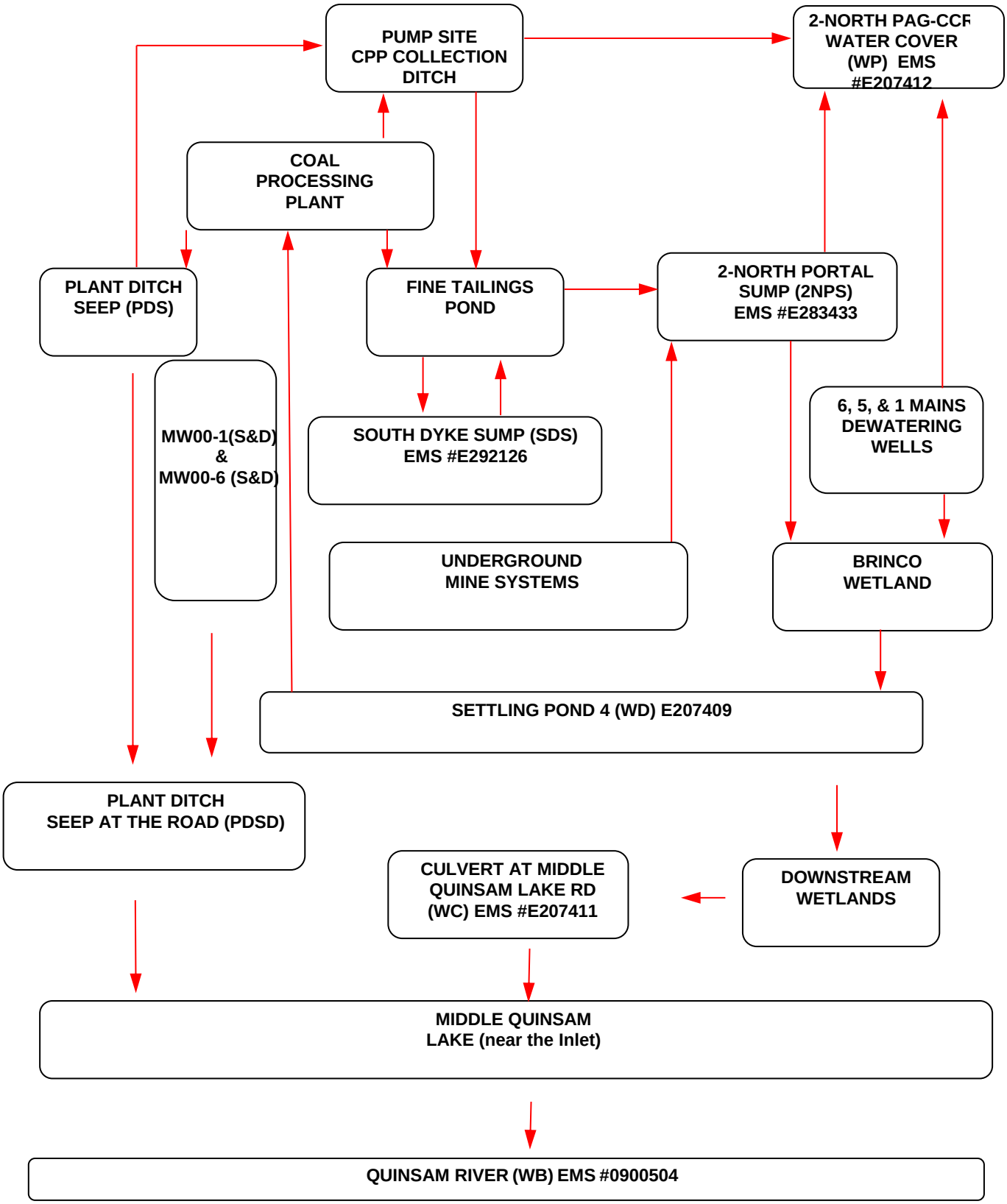

Figure 1: Water Movement and Flow Path in the North Management System

2.1.2 THE SOUTH WATER MANAGEMENT SYSTEM

The South Water Management System is designed to collect mine related runoff from the south disturbed surface areas and manage water in the 2-South (2S) EMS #E292127 and 3-South (3S) EMS #E217015 PAG-CCR containment pits, Long Lake Seep Passive Treatment System (LLTS), and 5-South mine workings.

The two long-term PAG-CCR pits (2-South and 3-South) have been completed as part of the south water management system. Construction of the 2-South PAG-CCR pit was completed in 2014; it includes a clay-bentonite liner to retain water within the pit and a water cover fed by a series of ditches and pipes that collect local catchment water. Surface personnel control valves to direct fresh non-mine impacted water into the PAG-CCR facility or to No Name Lake. A minimum of 1.50 m water cover is required in the 2-South PAG CCR. Excess water from the 2-South PAG-CCR pit overflows a spillway (built in 2015) into a large channel that leads to the 3-South PAG-CCR storage pit. This water is used to provide 1 m deep water cover over 3-South. Excess water in 3-South is pumped via an 88 HP pump capable of pumping 500 gallons per minute directly into the roadside collection ditch that flows into Settling Pond #1.

Settling Pond #1 (SPD) EMS #E218582 is the compliance point for permitted discharges before water enters Long Lake. Settling Pond #1 encompasses 1.8 ha of wetland with an average depth of 1.5 m. An emergency overflow ditch built into the impoundment dam is located on the north end of the pond. A siphon pipeline has been installed from Settling Pond #1 to the 3-South Pond to provide an emergency source of water to maintain the 1 m cover over the 3-South PAG-CCR pond. In 2015, a pumping system was installed in the 5-South workings with discharge into Settling Pond #1 to reduce water levels over the 8-Mains plugs that separate the 5-South and 2-North mines. Water from the 5-South Mine is pumped periodically to Settling Pond #1.

The LLTS is designed to inhibit flow at the Long Lake seep by lowering the 2-South mine-pool through pumping from monitoring well QU11-11, where it is treated on surface. There are four ponds (BCR-EFF, SPC-EFF, AL-EFF & SP-EFF) where water goes through processing. Effluent from this system (SP-EFF) is combined with Settling Pond #1 discharge, then flows 100 m to the location Biocell Downstream (BDS). This effluent channel leads into a series of meadow/biomass systems and combines with the surface and subsurface groundwater.

The 3-South 1977 bulk sample pit (3S77) EMS #E292128 is located upstream of the 4-South Pad and collects groundwater filtering in from the wetland through which Settling Pond #1 flows. The bulk sample pit has a surface discharge that filters into the groundwater and through the connector ditch above the 4-South Mine to the 4-South Fire Pond. The 4-South ditch monitoring location (4S-Lo) EMS #E292129 is a culvert downstream of 4-South Access Road and west of 4S coal pad; it collects runoff from the 4S-pad, groundwater seepage, and surface runoff from the haul road. The monitoring location SPC, EMS #E217014, located downstream of the 4-South Portal and 4S-Lo, does not interact with effluent from 4-South; it captures Settling Pond #1 water downstream of the wetland. The final collection point (EMS #E292130) is at the downstream end of the Long Lake Entrance (LLE) wetland and discharges approximately 50 m upstream of Long Lake. This site is considered the initial dilution zone (IDZ) for Long Lake.

Figure 2 provides a flow chart describing the flow paths of water in the South Water Management System.

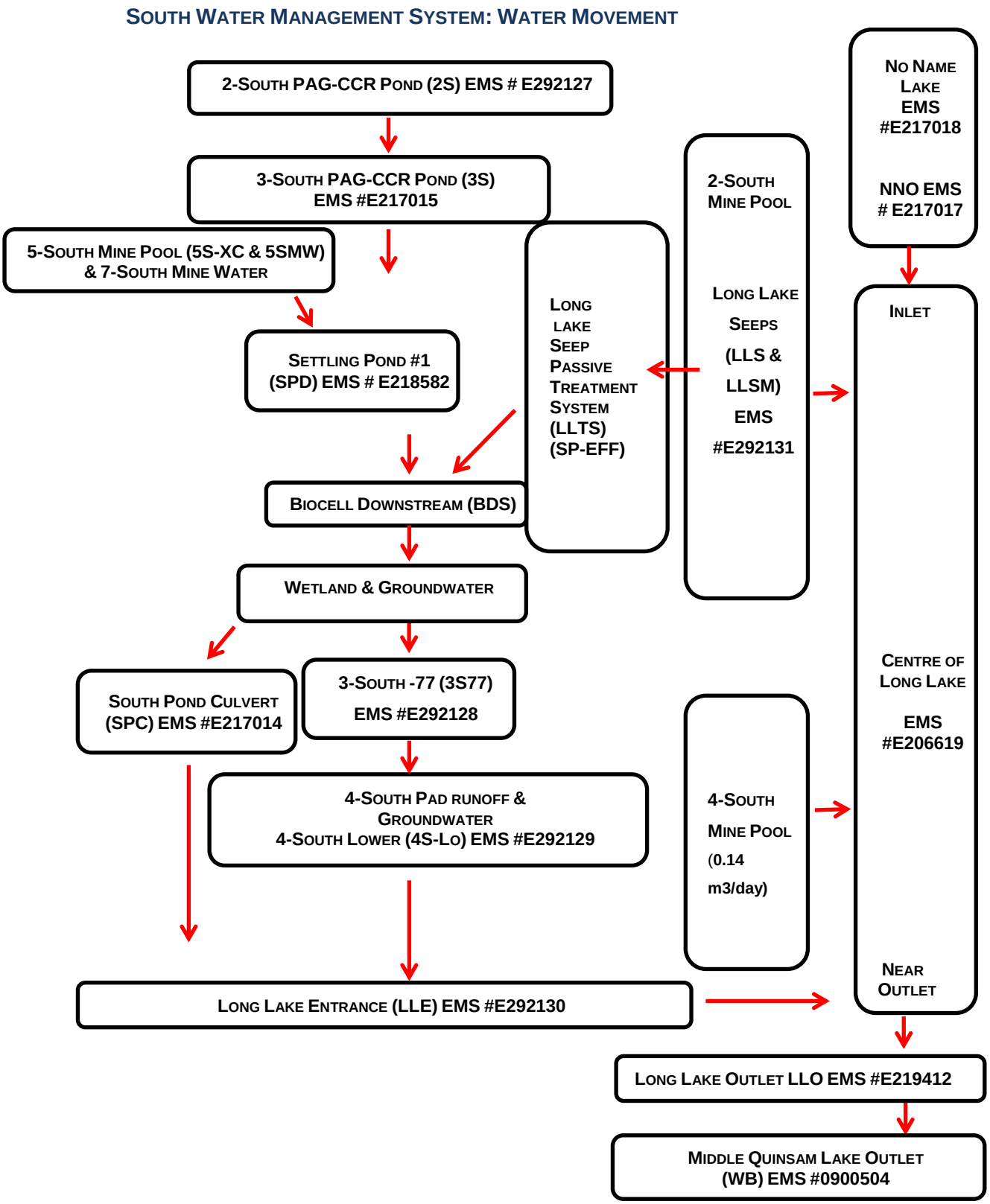

Figure 2: Water Movement & Flow Path in the South Water Management System

2.1.3 7-South Water Management System

The 7-South Water Management System includes the 7-South Surface Decant Settling Pond (7SSD) EMS #E292069, 7-South-Adit Sump (7SPS) EMS #E292110, 7-South Containment Pond (7SCP), and receiving environment sites downstream at Stream 1 (7S) EMS #E292109, which flows into the Lower Wetland and monitoring location Lower Wetland Outlet (LWO) EMS #E292112 at the confluence of the Quinsam River. This system is designed to manage excess water from the 7-South catchment area and mitigate environmental impacts from disturbed surface locations affected by mining and underground activity. Water is collected and stored in three main ponds in the 7-South Mine catchment area: 7SPS, 7SCP, and 7SDD.

7SPS contains water that is collected from dewatering processes during mining activity; most of surface water from the coal storage pad is directed into the adit sump. Water is pumped from active mining areas and stored adjacent to the portal entrance to use for dust suppression on mining equipment and for the fire suppression system. Water levels at 7SPS are set up on an automated float system, when water levels rise beyond a desired storage capacity, excess water is pumped underground into the 5-South Mine.

7SCP collects surface runoff from the 7-South surface disturbance area, local groundwater, and infiltration water from the coal pad. This pond allows suspended solids in surface water to settle before the water enters 7SSD. When this pond reaches a certain capacity, it discharges through a culvert into 7SSD. In 2015, the 7SCP was enlarged to accommodate more water. Additional pumps were placed at 7SSD and 7SCP to decrease 7SSD discharge and assist with water management. The revised system pumps water from 7SSD and 7SCP to 7SPS. The pump at 7SCP runs on an automated float system where water levels are kept below the overflow channel into 7SSD. During high precipitation events, a secondary pump can be activated to assist in pumping water to 7SPS. This pump can also be relocated to 7SSD where accumulated water can be diverted into 7SCP. This system does not eliminate discharge from 7SSD but helps reduce the amount discharged, given that 7SSD must discharge during times of heavy precipitation.

7SSD is the permitted discharge location and main water collection pond for the 7-South Mine area, with a cumulative catchment of 3.14 ha. 7SSD is a settling pond that receives water from groundwater infiltrated from the surrounding hillsides and the coal storage pad. This water is monitored for quality and quantity during discharge events. Water is discharged from the pond via

a 2 inch discharge line equipped with a valve to allow environmental personal to set the discharge rate based on flow rates measured at the downstream site 7S in Stream 1. An 8:1 ratio (7S:7SSD) was calculated from previous water quality data and modelling conservatively to protect the Stream 1 receiving environment. Water quality downstream in Stream 1 meets applicable guidelines with dilution ratios greater than 8:1.

Discharge from 7SSD forms the headwaters of Stream 1, monitoring location 7S is located on Stream 1 below the confluence with Stream 2 and, for the purposes of the effluent permit, is compared to British Columbia water quality guidelines (WQGs) for protection of aquatic life to evaluate potential effects on aquatic receptors at this location.

Figure 3 provides a flow chart describing the flow paths of water in the 7-South Water Management System.

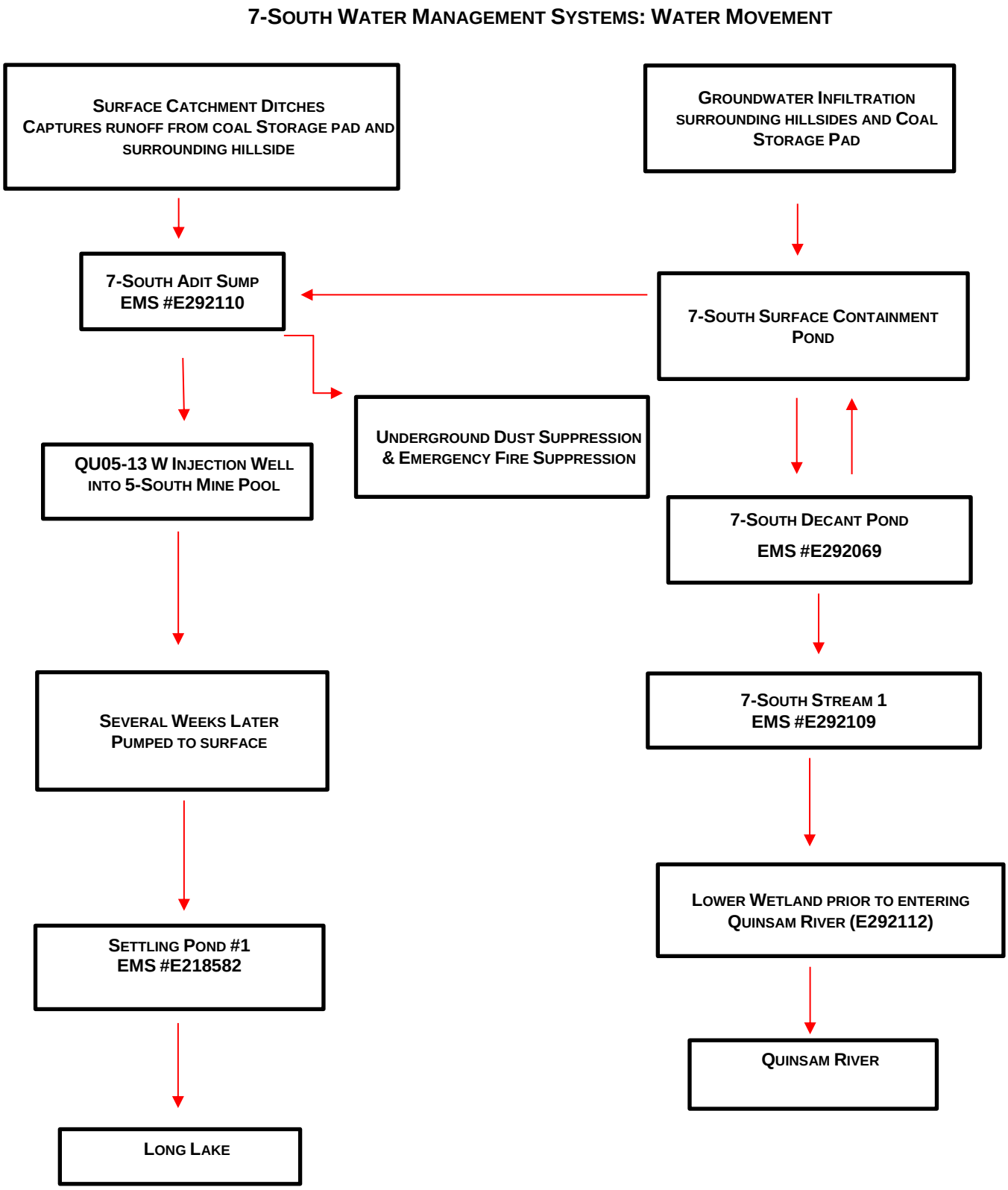

Figure 3: Water Movement and Flow Path at the 7-South Operation

2.2 RECEIVING ENVIRONMENT SITES

2.2.1 *RIVER, STREAM & LAKE MONITORING SITES*

Effluent Permit PE-7008 Section 4.2.3 identifies river, stream, and lake monitoring sites that represent the receiving environment for various mine related discharge(s). Most of these sites are monitored on a 5 in 30 sampling frequency (five events in 30 days) during the spring, summer and fall seasons. Table 2 lists the receiving water monitoring sites.

Table 2 : Receiving Water (Stream and Lake) Monitoring Sites

Streams	Lakes
North Mining Operation	
Quinsam River at Argonaut Road (WA) (EMS # 0126402) Outflow from Middle Quinsam Lake (WB) (EMS # 0900504)	Middle Quinsam Lake Centre (EMS # 206618)
South Mining Operation	
Long Lake Outlet (LLO) (EMS # E219412) No Name Lake Outlet (NNO) (EMS # E217017)	Long Lake at Centre (LLM) (EMS #E206619) No Name Lake (NNL) (EMS # E217018)
7-South Mining Operation (Areas 1 to 4)	
Quinsam River upstream of 7 South Mining Operation (QRDS1) (EMS # E286930) Quinsam River downstream of 7 South Mining Operation (7SQR) (EMS # E292113) Lower Wetland Outlet at the confluence of Quinsam River (LWO) (EMS # E292112)	Lower Quinsam Lake (LQL) (EMS #E292118)
7-South Area 5 Mining Operation	
Iron River upstream of mining operations (IR1) (EMS #E297230) Iron River upstream of 7SA5 (IR6) (EMS # E297231) Iron River downstream of 7SA5 and 242 inputs (IR8) (EMS # E297232) Quinsam River downstream of confluence with Iron River (IRQR) (EMS # E299256)	Lower Quinsam Lake (LQL) (EMS # E292118)

River and Stream Sites in the Quinsam River Sub-Basin

- Quinsam River at Argonaut Road (WA) EMS #0126402 – Located upstream of all mine related discharges; represents background (baseline) conditions for water quality comparisons.
- Outflow from Middle Quinsam Lake (WB) EMS #0900504 – Located at the outflow of Middle Quinsam lake; represents combined discharge from North and South water management systems.
- No Name Lake Outlet (NNO) EMS #E217017 – Located at the outflow of No Name Lake; not presently influenced by surface mine related discharge in the South. The groundwater influence from 2-South Pit to No Name Lake near the outlet site was estimated as 50 m^3/day or 10% of the seepage rate.
- Long Lake Outlet (LLO) EMS #E219412 – Located at the outflow to Long Lake; captures all South mine related inputs on surface and a percentage of groundwater (i.e. LLE and Long Lake Seep).
- Quinsam River Downstream Site 1 (QRDS1) EMS #E286930 – This site is located downstream of Middle Quinsam Lake Outflow (WB), the North Mining Operation and upstream of the 7-South Mining Operation; captures changes in water quality before the 7-South Mine and groundwater inputs related to mining.
- Lower Wetland Outlet at the confluence of the Quinsam River (LWO) EMS #E292112 – This site is located downstream of Stream 1 (7S); represents final surface discharge quality prior to combining with the Quinsam River.
- 7-South Quinsam River (7SQR) EMS #E292113 – Quinsam River downstream of QRDS1, LWO, and 7-South Mining Operation; captures incremental changes in water quality that may be attributed to 7-South PAG-CCR storage and flooded mine pool.

Iron River – Proposed 7-South Area 5 (7SA5) Mining Operation

- Iron River Upstream of Mining Operation (IR1) EMS #E297230 – Located upstream of any mine related activity; represents baseline conditions.
- Iron River Upstream of 7SA5 (IR6) EMS #E297231 – Located upstream of any mine related activity (currently); reflects baseline conditions in an area of different geologic formation(s) and baseline water quality influences than IR1 (mainly arsenic concentrations).

- Iron River downstream of 7SA5 and 242 inputs (IR8) EMS #E297232 – Downstream monitoring site on the Iron River; will be used to monitor potential influence of 7-South Area 5 (if developed).
- Quinsam River downstream of the confluence with the Iron River (IRQR) EMS #E299256 –Located downstream of all current and planned (7-South, Area 5) activities; represents the cumulative mine related discharge.

Lake Monitoring Sites

- No Name Lake (NNL) EMS #E217018– Located within the South mine development area.
- Long Lake (LLM) EMS #E206619 – Located within the South mine development area and the monitoring location receives water from No Name Lake, 2-South flooded mine pool as groundwater and surface water (Long Lake Seep). The outlet end receives seepage from 4-South flooded mine pool, estimated at 0.14 m^3/day and south water management discharge (LLE).
- Middle Quinsam Lake (MQL) EMS #E206618 – Located adjacent to the North mine development area and receives all discharge from the North water management system and upstream (non-mine related) inputs. Long Lake flows into Middle Quinsam Lake at the south end near the outlet (WB) via a small tributary stream (LLO).
- Lower Quinsam Lake (LQL) EMS #E292118 – Located well below mine related discharge(s); reflects the combined influences of Quinsam River and Iron River water quality.

2.2.2 *Groundwater Monitoring Sites*

Numerous groundwater observation wells in the vicinity of pits 2N, 1S, 2S, 3S, 4S, 5S, Block 242, and 7S are monitored. The site, location, frequency, and geological details of these wells are listed the *2016-2017 Annual Groundwater Monitoring Report* in Appendix B, Table 1. As an alternative to the 2N, 1S, 2S, 3S, 4S, 5S, and 7S wells, QCC established monitoring sites at underground sumps. During 2016-2017, QCC monitored 37 locations for groundwater. The *"2016-2017 Annual Groundwater Report"* located in Appendix IX outlines sampling methods and analytical results of the monitoring program for groundwater wells and underground sumps. The table below lists groundwater wells monitored in 2016- 2017.

Table 3: Groundwater Wells and Underground Sumps Monitored in 2016-2017

Area	In-Situ Sumps	In-Situ Wells	Ex-Situ Wells	
2-North Ground Water Monitoring	6M2N	1M2N 5M#2 QU10-13 D	QU08-21G S QU10-10 S QU10-11 S	QU08-21G D QU10-10 D QU10-11 D
River Barrier Pillar		QU11-09 M	QU11-05 S QU11-09 S	QU11-05 D
2-North Plant Monitoring Wells			MW00-1 S MW00-6 S	MW00-1 D MW00-6 D
7-South Groundwater Monitoring	1M7S	QU14-10	QU08-10 D QU08-13 B	QU08-13 A
7-South Area 5, 242 Portal Area		242-D		
5-South Monitoring	5SXC	5SMW		
4-South Monitoring Wells		QU11-01 QU78-161	QU10-07 D QU10-09 S	QU10-08 D QU10-09 D
2/3 South Monitoring Wells		QU11-11 MW00-4	MW00-2 MW12-24	MW12-23

2.3 ADDITIONAL MONITORING PROGRAMS

QCC conducts a diverse environmental monitoring program governed largely by the effluent permit PE: 7008. There are also additional baseline water quality monitoring programs and, in 2017, a sediment and benthic invertebrate monitoring program was conducted.

2.3.1 *Baseline Monitoring Programs*

Quinsam conducts additional monitoring to support permit amendment efforts and to provide additional insight into water quality trends and observations. Although this information is not specifically included in this report, the data may be used in future submissions to the MOE. As part of the 7-South Area 5 permit application, baseline monitoring in the Iron River continues to be performed.

Baseline monitoring and characterizing of water quality for future permitting of the 3-South pit continues. An engineered outlet channel was constructed, which will act as a permanent overflow channel connecting the 3-South sub-aqueous PAG-CCR disposal pond to the drainage channel connecting No Name Lake to Long Lake. Monitoring locations include the 2-South Inflow (2SI), 2-South pit near the outflow (2S), 2-South Channel (2SC), and 3-South Pit (3S). Receiving environment monitoring sites are No Name Lake Outlet (NNO) and three locations on the No Name Lake connector channel. The three sites on the connector channel include:

- downstream of the 3S outlet channel (3SDS)
- a tributary to the connector channel (3SDST)
- 100 m downstream of the tributary and the connector channel (3SDS3)

The sites have been monitored on the 5 in 30 schedule during spring, summer, and fall, and more recently on a monthly basis.

2.3.2 *Sediment and Benthic Monitoring*

QCC conducted sediment and benthic monitoring in August through October 2016 to meet condition 4.2.7 (iii) of the amended Permit PE-7008 (dated September 22, 2014). This monitoring program was designed to supplement existing water quality data by evaluating sediment chemistry and benthic biota in waterbodies that receive mine impacted discharges and reference sites with similar characteristics. Appendix VI describes the program, with details provided in Appendix 1, Table 1 (of that report) listing the sampling sites in the five lakes, one wetland, and one river system for a total of 23 sites. Appendix XI, Figures (2-18) display the monitoring site locations and the table below lists the waterbody type, waterbody name and site outlined in the study.

Table 4: Sediment and Benthic Monitoring Sites

Waterbody Type	Waterbody Name	Site
Lakes	No Name Lake (NNL)	No Name Lake Inlet, NNLI (EMS # E224246) No Name Lake Deep, NNLD (EMS # E217018) No Name Lake Near Seep (EMS # E292114) No Name Lake Outlet (EMS # E217017)
	Middle Quinsam Lake (MQL)	Middle Quinsam Lake Inlet (EMS # E206901) Middle Quinsam Lake Deep (EMS # E292115) Middle Quinsam Lake Near Seep (EMS # E292116) Middle Quinsam Lake Outlet (EMS # 0900504)
	Lower Quinsam Lake (LQL)	Lower Quinsam Lake Inlet (EMS # E292117) Lower Quinsam Lake Deep 1 (EMS # E29118) Lower Quinsam Lake Deep 2 (EMS # E292119) Lower Quinsam Lake Outlet (EMS # E292120)
	Long Lake (LL)	Long Lake Inlet (EMS # E292121) Long Lake Deep (EMS # E292122) Long Lake Near Seep (EMS # E292123) Long Lake Outlet (EMS # E219412)
	Gooseneck Lake (GNL)	Middle Gooseneck Lake (EMS # 1132502)
Wetland	Lower Wetland	Lower Wetland Inlet (EMS # E292124) Lower Wetland Middle (EMS # E292125) Lower Wetland Outlet (EMS # E292112)
Quinsam River	at Argonaut Road (WA)	(EMS # 0126402)
	upstream of 7 South Mining Operation (QRDS1)	(EMS # E286930)
	downstream of 7 South Mining Operation (7SQR)	(EMS # E292113)

2.3.3 *Long Lake Seep Passive Treatment System & Loading Assessment*

Refer to Appendix XII for an annual review of the Long Lake Seep Passive Treatment System and Loading assessment on Long Lake.

2.4 Maintenance & Reclamation Activities

To ensure proper functioning of site wide water management systems, haul roads, roadside ditches, catchment ditches, ponds, culverts, pumps and water lines are maintained on a routine basis. Regular maintenance activities include removal of debris from culverts, replacement of silt fences and straw bales, and removal of sediment build-up from catchment ditches and ponds. Pumps and water lines are inspected daily and maintained as part of the surface inspection.

No operational changes have occurred during the last year, as the Mine has remained in a "*Care and Maintenance"* program since January 2016. Major maintenance of treatment works has not occurred. Composite samplers have been maintained according to the schedule detailed in the *Draft Environmental Procedures Manual*.

Surface disturbance was limited to the South mining area, close to the 3-South pit, where an engineered outlet channel was constructed that will act as a permanent overflow channel connecting the 3-South sub-aqueous PAG-CCR disposal facility to the drainage channel connecting No Name Lake to Long Lake.

The following reclamation and reclamation-related work was completed in 2016 (see the *Annual Reclamation Report for 2016, Mines Act Permit Number C-172* for further details):

- Red Alder seedlings were planted on the 0.78 ha of the 7-South overburden dump upslope of the 7-South settling pond, which had been split into three research plots in 2015 and revegetated with Douglas Fir seedlings +/- Coastal Native Bunchgrass or sodgrass +/- 11-33-11 fertilizer.
- 7-South portal sump slope had top-soil placement and was seeded with Coastal Native Bunchgrass and 11-33-11 fertilizer.
- The 242 mine portal was backfilled with boulder till, with the highwall resloped with till and cover soil and revegetated with Coastal Native Bunchgrass, Sodgrass and an 11-33-11 fertilizer.

- The 3-South outlet channel was constructed, with hydroseed blanketing the disturbed area on both sides of the channel. The hydroseed recipe included Coastal Native Bunchgrass, Coastal Reclamation Mixture seed, and 18-18-18 fertilizer.
- The 3-South east dam construction commenced. The high wall and north dump area was re-contoured and hydroseeded with Coastal Native Bunchgrass, Coastal Reclamation Mixture, and 18-18-18 fertilizer.
- In March 2016, 4-South portals were backfilled and the pad was partially excavated, locating an underground porous culvert, which was subsequently plugged to eliminate water from seeping through the pad. The pad and highwall were resloped with till and cover soil. In April 2016, the area was reforested using Red Alder seedlings, and seeded with Coastal Native Bunchgrass with an 11-33-11 fertilizer.
- The 2-South east highwall was resloped. The resloped highwall and the 2-South west clearing surrounding the weather site was reforested with Red Alder seedlings and seeds, and Coastal Native Bunchgrass with 11-33-11 fertilizer.
- The 1-South sump was infilled and contoured to eliminate water collection, and the surrounding area was hydroseeded with a mixture of Red Alder seed, Coastal Native Bunchgrass, Coastal Reclamation Mixture seed, and 18-18-18 fertilizer.
- 13 exploration drill sites, sumps, and access roads were reclaimed. Reclamation included cementing drillholes, infilling sumps, scarifying drill pads and access roads, and spreading windrowed vegetation back on the drill pads and access roads.
- 25 ha, encompassing the main roads and several soil and till stockpiles were treated with herbicide (targeting Scotch Broom), in accordance with the Quinsam Coal Invasive Plant Management Program.

Reclamation work performed around the 2, 3 & 4 & 7-South areas are expected to substantially improve water quality in the receiving environment by decreasing exposure of weathering waste rock dumps and highwalls

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3.0 CHEMICAL REAGENTS AND WASTE STORAGE

Waste oil and solvents are stored in sealed containers or tidy tanks at secure locations and removed from site for recycling by Terrapure Nanaimo (RS15365). In 2016, 6,300 litres of waste oil was collected and recycled.

Scrap metal at the mine site is collected in designated containers and recycled.

4.0 INCIDENTS - PERMIT LIMIT EXCEEDANCES & PERMIT NON-COMPLIANCES

This section provides a summary of permit limit exceedances and permit non-compliances (PNC) specific to missed samples, parameter analysis, and missing flow data. Appendix 1, Table 2 summarizes permit limit exceedances and non-compliances for 2016/2017. Appendix VII provides the spill reports.

There were 15 reportable total suspended solid (TSS) exceedances and 1 dissolved phosphorous exceedance related to mine discharge during the 2016-2017 reporting period:

- WD: TSS was elevated on 13 occasions correlating to extreme storm events and dewatering of 2-North Mine; spill and non-compliance reports were submitted (DGI 162161, DGI 162328 & DGI 162403 & DGI 163158 & 163326).
- 7SSD: TSS was elevated on two occasions on dates of extreme storm events; the corresponding spill report is DGI 162073.
- Settling Pond #1 at site BDS (under the authorization to bypass the works, E218582) experienced elevated dissolved phosphorous (0.0608 mg/L) above permit limits (0.03 mg/L); the spill report number is DGI 160152.

WD experienced elevated TSS on 13 separate occasions in the Third Quarter (Q3) on October 23rd and November 4th through 13th and again in the Fourth Quarter (Q4) on January 22nd and 30th. The incidents occurred after extreme storm events throughout Q3, which also followed a period of three weeks when there was no dewatering of the 2-North mine pool as the 1-Mains pumping system was down. Once the pumping system was back online, the 2-North, 1-Mains mining section continued to be dewatered. The water levels underground had increased rapidly as a result of precipitation and pump failure and fluctuating water levels may have mobilized local materials and increased TSS levels. PEP was notified upon receipt of results and follow-up action was initiated to ensure the increased TSS levels were localised only; this included additional downstream monitoring and the sample analysis was rushed. Total and dissolved metals were measured in water collected at Settling Pond # 4 and key monitoring locations downstream at WC (which monitors water quality prior to entering Middle Quinsam Lake near the inlet), Middle Quinsam Lake Inlet, and the centre of Middle Quinsam Lake. Initially, the elevated TSS was believed to be associated with elevated iron concentrations, but analytical results indicated concentrations were below the WQG and the permit limit. However, sulphur, sodium, and hardness levels were elevated in the samples. Spill reports were submitted to MoE and MEM.

All other parameters remained below permit limits at Settling Pond # 4 during this monitoring year.

A permit limit exceedance for dissolved phosphorus (P-D) was observed at BDS for one sampling event (April 4, 2016; 0.0608 mg/L). This value exceeded the permit limit of 0.03 mg/L applied to the upstream settling pond, Settling Pond #1 (SPD) E218582 and BDS in accordance with the "*Authorization to Bypass the Works*" letter dated August 25, 2015. A spill report was filed with PEP on April 18. The 24 hour cumulative water volume discharged into Long Lake was 10,722 m^3. Subsequent sampling was performed at upstream sites SPD, SP-EFF, and downstream site Long Lake Entry (LLE); all results were within permit limits.

7SSD experienced elevated TSS levels on two separate events on October 7 and 16, 2016 (27.3 and 35.0 mg/L, respectively). These events occurred after heavy rains.

All PNC incident reports were submitted to the Environmental Compliance website at: environmentalcompliance@gov.bc.ca. These included:

- *Non-compliance PE7008 Missing TSS Equipment Malfunction April 2 - 3rd 2016.* Date submitted April 18, 2016.
- *Non-compliance PE: 7008 Equipment Malfunction May 30 - June 6th, 2016*. Date submitted June 27, 2016.
- *SP4 Non-compliance Equipment Malfunction October 31st through November 20th, 2016.* Date submitted December 1, 2016.
- *Non-compliance PE7008 Missing TSS, Equipment Malfunction October 14, 15, 2016.* Date submitted January 25, 2017.

PNC for continuous discharge occurred intermittently for 29 days out of 365. Discharge was not recorded from May 30 through June 6 and October 31 through November 20, 2016 due to a malfunction in the flow meter. The ISCO Ultra Sonic Flow Meter malfunctioned, erasing continuous flow data. The instrument reset to factory settings while the data was being downloaded to the field laptop. On the second event (October 31 through November 20) field observations and spot measurements were recorded from the flow meter while the new instrument was being shipped to site. A new ISCO signature flow meter with an ultra-sonic level sensor was purchased and installed on November 21, 2016. PNC reports were submitted as required. The instrument has been functioning normally since installation.

As a result of sampler error, no daily composite TSS samples were collected from Settling Pond # 4 on February 21 and 22 and from SPD on February 22, 2017. The composite sampler was functioning normally; however, the samples were not collected, resulting in PNC.

Equipment malfunction occurred at 7SSD on October 14 and 15, resulting in PNC for missed TSS composite samples.

At 7SSD on January 17, 2017 the discharge pipe cracked due to freezing conditions at the discharge line. This damage resulted in a discharge of ponded water for approximately 24 hours (amounting to 25.16245 m^3) and discharged at a rate of 0.29 L/s. Dilution ratios were suitable downstream at 7S during this discharge. As this release of water was not discovered until the next day, a TSS sample was not obtained on the 17th. Throughout the 2016/2017 monitoring year, QCC failed to collect 3 of 21 required composite samples at 7SSD due to equipment malfunction. As a mitigation strategy, the site has had power hard wired to the new composite sampler, which should reduce the risk of equipment failure at this site.

A PNC incident occurred for one sample at SPD on November 9; a daily composite TSS sample was collected but the sample spilled during transit to the laboratory, leaving insufficient volume to analyze for TSS.

A TSS sample was not collected from one monthly sample at WP EMS #E207412 due to the parameter not being included on the chain of custody sent to the analytical laboratory.

Harsh winter conditions (snow and ice) made it unsafe to collect samples on the Iron River and Quinsam River (at IR1, IR6, IR8, 7SQR and IRQR) during February's monthly sampling events.

5.0 MATERIALS AND METHODS: ENVIRONMENTAL MONITORING PROGRAM

Water, sediment, and benthic samples were collected in accordance with methods described in "*The British Columbia Field Sampling Manual for Continuous Monitoring of Air- Emissions, Water, Soil, Sediment, and Biological Samples*" (MOE 2013)[1] and the "*Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators, Version 2, June 2016* (MOE 2016)[2]. This includes following of specified field protocols: use of measures to reduce potential cross-contamination; use of field duplicates, split samples, and method blanks; assessment of within site variability; and checking for transcription errors.

Maxxam Analytics (Burnaby B.C.), a Canadian Association for Laboratory Accreditation (CALA) designated laboratory, conducted the analysis of surface, groundwater, and sediment samples. Phytoplankton samples were analyzed by Stantec Consulting Ltd. (Burnaby B.C.). Zooplankton samples were analyzed by Fraser Environmental (Surrey, B.C.). Benthic samples were analyzed by Cordillera Consulting (Summerland B.C.).

5.1 WATER QUALITY ANALYSIS

PE-7008 identifies the parameters to be analyzed in effluent. Each site has specific requirements for parameters to be analyzed. The following parameters are generally monitored at each station:

- Total suspended solids (TSS) (mg/L)
- Total dissolved solids (TDS) (mg/L)
- pH-Field (standard units)

[1] MOE. 2013. "The British Columbia Field Sampling Manual for Continuous Monitoring of Air- Emissions, Water, Soil, Sediment, and Biological Samples". Available at: http://www2.gov.bc.ca/assets/gov/environment/research-monitoring-and-reporting/monitoring/emre/field_sample_man2013.pdf

[2] MOE. 2016. *Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators, Version 2, June 2016*. Available at: http://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/water_air_baseline_monitoring.pdf

- Conductivity-Field (uS/cm)
- Alkalinity (mg/L as $CaCO_3$)
- Hardness (mg/L as $CaCO_3$)
- Sulphate (mg/L)
- Ammonia as nitrogen (mg/L)
- Nitrate/nitrite combined as nitrogen (mg/L)
- Dissolved Organic Carbon (mg/L)
- Total phosphorus and dissolved phosphate (mg/L)
- Total and dissolved metals (mg/L)
- Oil and grease (for sites SPD and WD only) (mg/L)
- Rainbow trout bioassays (for sites SPD, WD and 7SSD only)
- 7 Day *Ceriodaphinia dubia* chronic toxicity test (at site 7S only)

The following parameters are specific to lake sampling:

- Dissolved oxygen (mg/L)
- Dissolved oxygen (Percent saturation)
- Temperature (Celsius)
- Light Extinction
- Oxidation reduction potential
- Biological
    - Phytoplankton (chlorophyll “a” and phaeopigment)
    - Phytoplankton (counts and identification to species)
    - Zooplankton (counts and identification to species)
    -

All surface water samples requiring filtering and preserving are collected in 1L plastic bottles and sent to Maxxam as raw water samples; samples were filter and preserved at Maxxam to reduce the risk of cross-contamination on site. Groundwater samples were filtered through a 0.45 µm filter and preserved on site. Maxxam analyzed dissolved and total metals samples using the CCME/BC WQG analytical package to provide suitable detection limits for comparison with guidelines and as per MOE requirements. This included use of conventional and Inductively Coupled Plasma Mass Spectrometry (ICPMS) equipment.

5.2 ENVIRONMENTAL MONITORING EQUIPMENT

The following equipment was used to conduct the surface monitoring program at Quinsam Coal:

- ISCO 4210 flow meters equipped with a paper chart plotter and datalogger, which are connected to a sonic depth sensor to measure water height above decant (Settling Pond #1) and an ISCO signature flow meter with an ultrasonic sensor (Settling Pond #4). Both instruments use water height to determine discharge by using provided weir/orifice equations. Continuous monitoring is achieved using a datalogger and downloaded using a computer with Flowlink software.
- A Sitrans F M MAG 8000 CT electromagnetic flow meter to record discharge at 7SSD.
- ISCO 12-volt automatic samplers programmed to collect daily composite samples for analysis of TSS deployed at all permitted discharge locations.
- A YSI Exo 1 multiparameter sonde and YSI Pro-Plus, to obtain physical water quality parameters, and calibrated prior to each sampling event following manufacturer specifications for maintenance and handling.
- Two handheld sondes (Eutech PC Tester 35), for routine monitoring of pH and conductivity.
- Levelogger pressure transducers, used to obtain continuous water level measurements at Long Lake Outlet, Middle Quinsam Lake Outlet and the Iron River, with data used to create daily hydrographs.
- A 4 litre Beta sampler, to collect lake water samples; the sampler is constructed with materials to minimize interference cross contamination of metals and the 4 litre volume provides sufficient water for all required analyses in one deployment per depth.
- A Davis Vantage Pro 2 weather site module, to record rain, relative humidly, atmospheric pressure and temperature, with data downloaded via computer.
- A Campbell Scientific weather site, to record temperature, precipitation, wind, humidity, solar intensity, and snow accumulation data (installed next to the 2-South pit in August 2015, became operational in October 2015).
- An Eckman grab sampler, for collection of sediment and benthic invertebrate samples.

Although this list is not exhaustive, it provides an overview of the equipment used for environmental monitoring. Groundwater monitoring equipment is listed in Appendix IX, Section 3 of the Groundwater Report.

5.3 QUALITY ASSURANCE/QUALITY CONTROL

Quality Assurance/Quality Control (QA/QC) sampling followed protocols described in MOE (2013, 2016). QA/QC practices were integrated into the water sampling program to maintain the integrity, consistency, and reproducibility of sampling techniques and results of environmental monitoring. Various samples, including field blanks, trip blanks, equipment blanks, and replicates, are used to evaluate methods and identify potential issues related to sampling techniques and equipment. . Each sample type serves a specific purpose:

- Field Blanks – Samples of laboratory-grade, reverse osmosis, deionized water deposited into sample containers in the same location in which a field sample is collected. These samples are carried and treated in the same manner as a field sample to assess any potential cross-contamination that may occur due to sampler technique.
- Trip Blanks – Samples of laboratory-grade, reverse osmosis, deionized water deposited into sample containers in a laboratory setting are transported into field locations with samplers to determine if any cross-contamination occurs due to the handling or storage of sample bottles.
- Equipment Blanks – Samples of laboratory-grade, reverse osmosis, deionized water placed into a piece of equipment at a sampling station to identify potential cross-contamination associated with equipment (e.g., Beta sampler), sampling procedures, or general cleanliness.
- Replicates – Samples collected at the same location and time by the same sampler using the same techniques and equipment. Replicates samples are used to assess precision for each analyte analyzed. Observed variance between replicates identifies uncertainty in sampling, environmental heterogeneity, and laboratory analysis.

Field replicate samples are collected during every sampling event, accounting for approximately 10% of analyses requested from the laboratory. One sampling event may span two or more days. The primary sampling events are:

- Weekly, monthly, and quarterly sampling for all permitted monitoring locations
- 5 in 30 day programs, three times per year for receiving environment sampling for lakes, rivers and streams
- Monthly sampling at Long Lake Treatment System ponds, with a replicate collected quarterly

Relative Percent Difference (RPD) values between replicate samples are calculated using the following formula (MOE 2013):

$$RPD = \frac{(Sample\ Result - Duplicate\ Result)\ X\ 100}{(Sample\ Result + Duplicate\ Result)\ /\ 2}$$

The RPD is used to measure variance between replicates and overall integrity and representation of samples. Data quality objectives (DQO) for RPD are set for results where at least one of the duplicates is reported as more than five times the laboratory Method Detection Limit (MDL) and are listed in MOE (2013). Values less than 20% are deemed acceptable; values between 20 and 50% identify a potential problem, and values greater than 50% identify a definite problem. The most likely reason for a high RPD is sample misrepresentation or cross-contamination, heterogeneity of the waterbody, (especially if repeatedly found for a particular site), method or piece of sampling equipment. RPD calculations with values greater than 20% and 50% are presented in Appendix I, Table 64.

During the 2016/2017 monitoring year, 72 replicate surface water samples were collected. Of the 3720 analyzed parameters in these samples, 83 (1.6%) had an RPD greater than 20% while 23 of the 83 (0.6% of total) had an RPD greater than 50%. Duplicate analyses for total copper, dissolved copper, and total aluminum accounted for the most frequent instances of RPD greater than 20%, followed by arsenic, sulphate, iron and manganese. These parameters were above the detection limit in all samples analyzed and typically were more than five times the detection limit, making them more likely to fail than others. Copper accounted for many of the instances of RPD greater than 50%, which might be associated with the low detection limit used. Overall there does not seem to be a parameter displaying enough RPD magnitude to identify a serious problem needing immediate attention. QCC will continue to adhere to sampling practices identified in MOE (2013) and promote best practices at all locations.

All replicates from in-mine release sites had an RPD less than 20% and as a result were not included in this calculation. Of the 83 instances of RPD greater than 20%, 54 were from lake samples and 29 were from river samples (more samples and more replicates were taken from lakes than from rivers). High RPD values were encountered in previous years in lake samples prompting QCC to undertake an internal investigation of lake sampling techniques in 2016. It was concluded that greater cleanliness, care, and storage of lake equipment may increase sampling integrity. The beta sampler was inspected and replaced as small leaks were found near the

gaskets that lock the chamber together. A more rigorous cleaning program of the equipment was established in 2016, including the use of hydrochloric acid mixed with deionized water after every lake site to limit cross-contamination and accumulation of any particles. In previous years, between sample locations, the sampler was rinsed three times with deionized water, but not hydrochloric acid. Also, a sonar depth finder was purchased and used to accurately obtain the current bottom depth of each lake sampling location rather than relying on previous data and readings from the sonde's pressure transducer. This reduced the potential for disturbance of water at the sediment interface and introduction of sediment into the sampler. This unit allows greater control of sampling depth and reproducibility of week-to-week sampling elevations for more comparable lake data.

Replicate samples (NNL1, NNL4, NNL9 and WA) saw RPD values for turbidity and TSS (QRSD1) greater than 20% indicating that some metals (total aluminum and copper) associated with those replicates had an RPD greater than 20% suggesting natural heterogeneity within those samples.

The DQO for field blank samples was that concentrations should not be significantly greater nor occur more frequently than for laboratory method blanks (MOE 2013). Results greater than two times the laboratory MDL were identified and investigated to determine potential contamination.

Field blank, trip blank, and equipment blank results of laboratory grade deionized water were within the acceptable range for samples analyzed in 2016/2017 (Appendix I, Table 42). Nine blank samples were analyzed for sulphate and metals; all results met the DQO, indicating acceptable field sample collection and handling.

Results of the 2016/2017 QA/QC review indicate confidence in the ability of QCC to collect and analyze samples that meet required accuracy and precision requirements. Internal performance audits will continue and any identified deficiencies will be investigated to adjust sampling protocol. All employees will be kept up to date with sampling procedures and provided with any training and equipment necessary.

A variance analyses to identify outliers is performed prior to uploading analytical data into the database. Any results outside 95% confidence intervals (within 4 standard deviations) of previous results are investigated, and if needed Maxxam is contacted and the results are rerun and a new report issued that include a review of Maxxam's internal investigation.

Maxxam Analytics laboratory performs internal QA/QC on all sample sets that are analyzed. This is included in the laboratory report provided from Maxxam and reviewed by QCC. The internal QA/QC performed by Maxxam Analytics meets laboratory standards. Maxxam Analytics internal QA/QC involves the following procedures with every sample set analyzed:

- Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
- Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
- Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

6.0 HYDROLOGY

6.1 NORTH WATER MANAGEMENT SYSTEM

6.1.1 *AUTHORIZED DISCHARGE RATES AT SETTLING POND #4 (WD) E207409*

Maximum authorized rates of discharge at WD are 0.32m^3/s (instantaneous) and 0.08m^3/s (annual average) or 2,522,880 m^3 over a period of 365 days. Maximum discharge rates were below 0.32m^3/s in 2016/2017, and were highest (0.236m^3/s) during heavy precipitation events in November and December 2016 and February 2017. Cumulative discharge was 3,401,839 m^3, equivalent to an annual average discharge rate of 0.110m^3/s, which is higher than the authorized average (0.08 m^3/s or 2,522,880 m^3). Figure 4 displays maximum daily discharge and cumulative discharge compared to permit limits.

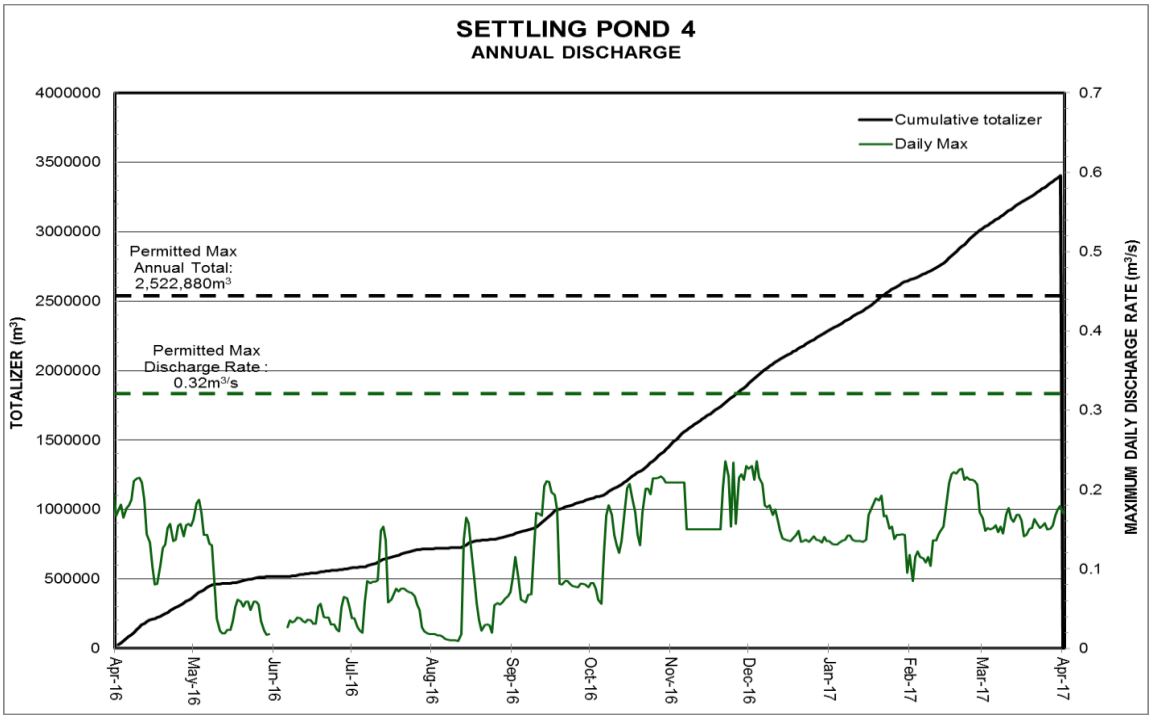

Figure 4: Settling Pond #4 Maximum Daily and Cumulative Discharge, 2016/2017

The annual average flow rate exceeded the maximum permissible value due to elevated discharge rates at WD during spring, fall, and winter coinciding with increased (seasonal) precipitation events. Extreme storm events during the fall and winter seasons increased surface runoff and the rate of underground dewatering to maintain water levels in the 2-North mine. Discharge was higher during the 3rd Quarter (October through December) than in the 4th Quarter (January to March), when conditions were drier and the underground pumping rate was lower.

A summary of discharges from Settling Pond # 4 is displayed in Appendix I, Tables (28-29).

6.2 SOUTH WATER MANAGEMENT SYSTEM

6.2.1 *AUTHORIZED DISCHARGE RATES AT SETTLING POND #1 (SPD) E218582*

Maximum authorized rates of discharge at SPD are 0.46m^3/s (instantaneous) and 0.10m^3/s (annual average) or 3,153,600m^3 over a period of 365 days. Both annual maximum flow (0.221m^3/s) and annual average flow (0.0290m^3/s) were well below the permitted rates. Figure 5

shows maximum daily discharge and cumulative discharge compared to permit limits.

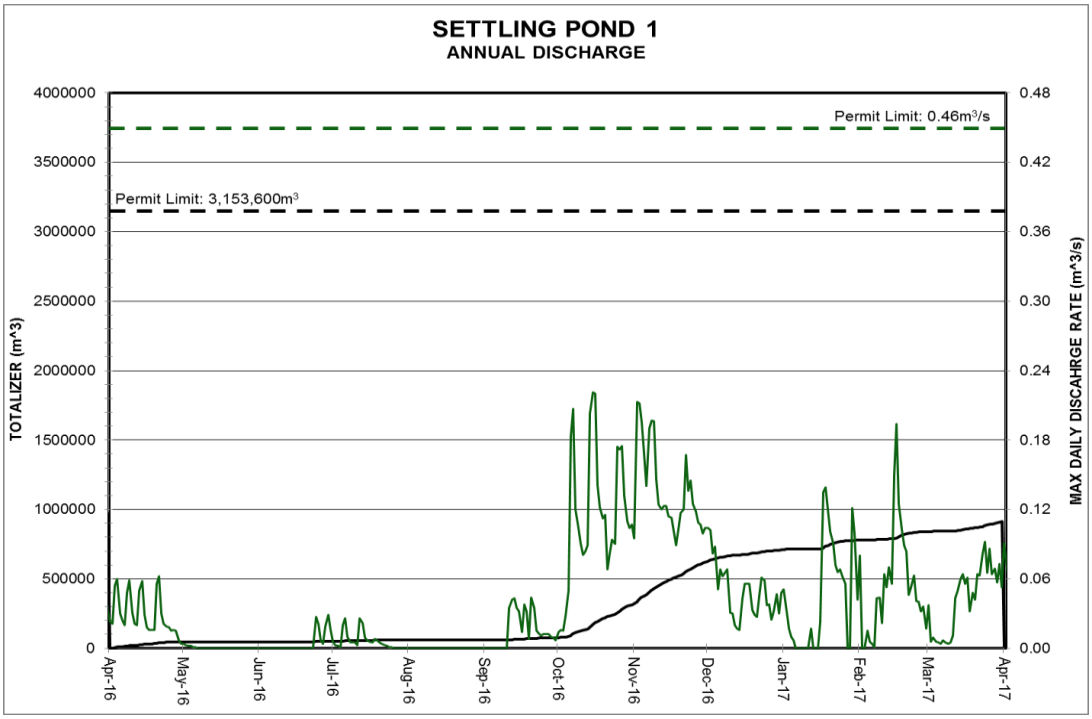

Figure 5: Settling Pond #1 Maximum Daily and Cumulative Discharge, 2016/2017

Daily discharge peaked at SPD several times during October through December and again in February, coinciding with heavy precipitation resulting in increased surface runoff and pumping from the 3-South pit and 5-South underground. The maximum observed rate of discharge was in October 2016. With the low precipitation recorded in spring and summer of 2016, there was no flow recorded from May 7 through June 22 and July 26 through September 10. There was pumping at 3-South pit in summer 2016 with discharge to and out of SPD, due to construction in the pit and surrounding area. Normally the settling pond does not discharge for the entire summer period.

A summary of SPD discharge is displayed in Appendix I, Tables (30-31).

6.2.2 *Initial Dilution zone Monitoring Site, South Water Management System Entrance into Long Lake (LLE) E292130*

Flow monitoring is required weekly at LLE, which discharges near the outlet of Long Lake. Discharge at LLE represents the combined flow from the South water management system (SPD and SPEFF) along with groundwater from the 4-South coal pad area and non-mine related surface water from the upstream wetland and drainage features. As such, this site provides cumulative flow data representing all permitted discharges from the South water management system prior to entering Long Lake near the outlet.

Flow at LLE is well correlated with precipitation events and, historically, experiences a seasonal dry period during summer. However, since commencement of the Long Lake Seep treatment system, a base flow (corresponding with treatment system discharge of 4 L/s) is often present.

Appendix II, Graph 64 displays discharge versus precipitation at LLE.

6.2.3 *Seep Monitoring Sites, Long Lake Seep (LLSM) – E292131*

Manual flow measurements are obtained weekly at the LLSM weir. The flow information is available in Appendix II, Graph 63. The flow recorded at Long Lake Seep indicates a dependency on mine pool (void) water levels as depicted in Figure 6. Mine pool water levels correlate with seasonal precipitation, with highest levels observed in November 2016. As mine pool levels decrease below a certain elevation in late spring, flow at the seep decreases substantially and temporarily stops. In 2016, the seep ceased to flow for four months (May 24 through September 26). It is determined that seep flow is most closely related to water level at the monitoring well MW004 and the threshold level for seep flow is approximately 303.5 - 304 mASL. This trend will continue to be monitored and verified in the future.

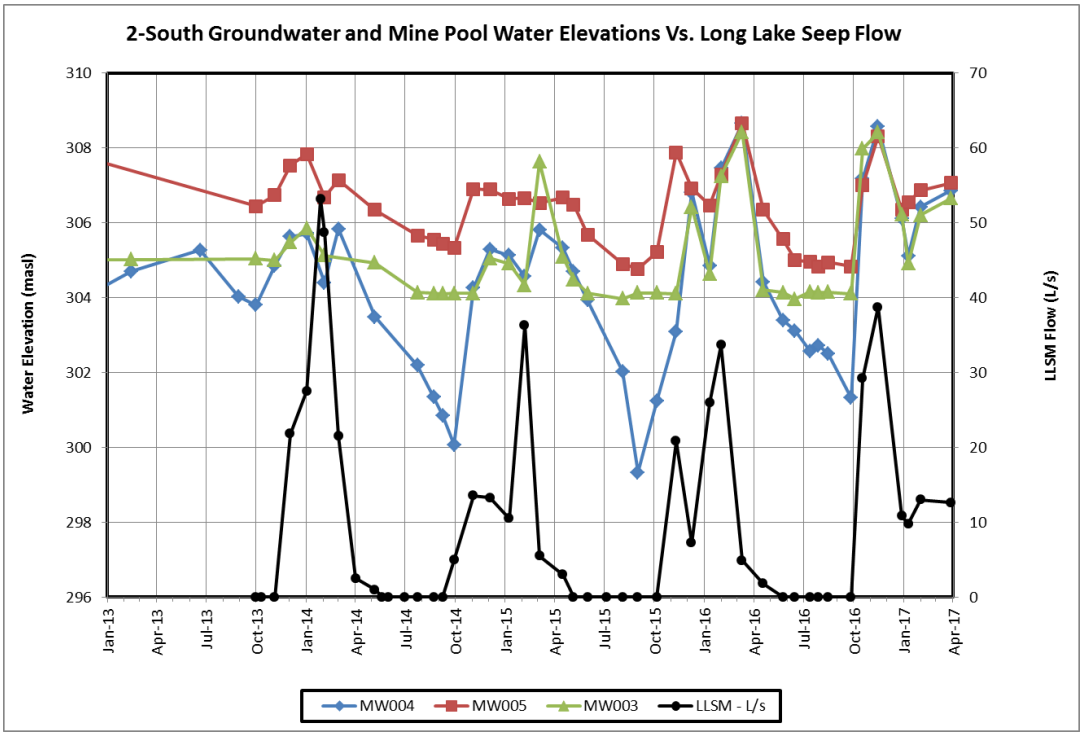

Figure 6: Groundwater and Mine Pool Water Elevations vs. Long Lake Seep Flow, 2016/2017

6.3 7-South Mining Operation Decant (7SSD) - E292069

The maximum authorized discharge from settling pond 7SSD is 0.005m^3/s (5 L/s). However, discharge is dependent on assimilative capacity of Stream 1 (7S) and, therefore, dynamic in nature. To facilitate determination of the appropriate discharge level at 7SSD, a flow rating curve was developed for monitoring site 7S (Figure 7) to allow instantaneous flow levels at 7S to be measured by reading the installed staff gauge.

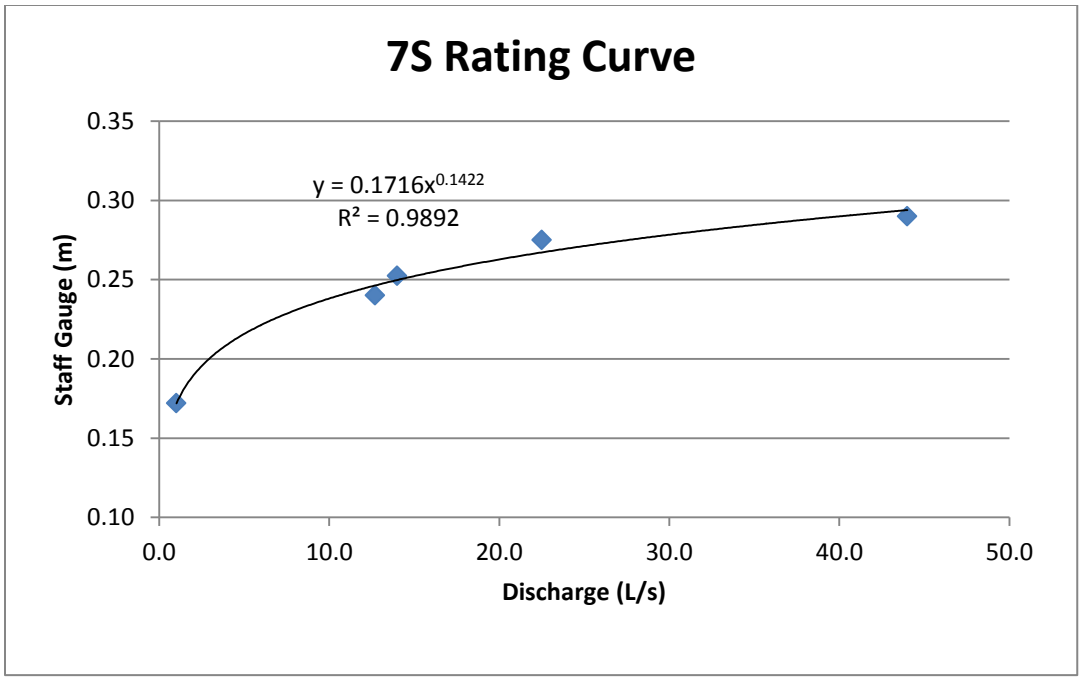

Figure 7: Monitoring Site 7S Stage Discharge Curve

Initially, an 8:1 dilution ratio was identified to maintain desirable water quality in the receiving environment, monitored at downstream site Stream 1 (7S). However, throughout the 7-South operational period, a lower dilution ratio has been shown to allow WQG's to be met in the receiving environment (site 7S). The dynamics of this system are still being monitored and measured; as a longer term dataset is developed, the information will be evaluated to optimize discharge rates, while continuing to protect aquatic life.

In 2015, modifications were made to minimize discharge from 7SSD. The containment pond (7SCP) that delivers water into 7SSD was enlarged to accommodate more water. Additional pumps were placed at 7SSD and 7SCP to decrease 7SSD discharge and assist environmental personnel in water management. The revised system pumps water from 7SSD and 7SCP to 7SPS. The pump at 7SCP runs on an automated float system where water levels are kept below the overflow channel into 7SSD. During high precipitation events, a secondary pump can be activated to assist in pumping water to 7SPS. This pump can also be relocated to 7SSD, where any accumulated water can be diverted into 7SCP. This system does not eliminate all discharge from 7SSD but substantially reduces discharge frequency and aids in management during times of heavy precipitation.

Figure 8 shows 7SSD discharge rates and local precipitation. Discharge rates were substantially reduced during the 2016-2017 monitoring period compared to previous years, which had zero discharge from April to October. Discharge at 7SSD is exclusively influenced by groundwater inputs and precipitation. Appendix I, Table 32, displays cumulative flow measured at 7SSD for 2016/2017. Discharge occurred for 12 days over the year, totaling 731.274 m^3. Maximum discharge rates did not exceed the maximum permitted discharge (5 L/s) and a dilution ratio of >8:1 was maintained at all times. Appendix I, Tables 33-34, provide the 7SSD and 7S dilution ratios for 2016-2017.

Discharge mostly occurred during times of extreme rain events when the inflow volume of water exceeded the pumping capacity.

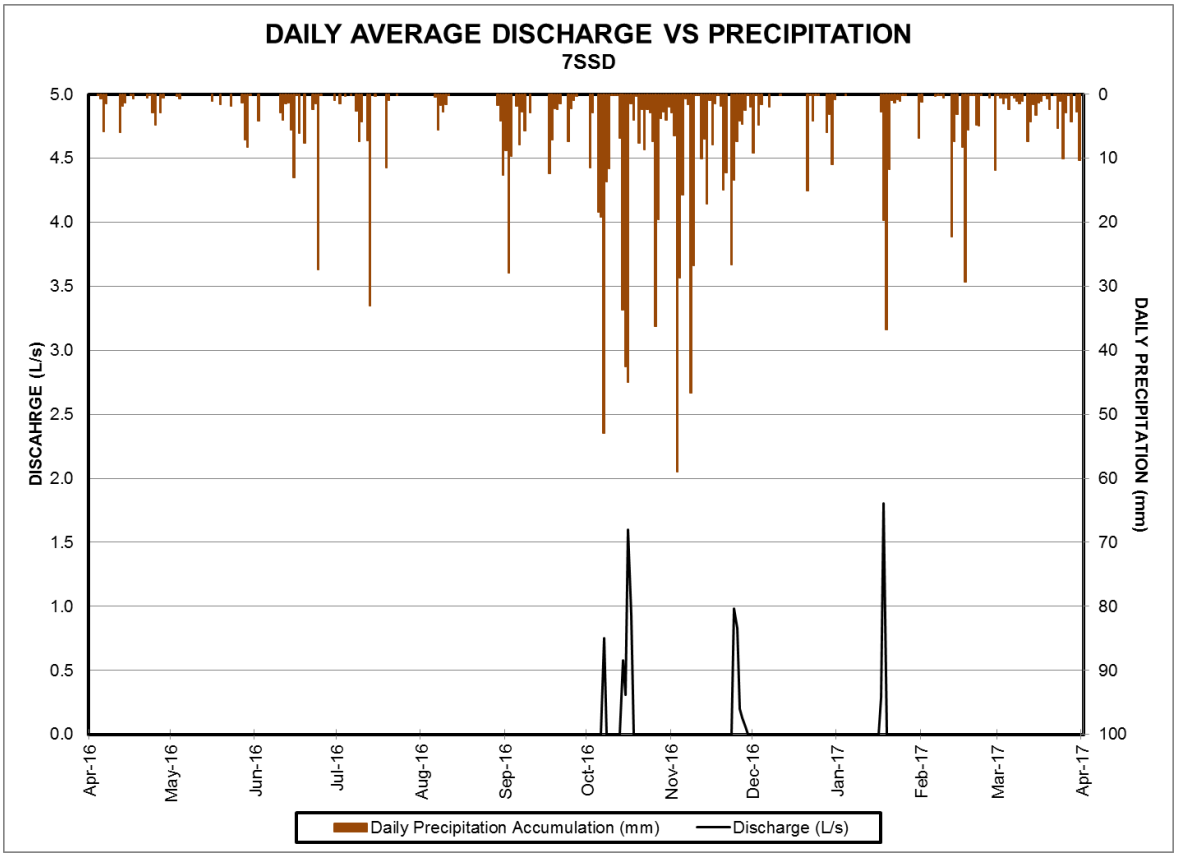

Figure 8: 7SSD Discharge, 2016/2017

6.4 RECEIVING ENVIRONMENT

Hydrometric stations in the receiving environment monitor hydrological conditions at key locations affected by QCC operations. Stage discharge curves for these stations have been developed using various methods (e.g. staff gauge, pressure transducer, manual measurements) and are periodically updated to ensure that the full range of flow is captured. The information is used to evaluate water quality and, in turn, determine assimilative capacity of the receiving environment with respect to mine related discharge. Moreover, flow is well correlated with lake flushing and turnover events, which directly influence concentrations of certain parameters (e.g. sulphate).

Flow data for WA is obtained from the Environment Canada monitoring station "Quinsam River at the Argonaut Bridge"; the data is currently subject to revision and has not been approved. The flow for WA is controlled upstream by the BC Hydro diversion dam to Gooseneck Lake; therefore, the volume of water diverted for hydro generating purposes influences flows at WA and WB. Accordingly, water levels at these two stations are not as closely correlated with precipitation as they are for other receiving environment stations.

Flow monitoring stations on the Iron River, Stream 1, and Long Lake system(s) are directly influenced by precipitation and the hydrographs typically show a pronounced peak following a precipitation event. This increase generally represents additional dilution and, therefore, assimilative capacity (for most parameters) in the receiving environment.

Appendix II, Graphs (61, 62, 65, 67 and 68) display flows compared to water level measurements and precipitation for the receiving environment hydrometric stations (WA, WB, LLO, 7S and LIR).

7.0 WATER QUALITY: IN-MINE MINE RELEASES & WATER MANAGEMENT SYSTEMS

This section presents results of the 2016/2017 water quality monitoring program for the North, South, and 7-South in-mine releases and water management systems for the major monitoring locations (e.g. settling ponds, discharges) and parameters of interest, to provide context for evaluating receiving environment water quality. The data for all in-mine release water quality monitoring stations are presented in Appendix I, Tables (4 - 27 and 35- 37) with tables (19 and 23) representing the initial dilution zones for the south mine area (LLE) and 7S-South Mine area (7S). Weekly field pH and conductivity results are presented in Appendix I, Tables (38 and 39).

Appendix I, Tables (44 - 74) provide a six year statistical summary (year over year, minimum, maximum, average, median, geometric mean, count, count < detection limit (DL), standard deviation, first quartile, third quartile and standard error) for 27 parameters measured in the Settling Ponds, applicable receiving environment monitoring stations, and ex-situ groundwater wells. Monitoring years 2011-12 to 2016-17 are presented, where data is available. Table 5 below lists the monitoring stations, parameters, and statistics included in this evaluation.

For a summary of permit limit exceedances please refer to Appendix I, Table 2 and Appendix X to review the Annual Status Form prepared for PE-7008.

Table 5: List of Monitoring Stations, Parameters and Statistics

Monitoring Stations		
WA	LLS	
WD	LLSM	QU0813A
MW001D	MW002	QU0813B
MW001S	QU1009D	QU0821GD
MW006D	QU1009S	QU0821GS
MW006S	SPD	QU1010D
WC	LLE	QU1010S
MQL1	LLM1	QU1011D
MQLB	LLMB	QU1011S
NNL1	LLO	QU1105S
NNLB	WB	QU1109S
NNO	7SSD	7SQR
Parameters		
Arsenic (As-T)	Iron (Fe-T)	Lead (Pb-T)
Arsenic (As-D)	Iron (Fe-D)	Lead (Pb-D)
Aluminum (Al-T)	Manganese (Mn-T)	Sulphate (SO4-D)
Aluminum (Al-D)	Manganese (Mn-D)	Zinc (Zn-T)
Alkalinity (Alk-T)	Mercury (Hg-T)	Zinc (Zn-D)
Cadmium (Cd-T)	Mercury (Hg-D)	Phosphorous (P-T)
Cadmium (Cd-D)	Hardness (Hard-T)	Phosphorous (P-D)
Copper (Cu-T)	Nickel (Ni-T)	Nitrate & Nitrite combined (N-NO2,3)
Copper (Cu-D)	Nickel (Ni-D)	Ammonia Nitrate (N-NH3)
Statistics		
Count	Geometric Mean	1st Quartile
Minimum	Count <DL	Median
Maximum	Standard Deviation	3rd Quartile

7.1 NORTH WATER MONITORING SITES

The two primary monitoring locations in the North water management system are located at Settling Pond #4, sedimentation pond decant (WD) EMS #E207409 and the final discharge point above Middle Quinsam Lake (WC) EMS #E207411. A discussion for these two sites is presented below. Results for WD and WC including additional monitoring locations in the North mine area are provided in Appendix I, Tables (4 -10 and 37 - 38).

7.1.1 *SETTLING POND #4 (WD) EMS #E207409*

Results for the 2016/2017 monitoring program demonstrated that water quality for all permitted parameters (except TSS) were within the permit limits listed in Table 6. Section 4 provides a summary of exceedances and Appendix (VII) provides the submitted Spill Reports. Appendix I, Tables (4, 25, 35 and 38) provide water quality results for Settling Pond #4.

Table 6: Permit Limits Applied to Settling Pond #4

Parameters	Limit	Unit
Total Suspended Solids (daily composite)	25	mg/L
Total Suspended Solids (hourly composite)	35	mg/L
pH	6.0-8.5	mg/L
Ammonia (as N)	1.0	mg/L
Phosphorus (as P)	0.03	mg/L
Oil and Grease (total)	10	mg/L
Aluminum, dissolved	0.5	mg/L
Copper, dissolved	0.02	mg/L
Iron, dissolved	0.3	mg/L
Lead, dissolved	0.05	mg/L
Zinc, dissolved	0.1	mg/L
Rainbow Trout Bioassay (*Oncorhynchus mykiss*)	No mortalities at 100% effluent concentration after 96 hour	96LC50

7.1.2 *General Parameters*

pH

In 2016/2017, field pH values displayed little variance, ranging from 7.40 to 8.20. Starting in April 2013, field measurements (instead of lab) were used for improved accuracy and reliability. Consequently, a slight decline in reported pH was observed compared to historic results as depicted in Appendix II, Graph 3. Weekly field pH results are provided in Appendix I, Table 38.

Total Suspended Solids (TSS)

There were more TSS exceedances in 2016/2017 than in previous years as extreme storm events led to increased runoff and dewatering of the 2-North underground in quarters three and four. Observations with respect to precipitation, dewatering system operation, pond turbidity, concentrations of TSS and metals will continue to refine best practices and minimize TSS concentrations in WD. Appendix VII presents the information and indicates the situation was attributed to extreme storm events. QCC intends to contact the Director in regards to establishing a maximum level for TSS during extreme storm events, as per Section 2.1.7 of the Effluent Permit, Effluent Characteristics (for Total Suspended Solids). This section states "*Variances may be allowed by the Director for higher discharge rates. The Director may as well, in the future, establish a maximum level for total suspended solids during extreme storm events*".

Hardness and Dissolved Sulphate

Both hardness and sulphate concentrations at WD have displayed marked decreased since 1996; see Graphs 1 and 2 in Appendix II. During 2016/2017, hardness ranged from 292 mg/L to 664 mg/L (averaging 423 mg/L), while sulphate ranged from 320 mg/L to 1170 mg/L (averaging 734 mg/L). Average monthly sulphate concentrations peaked during spring and summer 2016, when discharge rates were lowest signaling minimal mine water dilution and potential evapoconcentration.

As observed in previous years, sulphate concentrations follow a seasonal pattern, with lower concentrations during late winter and early spring and higher concentrations during summer and early fall. Sulphate continues to be the primary parameter of interest from mine related discharges, as it's a common and traceable parameter associated with coal mining.

7.1.2.1 *Dissolved Metals*

Since commencement of underground mining in 1992, dissolved aluminum, copper, iron, lead, and zinc concentrations have remained well below permit limits, with minor, irregular fluctuations noted. In 2016/2017, concentrations measured in samples filtered in the laboratory were typically below detection limits and were well below permit limits. Seasonal trends for parameters of interest were as follows (Appendix II, Graphs 5 through 8):

- Dissolved iron remained below permit limits throughout the monitoring year.
- Dissolved aluminum displayed peak concentrations in October through December, with a maximum of 0.0297 mg/L recorded in November; well below the permit limit of 0.5 mg/L
- Total manganese showed a peak (0.551 mg/L, November 2, 2016) related to high discharge events and TSS exceedances. As there are no permit limits for manganese, concentrations were compared to the WQG of 0.8 mg/L. All results were below the WQG; therefore, adverse effects on the downstream receiving environment would not be expected
- Total iron concentrations have shown an increasing trend since 2006, with concentration variations relating to fluctuating 2-North mine pool water elevations. Concentrations ranged from 0.215 mg/L to 1.33 mg/L in 2016/2017, averaging 0.613 mg/L, with peaks in April 2016 (1.18 mg/L) and December 2016 (1.33 mg/L). The relationship between the mine pool water elevation and elevated total iron concentrations at Settling Pond #4 is believed to be directly related to water flushing the oxidized mine walls and releasing iron into the water column. Appendix II, Graph 8 displays water elevations in the 2-North mine pool (via QU10-13 D) and total iron concentrations at WD

7.1.3 *Culvert into Middle Quinsam Lake (WC) EMS #E207411*

Monitoring station WC represents the cumulative surface water discharge from WD prior to entering Middle Quinsam Lake. Concentrations for parameters of interest are typically slightly lower at WC than at WD, likely attributed to the attenuation that occurs along the WD-WC flow path that includes an expansive wetland. The exception observed is sulphate concentration during summer when discharge and dilution are lowest and evapoconcentration is thought to occur. During 2016/2017, sulphate ranged from 482 mg/L to 1080 mg/L, averaging 691 mg/L at

WC. Metal concentrations are attenuated in the wetland, likely due to uptake by vegetation. This was particularly evident for total iron during times of elevated TSS and iron at WD. Total iron ranged from 0.039 mg/L to 0.147 mg/L averaging 0.309 mg/L. The wetland also provides additional settling and filtration for TSS, which was below the DL (4 mg/L) throughout 2016/2017, even when TSS was elevated at WD (Appendix II, Graph 4). The 2016/2017 results demonstrate the wetland is functioning to reduce TSS before the discharge enters Middle Quinsam Lake. It is important to remember that after passing WC, the discharge water enters another large wetland before entering the inlet of Middle Quinsam Lake approximately 350 m downstream of WC.

7.2 SOUTH WATER MONITORING SITES

The primary monitoring locations in the South water management system are stations that directly influence water quality in Long Lake: Settling Pond #1 decant (SPD) EMS #E218582, Biocell Downstream (BDS), Long Lake Entrance (LLE) EMS #E292130, and Long Lake Seeps (LLS & LLSM) EMS #E292131. The BDS station is an additional location established under the '*Authorization to Bypass the Works*' and is intended to capture the combined discharge of the Long Lake Seep Passive Treatment System Effluent (SPEFF) and SPD. Accordingly, permit limits for SPD have been applied to this site. Please refer to the Long Lake Seep Passive Treatment System and Annual Loading Assessment found in Appendix XII for a full report on loading into Long Lake. This includes point source loading at sites SPD, SPEFF and the Seeps and quantified contributions of dissolved arsenic, iron, sulphate and manganese. The greatest point source contributor of sulphate into Long Lake was SPD with the Seeps contributing the second greatest overall load.

Results for the additional monitoring locations in the South mine area (e.g. SPC) are provided in Appendix I, Tables (11 through 21, 35 through 37 and 39).

7.2.1 *SETTLING POND #1 (SPD) EMS #E218582 AND BIOCELL DOWNSTREAM (BDS)*

These two sites represent the cumulative mine related discharge from the South water management system and are discussed together for ease of comparison. Permit limits applied to SPD and BDS are shown in Table 7. All parameters were below permit limits at SPD and BDS in

2016/2017, except for dissolved phosphorus at BDS on April 4, 2016 (0.0608 mg/L). The corresponding spill report number is DGI 160152.

Table 7: Permit Limits Applied to SPD and BDS

Parameters	Limit	Unit
Total Suspended Solids (daily composite)	25	mg/L
Total Suspended Solids (hourly composite)	35	mg/L
pH	6.0-8.5	mg/L
Ammonia (as N)	1.0	mg/L
Phosphorus (as P)	0.03	mg/L
Oil and Grease (total)	10	mg/L
Aluminum, dissolved	0.5	mg/L
Copper, dissolved	0.02	mg/L
Iron, dissolved	0.5	mg/L
Lead, dissolved	0.05	mg/L
Zinc, dissolved	0.2	mg/L
Rainbow Trout Bioassay (*Oncorhynchus mykiss*)	mortalities at 100% effluent concentration after 96 hour	96LC50

Appendix I, Tables (11, 26 and 35) contain results for SPD water quality while Tables (13, 35 and 39) contain results for BDS. Appendix II, Graphs (9 through 14) display the parameters of interest for SPD.

7.2.1.1 *General Parameters*

pH

All pH readings were within the permit limits at both sites in 2016/2017. Weekly field conductivity and pH are displayed in Appendix I, Table 39. Average field pH was 7.73 at SPD and 7.85 at BDS. Appendix II, Graph 11 indicates peak pH in August and October followed by a decline through fall and winter as discharge commenced, corresponding to pumping from 3-South and 5-South underground.

Nutrients

Dissolved phosphorous exceeded the permit limit of 0.03 mg/L at BDS in April 2016. Ammonia and dissolved phosphorus were below the permit criteria in all other samples from SPD and BDS.

Total Suspended Solids (TSS)

Grab and composite samples for TSS analysis were collected, depending on discharge rates and sampling criteria. TSS ranged from <4.0 mg/L to 15.5 mg/L in 2016/2017 with no permit limit exceedances for SPD or BDS. Most results were less than the detection limit of 4.0 mg/L. During winter, pumping from 5-South underground resulted in TSS concentrations up to 15.5 mg/L. Appendix II, Graph 12 displays the last six years of data for SPD.

Hardness and Dissolved Sulphate

Prior to 2015, the 2 and 3-South pits were the main contributors of sulphate to Settling Pond #1 before dewatering of the 5-South commenced in 2015. As retreat mining was completed in 5-South mine, the workings were isolated from the 2-North mine workings via an engineered bulk head that does not allow in-situ water to interact. Dewatering occurs to maintain water level in the underground workings and alleviate the pressure on the concrete bulk heads that are installed separating 2-North from 5-South. 5-South mine water is transported via pipeline to Settling Pond #1 via a pumping system triggered by increases in water elevation in the 5-South Mine. As water management is now crucial in the 5-South mine pool, excess water is pumped into Settling Pond #1, resulting in increased sulphate concentrations there.

Sulphate concentrations in Settling Pond #1 (and BDS) vary, depending on pumping rates from 5-South underground and 3-South Pit during times of heavy precipitation. Sulphate ranged from 33 mg/L to 632 mg//L and averaged 283 mg/L in 2016/2017. Concentrations were highest from early spring through late summer (low dilution) and lowest during winter (higher flow and high dilution) as shown in Appendix II, Graph 10. Sulphate concentrations will continue to be closely monitored considering the recent flooding of the 2S PAG-CCR facility and dewatering from 5-South.

Typically, there is zero flow at SPD from late spring to early fall as there is minimal pumping from PAG-CCR storage facilities and 5-South. In summer 2016 however, discharge from SPD occurred as dewatering of 3-South was necessary to facilitate equipment access for reclamation activities. There was no discharge from SPD from May 7 through June 22, discharge from June 23 through July 25, and then no discharge from July 26 to September 11. As such, sulphate concentrations measured at BDS are directly related to SPEFF, with 100% of the flow at BDS discharged from the treatment system. Appendix I, Table 35, displays weekly sulphate results at BDS, SPD, and SPEFF.

7.2.1.2 *Dissolved Metals*

Dissolved aluminum, copper, iron, lead, and zinc concentrations at SPD and BDS were below their permit limits during 2016/2017.

7.2.2 *Long Lake Entrance (LLE) EMS #E2922130*

LLE is the most downstream monitoring station in the South Water Management System and represents cumulative mine water discharge into Long Lake (excluding the seeps). This station is located at the outflow of a culvert discharging from a wetland, and effluent flows through an approximately 50 m long channel before entering Long Lake. LLE is not defined as a receiving environment station but rather constitutes the upstream segment of a mixing zone defined as the IDZ in the permit. For observation purposes, results for LLE are compared to WQGs to assess overall water management system performance and influence on Long Lake.

Sulphate and dissolved iron are two main parameters of interest at LLE; both frequently exceeding WQG as displayed in Appendix II, Graphs 22 and 23. In 2016/2017, sulphate ranged from 81 mg/L to 566 mg/L (averaging 283 mg/L) with peak concentrations observed in late summer during the low flow period. Sulphate concentrations exceeded the WQG of 128 mg/L for 50 of 52 weekly samples when applying a five week rolling average. The sulphate WQG varies with hardness (see Table 8) and QCC follows a conservative approach defined in the WQG assuming a background hardness of 30 mg/L (very soft water, measured at WA) to derive a sulphate WQG of 128 mg/L. If the water hardness of 218 mg/L found at LLE was applied, the sulphate WQG would be 429 mg/L resulting in exceedances for only 4 of 52 weeks. If the average hardness in Long Lake (63 mg/L) was applied, the WQG would be 218 mg/L resulting in exceedances for 23 of 52 weeks. These comparisons demonstrate the conservative approach incorporated into the WQG for protection of aquatic life.

Table 8: Approved 30-day Average Water Quality Guideline for Sulpahte to Protect Aquatic Life

Water hardness* (mg/L)	Sulphate water quality guideline (mg/L)
Very Soft (0-30)	128
Soft to moderately soft (31-75)	218
Moderately soft/hard to hard (76-180)	309
Very hard (181-250)	429
>250	Need to determine based on site water

Dissolved iron exceeded the WQG maximum of 0.35 mg/L in 2 of 12 monthly sampling events (0.595 mg/L in January and 0.358 mg/L in March 2017). This was mostly likely related to high flow conditions causing the mixing of iron-rich bottom waters of the wetland into surface water discharged at LLE. The high flows may have inhibited the typical redox reactions and iron precipitation processes that reduce dissolved iron to particulate iron. Total iron concentrations were not elevated in 2016/2017.

The Vancouver Island Objective (VIO) for streams defines a maximum suitable concentration for total phosphorous of 0.01 mg/L and an average concentration of 0.005 mg/L applied from May through September. Exceedances occurred for two of the five samples and the 5 month average found at 0.0113 mg/L in August, 0.0182 mg/L in September and an average concentration using of 0.0106 mg/L. As previously stated, LLE is not considered a stream and the VIO is used for general comparison. Nutrients are monitored at LLE to assess loading from the treatment system for potential adverse effects on Long Lake and the downstream receiving environment. The elevated concentrations are most likely attributed to natural biotic processes including assimilation by vegetation, plankton, periphyton, and microorganisms. In wetlands, macrophytes play a significant role in uptake, assimilation and storage of phosphorous. Macrophytes absorb phosphorous directly from the water column and release it shortly after upon vegetation decomposition (R. Reddy, R. H. Kadlec, E. Flaig & P. M. Gale.1999)[3]. Elevated total phosphorus concentrations have been measured since before the treatment system was installed as displayed in the figure below. The measured concentrations are unlikely to result in eutrophication downstream given the low discharge rates from LLE during summer and the absence of a measurable increase in phosphorus in Long Lake where LLE enters the lake.

[3]R. Reddy, R. H. Kadlec, E. Flaig & P. M. Gale .1999. Phosphorus Retention in Streams and Wetlands: A Review, Critical Reviews in Environmental Science and Technology, 29:1, 83-146K

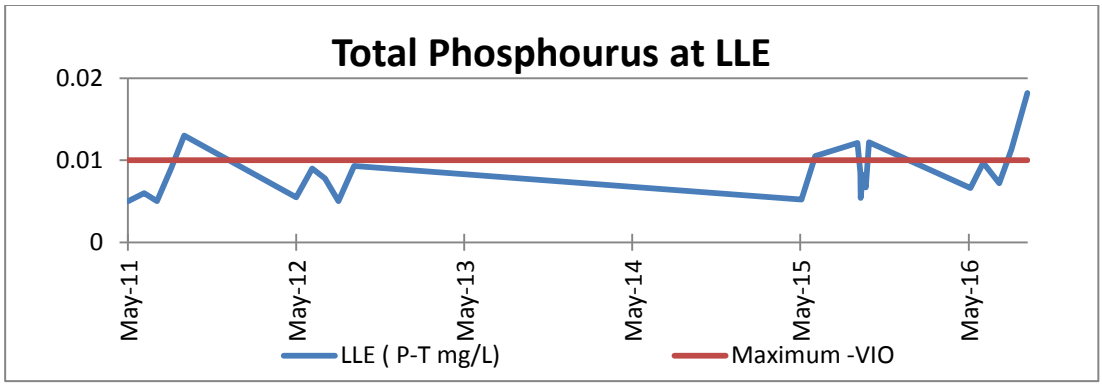

Figure 9: Total Phosphorus at LLE, 2016

Sulphate, iron, and TSS concentrations are influenced by precipitation events and source loading from the multiple disturbance areas within the South mining area. As sulphate and iron were found in high concentrations throughout routine monitoring, Lorax was contracted to perform a loading assessment for LLE to investigate the potential influence from the 4-South portal area. This was followed up with further water quality monitoring at LLE during times of low flow and additional studies. Lorax submitted a study in February 2017 entitled "LLE Wetland Survey and Iron Discharge Study." Quinsam submitted a report in April 2017 entitled "4-South Loading - LLE Water Quality Summary Report (Including Historical Reports)". These studies provide a greater understanding of elevated iron and sulphate concentrations within the LLE wetland.

Lorax (2017) concluded:

> "*The study results indicated that iron introduced into the LLE wetland via 4S-Lo is particulate Fe3+, which is stored within the wetland. Under typical conditions, the particulate Fe3+ settles in the wetland pond and cycles between the wetland substrate and the base of the oxic surface water layer. Water discharging from the wetland and sampled at LLE on August 29th, 2016 had a low concentration of Fe-T, and iron was less than detection limit in all the filtered samples. These data indicate that iron being discharged to Long Lake is present as particulate iron, which has a relatively low bioavailability. Therefore, potential effects from mine-related inputs of iron to Long Lake should be assessed for the Fe-T fraction."*

Water quality has improved following the reclamation work performed on the 4-South Pad as well as the new culvert (at a slightly higher elevation) installation at LLE. In 2016/2017, there were no exceedances for total iron and manganese and only two exceedances for dissolved iron, demonstrating that water quality has improved substantially from previous years.

Appendix I, Tables (19, 36 and 39) provide the full set of data collected at LLE. A statistical summary of the past six years is available in Appendix I, Tables 44 through 74. Appendix II, Graph (66) displays discharge versus precipitation at LLE.

7.2.3 *LONG LAKE SEEP*

The seep into Long Lake is a bedrock groundwater seep delivering water from the 2-South mine pool. This seep is monitored for water quality and quantity to assess overall loading into Long Lake. Long Lake seep water chemistry is influenced by groundwater levels in the 2 and 3-South mining area(s) and is subject to seasonal 'flushing' events due to local precipitation and infiltration.

Two seep sites are monitored on a continuous basis – LLS is the smaller seep and LLSM is the middle seep. LLSM is considered the primary seep, as flows at this site are typically much higher (and variable) than LLS; as such, the hydrology monitoring station is located on this seep.

Overall, water chemistry at both seeps remained consistent with that observed during previous reporting periods. A similar pattern of high flow during winter and no flow through summer and early fall was observed in 2016; however, the dry period (June-October 11) did not extend as long as in 2015 (June through November 23) but was similar to the four month dry period reported for 2014. This was a direct result of the amount of precipitation received at the mine site during 2016-2017. The middle seep ceases to flow when the mine pool water level falls below the elevation of approximately 303.5-304 metres above sea level (mASL) (measured at MW00-4).

Sulphate concentrations at the middle seep (LLSM) are elevated with higher concentrations during winter and lower concentrations through spring. Concentrations at the smaller seep (LLS) are elevated during winter and spring and decrease slightly during summer and early fall. Although results are available for LLS, the cumulative flow at this site was negligible. The increase in sulphate concentrations observed during winter is thought to be attributed to oxidation (and leaching) of the mine void walls as displayed in Appendix II, Graph 24.

Other parameters of interest include arsenic, iron, and total manganese. Both arsenic and iron have exhibited decreasing trends in recent years. Total manganese concentrations have remained fairly stable, although in 2016/2017, they were lower than in previous years. Metals

display the same seasonal trend as sulphate, with peak concentrations in the winter. Appendix II, Graphs 25 - 26 displays the concentrations of dissolved arsenic and total manganese since 2011. Concentrations of dissolved arsenic have decreased slightly since 2011, typically remaining below 0.004 mg/L but with one event above 0.005 mg/L in 2012. Total manganese has remained below the WQG of 0.8 mg/L since 2011.

Dissolved iron has decreased substantially and remained stable since mid-2012, when QCC transitioned from field filtering to laboratory filtering of dissolved metals.

During 2016/2017, monthly water quality samples were collected from the seeps with results included in Appendix I, Tables 20-21 and 39.

7.3 7-South Water Monitoring Sites

The 7-South water management system is comprised of a number of structures (Section 2.3) to manage local water in and around the disturbed area, with the most substantial structure being the 7-South settling pond (7SSD). This structure represents the point of discharge for 7-South operations and is regulated under PE-7008. Table 9 outlines the applicable permit limits at 7SSD for each controlled parameter.

Table 9: Permit Limits Applied to 7SSD EMS #E292069

Parameters	Limit	Unit
Total Suspended Solids (daily composite)	25	mg/L
Total Suspended Solids (hourly composite)	35	mg/L
pH	6.0-8.0	mg/L
Sulphate	500	mg/L
Aluminum, dissolved	0.1	mg/L
Cadmium, dissolved	0.000045	mg/L
Copper, dissolved	0.014	mg/L
Iron, dissolved	0.35	mg/L
Selenium, dissolved	0.016	mg/L
Rainbow Trout Bioassay (*Oncorhynchus mykiss*)	No mortalities at 100% effluent concentration after 96 hour	-

7.3.1 *7-South Settling Pond (7SSD) EMS #E292069*

The following discussion highlights parameters of interest at 7SSD EMS #E292069 with respect to discharge water quality and potential influence in the Lower Wetland and Quinsam River

receiving environment. A discussion of settling pond performance and validation of actual effluent water quality compared to the water quality prediction model developed for the 7-South water management plan by Lorax follows.

Complete water chemistry datasets can be found in Appendix I, Tables (22- 23, 128, 131-134, 151, and 153-162). Appendix II, Graphs (15 through 21) display the parameters of interest for 7SSD compared to 7S.

7.3.1.1 *General Parameters*

pH

In 2016/2017, pH was generally within the permit limit range (6.0 – 8.0), with weekly measurements ranging from 7.8 to 8.1 (average of 7.81).

Weekly pH and conductivity values for 7SSD are displayed in Appendix I, Table 38.

Total Suspended Solids (TSS)

The TSS ranged from <4.0 mg/L to 35.0 mg/L, with an average of 7.43 mg/L. There were 2 events where TSS was elevated above the permit limit of 25 mg/L (October 7 and 16, 2016) as a result of high surface erosion and low pond retention time during extreme storm events. Improved water management strategies such as revegetation of the surrounding banks and area as well as reduced discharge due to pumping systems have aided greatly in reducing TSS and overall discharge quantities.

Appendix I, Table 27 and Appendix II, Graph 16 display discharge versus daily TSS results at 7SSD.

Dissolved Sulphate

Concentrations of sulphate have decreased substantially since initiation of the management systems as improved practices have been applied. These concentrations have continued to decline into 2017 as improved pumping systems limit the amount of mine impacted water entering the pond. For example, the average sulphate concentration for 2014/2015 was 117.4 mg/L, compared to an average for 2016/2017 of 15.8 mg/L after secondary pumps were installed. Much

of the water entering the settling pond is direct rain water and has proven to limit the quantities discharged substantially. These results and observations reflect the effectiveness of improved management measures employed at the 7-South operational footprint to mitigate overall sulphate loading.

7.3.1.2 *Dissolved Metals*

There were no permit limit exceedances for any metals at 7SSD. The settling pond only discharged for 12 days in 2016/2017, with intermittent discharge in October, November, and January. Appendix I, Tables 22 and 32 display the data and discharge quantities, respectively for 7SSD. Tables 9 and 10 display the predicted (expected case and worst case) water quality compared to measured concentrations for parameters of interest at 7SSD and 7S, respectively. Table 9 indicates that dissolved arsenic is the only parameter at 7SSD with a measured concentration at the worst case prediction. Peak arsenic concentrations were measured in summer, resulting from low pond water levels and decreased dilution from precipitation. The pond was not discharging at the time of collection and most samples were collected from the ponded water. When discharge commenced in October, arsenic concentrations were low at both 7SSD and 7S (downstream) as depicted in Appendix II, Graph 18.

Table 10: Water Quality Prediction Model-Best and Worst Case Scenarios Compared to Measured Concentrations at 7SSD

7SSD WQ (2016-17 Averages)				
Parameter	**Expected Case (mg/L)**	**Worst Case (mg/L)**	**Average (mg/L)**	**Result**
Fluoride	0.122-0.134	0.150-0.161	N/A	
Sulphate	56-71	139.3-180.5	15.82	**Below Expected**
Aluminum	0.040-0.041	0.110-0.113	0.009	**Below Expected**
Arsenic	0.001	0.002	0.002	**At Worst Case**
Boron	0.069-0.082	0.152-0.186	0.05	**Below Expected**
Cadmium	0.000012-0.00013	0.000037-0.000040	0.0000037	**Below Expected**
Cobalt	0.00015-0.00017	0.00161-0.00211	0.00048	**Between Expected and Worst**
Copper	0.004	0.006	0.001	**Below Expected**
Iron	0.034	0.130-0.133	0.018	**Below Expected**
Manganese	0.016-0.017	0.054-0.066	0.053	**Between Expected and Worse**
Nickel	0.001	0.003-0.004	0.0005	**Below Expected**
Selenium	0.00193-0.00194	0.00612-0.00632	0.0001	**Below Expected**
Zinc	0.003	0.006	0.0025	**Below Expected**

***When calculating averages, 0.5 of the method detection limit values were used.**

Table 11: Water Quality Prediction Model-Best and Worst Case Scenarios Compared to Measured Concentrations at 7S

7S WQ (2016-17 Averages)				
Parameter	**Expected Case (mg/L)**	**Worst Case (mg/L)**	**Average (mg/L)**	**Result**
Fluoride	N/A	N/A	N/A	
Sulphate	6.49-7.80	15.4-17.8	2.99	**Below Expected**
Aluminum	0.043	0.055-0.056	0.038	**Below Expected**
Arsenic	0.0002	0.0003	0.000086	**Below Expected**
Boron	0.052-0.063	0.061-0.063	0.050	**Below Expected**
Cadmium	0.000010	0.000013	0.000003	**Below Expected**
Cobalt	0.00046-0.00047	0.00062-0.00065	0.00048	**Between Expected and Worse**
Copper	0.001	0.001	0.000394	**Below Expected**
Iron	0.020-0.021	0.030-0.031	0.00975	**Below Expected**
Manganese	0.0026-0.003	0.007	0.00054	**Below Expected**
Nickel	0.001	0.001	0.0005	**Below Expected**
Selenium	0.00028-0.00030	0.00070-0.00075	0.0001	**Below Expected**
Zinc	0.005	0.005	0.0025	**Below Expected**

***When calculating averages, 0.5 of the method detection limit values were used.**

Measured concentrations of sulphate, aluminum, cadmium, copper, iron, nickel, and selenium were below the expected case predictions. Measured concentrations of cobalt and manganese were above the expected predictions but below the worst case predictions at 7SSD. Cobalt was the only parameter observed between expected and worst case at 7S. Of the twelve parameters modelled, the annual average concentrations of nine parameters were below the expected case predictions, two were in-between, and one was at the worst case prediction. This is a marked improvement from previous years. Water quality measured at 7S compared to the model predictions had eleven parameters below the expected predictions and one in-between. This indicates that during 2016-17 monitoring year, measured water quality has improved from previous years, likely due to the adopted management practices over the past few years.

7.4 MIDDLE POINT FACILITY

All water samples collected in 2016/2017 had TSS, pH, and oil and grease concentrations below the permit limits at the Middle Point Facility. Results are presented in Appendix I, Table 75.

7.5 BIOASSAYS

PE-7008 indicates that rainbow trout (*Oncorhynchus mykiss*) LC_{50} bioassays are required once per year (fall flush) at BDS for Settling Pond #1, EMS# E218582 and at Settling Pond #4, EMS# E207409. The bioassays are performed using 100% (non-diluted) discharge water to assess the potential survival of rainbow trout over a period of 96 hours. A successful test sees no mortalities throughout the 96 hour period. Discharge was collected from BDS and Settling Pond 4 on October 20, 2016. On November 22, 2016 an extra rainbow trout LC_{50} bioassay was collected from monitoring site WC, EMS# E207411 to assess water quality downstream of Settling Pond #4 due to repeated TSS permit exceedances.

The permit requires a 96 hour LC_{50} test on *Oncorhynchus mykiss* to be completed using 7SSD EMS# E292069 effluent water and, concurrently, a 7-day *Ceriodaphnia dubia* test from water obtained from 7S, EMS# E292109. This is required twice per year; once during the spring freshet and once during the fall flush. The discharge from 7SSD pond was minimal (11 days) in 2016/2017 and low discharge quantities resulted in omitting the spring freshet sample. The fall flush sample was collected on October 17, 2016 at 7SSD and, concurrently at 7S.

All rainbow trout bioassays and the *Cedriodaphnia dubia* bioassay had 100% survival (Appendix III). This indicated that mine related discharges at BDS, Settling Pond 4, 7SSD, WC and receiving environment monitoring station 7S were compliant, with no acute toxicity in the discharges.

8.0 WATER QUALITY IN THE RECEIVING ENVIRONMENT

Preamble – Water Hardness

For this report, hardness dependent WQGs were derived using background levels of hardness (i.e., monitoring location WA ~30 mg/L) to provide a conservative assessment of receiving environment water quality. Guidelines and objectives do not have legal status but are designed to provide resource managers with direction and comparison for protection of receiving environments with aquatic life.

Guidelines and Objectives: Receiving environment water quality is compared to the British Columbia Ambient WQG for Protection of Aquatic Life for most parameters. The exceptions are hypolimnetic DO (using WQO based on a site specific conditions), total cobalt and total lead

(using more recently established Water Quality Objectives (WQO)[4]), and total phosphorus in streams (using the Vancouver Island objective[5]). Table 11 lists the WQG, WQO and VIO used to screen receiving water quality.

Table 12: Water Quality Guidelines and Objectives Applied to Receiving Environment Stations

Parameter	Lakes (mg/L)		Streams (mg/L)	
	Maximum	5 in 30 day Avg	Maximum	5 in 30 day Avg
Phosphorus - total	0.007 summer avg - Long Lake		0.01	0.005**
	0.006 summer avg - Middle Quinsam L		(May-September)	
Turbidity	n/a	n/a	5.0 NTU	1.0 NTU
Non-filterable residue or TSS	25	5	n/a	n/a
Hypolimnetic DO	3 mg/L minimum during June-August		n/a	n/a
pH	6.5 - 9	n/a	6.5 – 9	n/a
Aluminum (dissolved)	0.1	0.05	0.1	0.05
Arsenic (total)	0.005	n/a	0.005	n/a
*Cadmium (dissolved)	0.00017	0.000088	0.0017	0.000088
Cobalt (total)	0.05	0.004	0.05	0.004
Copper (total)	0.007	0.002	0.007	0.002
Iron (total)	1.0	n/a	1.0	n/a
Iron (dissolved)	0.35	n/a	0.35	n/a
Lead (total)	0.005	0.003	0.005	0.003
Manganese (total)	0.8	0.7	0.8	0.7
Mercury (total)	0.0001	n/a	0.0001	n/a
Nickel (total)	0.025	n/a	0.025	n/a
Silver (total)	0.0001	n/a	0.0001	n/a
Zinc (total)	0.03	n/a	0.03	n/a
*Sulphate dissolved	n/a	128	n/a	128

* Values represent Middle Quinsam sub-basin water quality using WA hardness. Iron River guidelines will be different based on seasonal hardness at IR1

** Average based on monthly samples from May to Sept

[4] Campbell River Area Middle Quinsam Lake Sub-Basin Water Quality Assessment and Objectives. Ministry of Environment. 1989

[5] Guidance Document for Phosphorous Management in Vancouver Island Streams. Ministry of Environment. 2012

Water quality at locations outside of the Middle Quinsam Lake Sub-basin, such as the Iron River and 7-South (7S and LWO), are compared exclusively to the WQG.

8.1 LAKES

The monitoring program for the Middle Quinsam Lake Sub-basin employed a 5 in 30 sampling approach at No Name Lake (NNL), Long Lake (LLM), Middle Quinsam Lake (MQL), and Lower Quinsam Lake (LQL). There are four depths monitored at each lake:

- 1 metre below surface (1 m)
- 4 metres below surface (4 m)
- 9 metres below surface (9 m)
- 1 metre above bottom (1mb)

Monitoring occurred during three separate periods:

- Spring – April/May 2016
- Summer – August 2016
- Fall – October/November 2016

The table below summarizes those parameters above WQG and WQO observed in the lakes for 2016/2017. A summary table is also provided in Appendix I, Table 3. Appendix I, Tables (44 through 75) provide a statistical summary for parameters of interest with Tables (76 through 79), displaying the depth profiles and field results, and Tables (80 through 127) displaying the water chemistry results compared to WQG and WQO. Appendix II, Graphs (27 through 52) illustrate parameter trends at each lake.

Table 13: Summary of Water Quality Guideline Observations at Lake Monitoring Sites

SUMMARY OF WATER QUALITY GUIDELINE OBSERVATIONS AT RECEIVING MONITORING LOCATIONS								
EMS ID & Site Name	Site Code & Depth	Parameter	Units	Guideline Limit	Result	Date	Guideline	Sampling Events Exceeding Guideline
E217018 - No Name Lake (NNL)	NNL 7-11 metres	pH-F	pH	6.5	6.16 to 6.47	Apr. 14th, 28th & May 11th	Min	(13/55) Depths profiled during spring
	NNL 7-11 metres				5.79 - 6.49	Summer 5 in 30	Min	(15/58) Depths profiled during summer
	NNL 1-12 metres				5.35 - 6.49	Oct. 27th, Nov. 3rd & 9th	Min	(31/63) Depths profiled during fall
	NNL 1 metre	Al-D	mg/L	0.05	0.0519	Fall 5 in 30	A	Average fall 5 in 30 was exceeded at 1 metre, 4 metre and 9 metre depths
	NNL 4 metre				0.0526			
	NNL 9 metre				0.0511			
E217017 - No Name Lake Outlet (NNO)	NNO	Al-D	mg/L	0.05	0.0521	Fall 5 in 30	A	Fall 5 in 30
E206619- Long Lake Middle (LLM)	LLM 1-20.6 metres	pH-F	pH	6.5	5.83 - 6.44	Oct. 27th, Nov. 3rd & 9th	Min	(68/102) Depths profiled during fall
	LLM 9 metre	SO4-D	mg/L	128	133	Spring 5 in 30	A	Spring 5 in 30 at 9 metres
	LLM 1 metre from bottom (LLMB)				134	Spring 5 in 30	A	Spring 5 in 30 at 1 metre from bottom
					131	Fall 5 in 30	A	Fall 5 in 30 at 1 metre from bottom
	LLMB	Mn-T	mg/L	0.8	0.998 & 1.02	Oct. 27th & Nov. 3rd	M	(2/5) Fall Sampling Events
E206618- Middle Quinsam Lake (MQL)	MQL 13-13.5 metres	Hypolimnetic DO	mg/L	3 mg/L minimum June through August	0.73 & 2.73	Sept. 1st	Min	(2/13.5) depths profiled on Sept. 1st were below 3mg/L. Guideline is from Jun-Aug.
E292118 - Lower Quinsam Lake (LQL)	LQL 15-16.4 metres	pH-F	pH	6.5	6.28 - 6.38	Aug. 31st	Min	(3/16.4) depths profiled on Aug. 31st
	LQL 12-16.4 metres	Hypolimnetic DO	mg/L	3 mg/L minimum June through August	0.00 - 2.81	Summer 5 in 30	Min	(22/81) depths profiled
	LQL 1 metre	Al-D	mg/L	0.05	0.0631	Fall 5 in 30	A	Fall 5 in 30
	LQL 4 metre				0.0625	Fall 5 in 30	A	Fall 5 in 30
	LQL 9 metre				0.0631	Fall 5 in 30	A	Fall 5 in 30
	LQL 1 metre from bottom (LQLB)	Al-D	mg/L	0.05	0.0641	Fall 5 in 30	A	Fall 5 in 30
		Fe-D	mg/L	0.35	0.498, 0.380 & 0.382	Aug. 3rd, 9th & 17th	M	(3/5) Summer Sampling Events
		Fe-T	mg/L	1.00	1.22, 1.15, 1.65 & 1.37	Aug. 3rd, 17th, 25th & 31st	M	(4/5) Summer Sampling Events

8.1.1 *SEASONAL TRENDS*

Spring and fall sampling is timed to cover the times of lake turnover, when water circulates freely in the water column and nutrients become more available for phytoplankton growth (Wetzel 2001)[6]. Water is most dense at 4ºC, and during winter, the surface water (epilimnion) is typically colder than 4ºC and the deeper water (hypolimnion) is at about 4ºC (displaying inverse stratification). Spring turnover occurs when the surface water warms to 4ºC and begins to mix with the deeper water. The lake circulates freely throughout the water column for several days (Wetzel 2001). Through the spring and summer, surface temperatures increase, establishing a thermocline (region of rapid temperature change), with warmer water above and cooler water below. Temperatures cool in late summer, and eventually the thermal stratification breaks down, leading to fall overturn and to mixing of the water column. As surface waters continue to cool, a colder layer overlies the dense bottom water (4ºC) and inverse stratification persists from late fall to spring. During periods with distinct stratification, it has been observed that water chemistry often displays variable concentrations throughout the water column. During overturn, nutrients associated with decomposition of organic matter that has sunk to the bottom are brought into surface waters, where they are available for phytoplankton growth. The timing and duration of spring and fall turnover depend on the size and depth of the lake.

8.1.1.1 *Spring*

The spring sampling program is scheduled to capture the lake turnover that typically occurs in conjunction with warmer temperatures, snowmelt, and increased precipitation. Spring sampling spanned from April 13 through May 11, 2016 during this monitoring year. The sampling regime was triggered after a significant precipitation event and warm temperatures where 300 mm of precipitation was received in March.

In 2016, spring turnover occurred during the last half of the sampling period, when temperatures increased to 4ºC in the upper water column.

[6] Wetzel, R.G. 2001. Limnology, Third Edition. Academic Press, San Diego CA.

Noteworthy observations resulting from the spring lake monitoring program include:

- Spring turnover was observed in all lakes during April as the ambient temperature was unusually warm when lake sampling commenced. Surface temperatures warmed to above 16^{o}C in all lakes during the fifth week of sampling
- Sulphate remained below the WQG (128 mg/L) in NNL, MQL, and LQL at all depths, and at LLM at 1 and 4 m, however exceeded the WQG at LLM at 9 m and 1 m from bottom
- No Name Lake continued to experience low pH values at depth.

The only parameters of interest that were higher than WQGs during spring sampling were sulphate (deep water at LLM) and pH (deep water at NNL).

8.1.1.2 *Summer*

The summer sampling program is scheduled to capture the period of low flow and lake stratification. In 2016, the summer program ran from August 3 through September 1. The summer program represents the lake's seasonal thermal stratification and a time when deeper lakes naturally develop anoxia in deeper waters. Results from this sampling period represent low dilution conditions when the lakes display minimum assimilative capacity and mine related surface discharges and groundwater infiltration have the greatest influence.

During the summer sampling program, there were high ambient temperatures and low precipitation (177.80 mm accumulated precipitation for June through August), with 78.30 mm in June, 68.9 mm in July, and 30.60 mm in August. This was comparable to summer 2015 (150 mm for June through August).

Noteworthy observations resulting from the summer monitoring program include:

- Sulphate was at or below the WQG (128 mg/L) in NNL, MQL LLM, LQL at all depths, with the maximum (128 mg/L) measures at LLM 1mb

- LLM 1mb had lower average Mn-T concentrations in summer 2016 (0.467mg/L) than in summer 2015 (2.24 mg/L), and were below the WQG average (0.7 mg/L) in 2016 (above the WQG in previous years)
- NNL and LQL had lower pH at depth than in surface waters,
- Hypolimnetic DO was below the site-specific WQG (3 mg/L) in LQL and MQL,
- Total and dissolved iron was elevated above WQG on occasions at 1mb in LQL.

8.1.1.3 *Fall*

The fall sampling program is scheduled to capture the period of elevated precipitation following the summer dry season, representing a 'fall flushing' event that is correlated with elevated surface water metal concentrations resulting from localized weathering and mobilization. The lakes turn over in the fall as the water temperatures decrease and high inflows return. In 2016, the fall monitoring program was initiated on October 27 and ran through November 21 during a time of heavy precipitation (728.70 mm from September 29 through November 21). This was notably higher than fall 2015, when only 285.3 mm of accumulated precipitation was reported for September through November 21.

Noteworthy observations resulting from the fall monitoring program include:

- Precipitation was high, with lake inflows and water levels greater than observed in many years,
- Water quality parameters at most lakes remained below WQGs and WQOs; exceedances occurred at LLM, NNL and LQL.
- All lakes had higher hypolimnetic DO levels compared to fall of previous years, resulting in decreased concentrations of iron and manganese at the sediment water interface (1mb depth),
- Sulphate concentrations were at or below the WQG (128 mg/L) in NNL, MQL, and LQL at all depths, and at LLM at all depths except LLM 1mb (with an average of 131 mg/L) ,
- In LLM, average sulphate concentrations at 1 and 4 m depths were lower in fall 2016 than in fall 2015 and the average concentration at 1 m was the lowest recorded since 5 in 30 sampling began in 2013,
- In MQL average sulphate concentrations for the four depths sampled ranged from 26 mg/L to 31 mg/L
- In LLM, Mn-T concentrations at 1mb in 2016 were the lowest since 2012 (average 0.53 mg/L); two of five samples exceeded the WQG maximum (0.8 mg/L)
- In LQL 1mb, total and dissolved iron concentrations declined below WQG's in fall 2016
- NNL and LLM had lower pH during the first three weeks of sampling below WQG's
- In LQL all depths and NNL 1, 4, and 9 m depths, the average Al-D concentrations were higher than the WQG average (0.05 mg/L).

8.1.1.4 *General Parameters*

pH

Lakes that are deeper and thermally stratified normally have pH that ranges from alkaline on the surface (epilimnion) to slightly acidic at bottom depths (hypolimnion). This trend is typically more pronounced during summer, when the lake is stratified and surface temperatures are elevated.

During 2016, NNL had several occurrences where pH fell below the WQG minimum of 6.5. For the depth profiles, this included 13 of 55 measurements in spring, 15 of 58 measurements in summer, and 31 of 63 measurements in fall.

Factors that may contribute to acidic conditions observed through the water column of NNL include:

- Natural conditions – the western end of the sub-basin is surrounded by a vast wetland; organic wetland soils tend to be acidic
- Limited turnover – temperature gradients are relatively small during spring and NNL is shallow (~12-13 m) compared to Long Lake depth of 20 m and Lower Quinsam Lake depth of 16 -18 m
- Anthropogenic sources – i.e., mining and logging in the area

NNL has a shallow basin (12-13 m) and a large drainage area. Since monitoring began in 2012, slightly acidic conditions have been recorded throughout the water column during spring, summer and fall sampling events, with most of the readings below the WQG of 6.5. Appendix II, Graph (28) displays pH values from 2012 to 2016 at 1 m, 4 m, 9 m, and 1mb. Baseline water quality sampling performed by MoE 1983 and 1984 also indicated pH less than 6.5 at depth. Monitoring will continue at NNL and and No Name Lake Outlet, with trends for pH evaluated.

The sampling location on No Name Lake is considered to be outside of mine related discharge, and low pH values are not believed to be associated with mining activities. No direct surface mine discharge locations to No Name Lake have been identified and the low pH is understood to be naturally occurring.

In Long Lake, pH ranged from 5.83 to 7.44 averaging 6.80 during 2016. In spring and summer 2016, stratification was apparent between 1 m and 4 m depths, where pH ranged from 6.58 to

7.37; pH was lower at 9 m and 1 mb. During fall, pH was below the WQG (in 68 of 102 cumulative depths profiled and is attributed to inflows from No Name Lake and the large amount of precipitation received. In the fall, LLM had pH less than 6.5 through the entire water column during the first three weeks of monitoring; pH was below 6.5 in the hypolimnion (16.0 - 19.8 m) on all five weeks of monitoring. Results are displayed in Appendix I, Table (77) & Appendix II, Graph (33).

Middle Quinsam Lake is generally neutral to slightly basic throughout the spring, summer, and fall and continued for 2016 (all samples above the WQG minimum). Both WA and WC, which enter Middle Quinsam Lake exhibit neutral pH. Results are displayed in Appendix I, Table (29) & Appendix II, Graph (71).

In Lower Quinsam Lake, pH was lower (6.28 to 6.38) than the WQG minimum in the hypolimnetic zone for one event during the summer 2016 sampling period (3 of 16.4 cumulative depth profiles, August 31), but was otherwise in the neutral range averaging 7.15 throughout the water column during the three sampling periods. Results are displayed in Appendix I, Table (79) & Appendix II, Graph (47).

HARDNESS

The WQG for sulphate and several metals varies with hardness. Water is defined as very soft if hardness ranges from 0 - 30 mg/L and soft to moderately soft at 31- 75 mg/L. No Name Lake is considered to have very soft water (average concentration of 13 mg/L in 2016). Lower Quinsam Lake is characterized as very soft to moderately soft (average concentration of 29 mg/L to 31 mg/L in 2016). Since summer of 2014, Middle Quinsam Lake has had soft to moderately soft water (average of 34 mg/L in 2016, similar throughout the water column in all three sampling periods; Appendix II, Graph (39)). Long Lake generally has moderate to hard water (higher hardness in deep water), but the range varies with season and depth. In spring, hardness averaged 82 mg/L at 1 m depth and 123 mg/L at 4 m depth; concentrations were lower in fall, with an average of 25 mg/L at 1 m and 61 mg/L at 4 m. The deeper waters of Long Lake were less variable, with spring to fall averages of 136 mg/L to 106 mg/L at 9 m and 125 mg/L to 134 at 1mb.

In all four lakes, hardness was slightly higher at surface during summer than during fall and spring, indicating flushing and dilution from rain and/or runoff after the summer. During summer, hardness was higher at surface than at depth in No Name and Lower Quinsam lakes, in contrast

to Long Lake, which had higher hardness at depth than at surface. This could be an indication of groundwater infiltration to Long Lake or the greater depth of Long Lake (19-20 m), which would have lower flushing in the hypolimnion zone.

SULPHATE

As noted in Section 7.2.2 and Table 7, the sulphate WQG is hardness dependent, but for QCC, it is set at 128 mg/L (applying a background hardness of 30 mg/L from monitoring station WA, upstream of mine influences).

Sulphate concentrations were lower than the WQG of 128 mg/L in No Name, Middle Quinsam, and Lower Quinsam lakes at all depths and in Long Lake at 1 m and 4 m depths during the three sampling periods. It was just above the WQG in Long Lake at 9 m (133 mg/L) and 1mb (134 mg/L) during spring and at 1mb during fall (131 mg/L). If the sulphate WQG was derived using hardness measured in Long Lake (31 to 180 mg/L), it would range from 218 mg/L (1 m and 4 m) to 309 mg/L (9 m and 1mb). Recognizing that hardness and sulphate concentrations in Long Lake reflect the influence of mining discharges, and not baseline conditions, a higher hardness-defined WQG would still be protective of aquatic life, given the protective mechanism provided by hardness (MOE 2013)[7].

Sulphate concentrations increased with depth in LLM, MQL, and NNL and appeared to be correlated with thermal stratification. In LQL, concentrations decreased with depth.

In 2016, sulphate concentrations in Long Lake were greatest during spring at all depths. Average concentrations declined during the summer at 1 m and 4 m depths, but remained high at 9 m and 1mb. Lower concentrations during summer were associated with the limited contribution from the seeps and limited to no surface discharge from Settling Pond #1. There was a large decrease between spring and fall at 1 m (average of 73 mg/L in spring vs. 16.15 mg/L in fall) and 4m (average of 120.6 mg/L in spring vs. 57.7 mg/L in fall). In deep water, the average concentrations were similar in spring and fall (133 mg/L in spring and 103 mg/L in fall at 9 m; 134 mg/L in spring

[7] Ministry of Environment. 2013. Ambient water quality guidelines for sulphate. Technical Appendix Update. Available at:http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/wqgs-wqos/approved-wqgs/bc_moe_wqg_sulphate.pd

and 131 mg/L in fall at 1mb). This vertical pattern through the seasons suggests that the deeper water (19 to 20 m depth) does not fully flush.

In Middle Quinsam Lake, the fall 2014 monitoring indicated a decrease in sulphate concentrations at 1 mb from above 128 mg/L to below 20 mg/L after a flushing event. Sulphate concentrations have remained below 52 mg/L since fall 2014. In 2016, the average sulphate concentrations were similar from surface to bottom during the three sampling periods (annual average of 26.9 mg/L). In contrast to previous years, concentrations were highest in surface waters during spring and summer 2016, and decreased slightly in the fall.

No Name Lake and Lower Quinsam lakes continued to have sulphate concentrations well below the WQG in 2016. In Lower Quinsam Lake, peak concentrations were reported during summer at 4 m (average of 22.4 mg/L), and suggested some influence of mining related discharges. In No Name Lake, the average sulphate concentration was below 3 mg/L for all three monitoring periods.

HYPOLIMNETIC DISSOLVED OXYGEN

The hypolimnetic dissolved oxygen (DO) Water Quality Objective of 3 mg/L minimum in June through August was developed for the Water Quality Objectives for Middle Quinsam Lake Sub-basin (MQL and LL) however, Quinsam applies this objective to NNL and LQL. The hypolimnion is the dense, cold bottom layer below the thermocline in a thermally stratified lake. Typically, the hypolimnion is the coldest layer in summer and the warmest layer during winter. Anoxic conditions may develop naturally in deep waters over the summer due to the lack of circulation with upper, oxic water during stratification and consumption of DO by microorganisms and chemical reactions. The reducing environment can cause lake sediments to release iron, manganese, sulfide, and arsenic, all of which could have potential toxicological effects on aquatic receptors.

In 2016, hypolimnetic DO in Long Lake was above 3 mg/L during the summer sampling period but decreased in the fall to less than 3 mg/L. Middle Quinsam and Lower Quinsam Lake exhibited anoxic conditions in the hypolimnion during the summer. On September 1, Middle Quinsam Lake had a DO of 2.73 mg/L at 13 m and 0.73 mg/L at 13.5 m. In Lower Quinsam Lake, water at 12 to 16 m had DO below 3 mg/L for all five weeks of sampling during summer; this lake has a deep basin (17 m) and typically experiences low DO at depth when stratification is pronounced.

8.1.1.5 *Total and Dissolved Metals*

Concentrations of most metals at the four lake monitoring stations were low throughout the spring, summer, and fall sampling periods. Elevated concentrations of dissolved aluminum, total and dissolved iron, and total manganese were observed in some lakes, as discussed below.

Iron and Dissolved Oxygen

Total and dissolved iron (Fe-T and Fe-D) concentrations in the four lakes have displayed similar trends since 2013: low concentrations near surface throughout the year; low concentrations at all depths during spring; and increased concentrations at depth during anoxic conditions during summer and fall. Iron concentrations were well below WQGs for No Name, Long, and Middle Quinsam Lakes (all depths) and at Lower Quinsam Lake (all depths except 1mb).

Lower Quinsam Lake (at 1mb) had elevated Fe-T and Fe-D above the WQGs several times during the summer sampling period. The maximum exceedance for Fe-T resulted in 1.65 mg/L and Fe-D resulted in 0.498 mg/L during fall. This is one of the deepest lakes sampled (17 m depth), and the elevated iron concentrations are directly related to anoxic conditions and associated increase in iron solubility at the sediment/water interface. Appendix II, Graphs (51 and 52) display the inverse relationship between low DO and elevated iron concentrations: when DO decreases below 3 mg/L, iron concentrations increase. Sediment in Lower Quinsam Lake has elevated iron concentrations, higher than sediment quality guidelines in several samples (Appendix I, Tables 221-224).

Manganese and Dissolved Oxygen

A similar relationship exists with manganese (Mn-T) and low dissolved oxygen In Long Lake as observed with iron at LQL. Mn-T concentrations have been found to be inversely proportionate to dissolved oxygen concentrations and are found at highest levels when DO falls below 3 mg/L. In 2016, Mn-T concentrations were lower than in previous years, with fewer WQG exceedances. Total Mn in LL has been found in greatest concentrations at the 9m and 1mb depths where Mn-T has been observed in moderate to elevated concentrations since 2006. Peak concentrations were observed in 2015 at depth when concentrations of DO fell well below 3 mg/L.

Manganese was marginally higher than the WQG maximum (0.8 mg/L) in Long Lake at 1mb during the first two weeks of the fall 2016 sampling period (with a DO of 1.99 mg/L and 1.82 mg/L). At this time, the lake water level was particularly high due to heavy precipitation events and the 1mb samples were taken at 20.3 m and 20.5 m (normally taken at 19 m). The average

concentrations did not exceed the WQG average (0.7 mg/L). During the third week of fall sampling, DO continued to decline but Mn-T concentrations declined to <0.5 mg/L; this suggested there may have been a malfunction in the DO probe. Appendix II, Graphs 37 and 38 display the maximum and 5 in 30 average concentrations of total manganese at Long Lake, respectively.

A similar trend of elevated Mn-T with low DO was identified for Lower Quinsam Lake at 1mb during the summer monitoring period. However, concentrations did not exceed the WQG maximum or average during 2016, Appendix II, Graphs 49 and 50 depict these trends.

The Ambient Water Quality Guidelines for Manganese[8] state:

> "*Mn is only slightly to moderately toxic to aquatic organisms in excessive amounts. It is present in almost all organisms and often ameliorates the hazard posed by other metals. Hence jurisdictions in the international arena have not disseminated for Mn guidelines to protect freshwater and marine life. Mn availability and, hence its toxicity in the aquatic environment, can be influenced by many factors including water hardness."*

In deeper lakes, stratification may result in anoxic conditions in the hypolimnion and the dissolution of the iron and manganese from sediment. Casey (2009)[9] noted:

> "*Iron and manganese are commonly found in groundwater and some surface water such as lakes that have a significant groundwater input. The existence of Fe-D and or Mn-T in groundwater generally infers prior anaerobic conditions with the result that the water is likely to be devoid of oxygen and may also have a high carbon dioxide (CO_2) concentration. As well as being associated with groundwater input the existence of Fe-D and Mn-T in some deep lakes and reservoirs may be due to stratification, resulting in the development of anaerobic conditions in the bottom water zone and the dissolution of the iron and manganese from floor deposits*."

Long Lake has historically been characterized as having very low DO at depth, with levels in September to October below 4 mg/L at depths greater than 15 m (Kangasniemi.1989)[10]. Nordin

[8] Ministry of Environment.2013. Ambient Water Quality Guidelines for Manganese

9 Casey,T.J. 2009. Iron and Manganese in Water Occurrence, Drinking Water Standards and Treatment Options through the Aquavarra Research LMT Water Engineering Papers. Paper 3..

(2006)[11] reported that Long Lake stratifies into hyperlimnion and hypolimnion sections in April and May and remains stratified until October through November. Appendix II Graph 34 displays the inverse relationship between historical DO vs Mn-T reported at 1 mb since 2005 that occurs during late summer and fall when DO levels decline to below 3 mg/L.

SLR (2015)[12] suggested these findings have potential implications for the means by which sediments and Contaminants of Potential Concern (COPC) are distributed in Long Lake. They suggested that the deepest portion of the lake has the greatest potential to accumulate and retain COPC's whose mobility in aquatic systems is affected by oxygen availability in overlying waters and sediments.

It is conceivable that manganese has a greater loading rate from the parent rock and substrate materials, with mobility accelerated by anoxic conditions at depth (SLR.2015); The regional geology of Long Lake is divided in half with the Nanaimo group in the southern half and the Island Plutonic Suite (IPS) in the northern half (SLR.2015); this could have implications for different loading of arsenic and possibly manganese and other metals from parent material (SLR.2015).

The Mn-T concentrations in deep waters of the lakes do not appear to be mine related, as concentrations at most discharge locations remains low; however, the WQG exceedances are of concerns for assessing potential effects in the receiving environment and trends will continue to be monitored in subsequent years.

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[10] Kangasniemi, B.J.1989.Campbell River Area Middle Quinsam Lake Sub-Basin Water Quality Assessment and Objectives. Ministry of Environment, Lands and Parks. Summary.

[11] Nordin, R.N.2006.An Evaluation of the sediment quality and invertebrate benthic communities of Long and Middle Quinsam Lakes with regards to local coal mining activity.

[12] SLR.2015. Sediment Quality, Toxicity, and Bioavailability Review with Background Assessment Based on Current Knowledge of Sediment Dynamics and interpretation or Pre and Post Mining Sediment Concentrations and Distribution.

Arsenic

Arsenic has become a parameter of interest in the Quinsam watershed, particularly for Long Lake, however this parameter is not observed to be elevated in the receiving environment water quality. In the 2016 monitoring programs, arsenic concentrations were well below the WQG (0.005 mg/L), in the four lakes monitored, and so is not a specific concern. Arsenic concentrations in sediment were elevated above guidelines in Long Lake, No Name Lake, and Lower Quinsam Lake (see Section 9.1) and in ex-situ groundwater throughout the site due to the host rock geology (See Appendix IX).The water quality data confirms that arsenic found in the sediment is not transported into the water column, even during times of anoxic conditions.

Aluminum

Aluminum is normally present at concentrations below WQGs but was occasionally elevated above WQGs in 2016. Dissolved aluminum (Al-D) concentrations exceeded the WQG average (0.05 mg/L) during fall in NNL (1 m, 4 m, and 9 m) and at No Name Lake outlet (NNO) as well as LQL (1mb). Al-D was just below the WQG average at LLM (1 m, 4 m, and 9m). Al-D has been naturally elevated above the WQG in background samples taken upstream, associated with runoff and flushing events. During spring and fall sampling on the Iron River upstream monitoring stations (IR1 and IR6) not influenced by mining, also experienced elevated Al-D concentrations.

8.2 RIVER AND STREAM SITES

The table below summarizes those river and stream sites that were observed to have parameters in excess of the WQG's. This table is also available in Appendix I, Table 3.

Table 14: Summary of Water Quality Guideline Exceedances in the Streams and Rivers

SUMMARY OF WATER QUALITY GUIDELINE OBSERVATIONS AT RECEIVING MONITORING LOCATIONS

EMS ID & Site Name	Site Code & Depth	Parameter	Units	Guideline Limit	Result	Date	Guideline	Sampling Events Exceeding Guideline
E286930 - Quinsam River Upstream of 7-South Mining Operation (QRDS1)	QRDS1	Zn-T	mg/L	0.0075	0.0225	Spring 5 in 30	A	Spring 5 in 30 (max. result of 0.0927 mg/L increased average. All other Zn-T results were below detection limits.
				0.033	0.0927	Apr. 12th	M	(1/5) Samples collected during spring. Maximum result may be an outlier.
E292112 - Lower Wetland Outlet at the Confluence of Quinsam River (LWO)	LWO	Al-D	mg/L	0.05	0.1446	Spring 5 in 30	A	Spring 5 in 30
				0.1	0.126, 0.103, 0.153, 0.184 & 0.157	Spring 5 in 30	M	(5/5) Spring Sampling Events
				0.05	0.0799	Summer 5 in 30	A	Summer 5 in 30
				0.1	0.128 & 0.102	Oct. 12 & Oct. 31	M	(2/5) Fall Sampling Events
				0.05	0.0767	Fall 5 in 30	A	Fall 5 in 30
		Cu-T	mg/L	0.002	0.00255	Spring 5 in 30	A	Spring 5 in 30
					0.00233	Summer 5 in 30	A	Summer 5 in 30
		Fe-D	mg/L	0.35	0.494, 0.444, 1.15, 1.640 & 1.25	Spring 5 in 30	M	(5/5) Spring Sampling Events
					0.462, 0.489, 0.536, 0.657 & 0.615	Summer 5 in 30	M	(5/5) Summer Sampling Events
		Fe-T	mg/L	1.00	1.88, 2.91 & 2.06	Apr 27th, May 3rd & 10th	M	(3/5) Spring Sampling Events
					1.110 & 1.100	Summer 5 in 30	M	(2/5) Summer Sampling Events
		TSS	mg/L	5.00	5.6	Summer 5 in 30	A	Summer 5 in 30
E292113 - Quinsam River Downstream of 7-South Mining Operation (7SQR)	7SQR	As-T	mg/L	0.005	0.00558	Aug.11	M	(1/5) Summer Sampling Events
		P-T	mg/L	0.01	0.0117	Aug.11	M	VIO- (1/4) Monthly samples from Jun - Sep
E297230 - Quinsam River Upstream of Mining Operations (IR1)	IR1	Al-D	mg/L	0.05	0.0670	Spring 5 in 30	A	Spring 5 in 30
				0.05	0.0765	Fall 5 in 30	A	Fall 5 in 30
				0.1	0.105	Oct.26	M	(1/5) Fall Sampling Events
E297231 - Iron River Upstream of 7SA5 (IR6)	IR6	Al-D	mg/L	0.05	0.0721	Spring 5 in 30	A	Spring 5 in 30
				0.05	0.109	Fall 5 in 30	A	Fall 5 in 30
				0.1	0.114, 0.147 & 0.113	Oct.18th, 26th & Nov. 10th	M	(3/5) Fall Sampling Events
E297232 - Iron River Downstream of 7SA5 & 242 Inputs (IR8)	IR8	Al-D	mg/L	0.05	0.0725	Spring 5 in 30	A	Spring 5 in 30
				0.05	0.0982	Fall 5 in 30	A	Fall 5 in 30
				0.1	0.133 & 0.101	Oct. 26th & Nov. 10th	M	(2/5) Fall Sampling Events
		As-T	mg/L	0.005	0.00556, 0.00599, 0.00803 & 0.00886	Summer 5 in 30	M	(4/5) Summer Sampling Events
E299256 - Quinsam River Downstream of the Confluence with the Iron River (IRQR)	IRQR	Al-D	mg/L	0.05	0.0587	Fall 5 in 30	A	Fall 5 in 30

For all Middle Quinsam Lake Sub-basin results background hardness of 30 mg/L was used to calculate those parameters that are hardness dependent.

For Iron River results IR1 average hardness was used to calculate hardness dependent parameters. 5 in 30 average hardness concentrations = 24 mg/L for Spring, 73 mg/L Summer and 30 mg/L for Fall.

8.2.1 *Middle Quinsam Lake Inflow (WA) EMS #0126402 and Outflow (WB) EMS #0900504*

Comparing Middle Quinsam Lake's inlet (WA) EMS # 0126402 and outlet (WB) EMS #0900504 offers an opportunity to assess potential mine-related effects on Middle Quinsam Lake water quality. Furthermore, water quality results from WA are considered "baseline" for the Middle Quinsam sub-basin receiving environment stations as it is situated upstream of any mine related discharge. Data obtained from WB (outlet of Middle Quinsam Lake) provides information on lake water quality after the addition of discharges from the South water management system, shallow and deep groundwater, Long Lake Outlet (LLO), mine related discharge from Settling Pond #4, and other anthropogenic sources (e.g., logging). Summary statistics for the last six years are provided in Appendix I, Tables 44 and 74 with Tables 128 through 133 presenting water quality data for WA and WB providing a comparison to WQOs and WQGs. Appendix II, Graph (63) displays Middle Quinsam Lake daily inflow obtained at the WA hydrometric station and Graph (64) compares discharge at WB with precipitation. Appendix II, Graphs (53 through 59) display the parameters of interest or those found elevated above guidelines (dissolved sulphate, aluminum, total arsenic and zinc) in the Quinsam Sub-basin.

TSS results at WA and WB remained below detection limits (<4.0 mg/L) throughout all sampling events as reported in previous years, and are expected to continue. Samples for WB are collected below the Coal Main road crossing on the Quinsam River and the low TSS results reflect the efforts made in reducing sediment and erosion at this location.

The pH values were similar at WA and WB. During 2016/2017, pH at WA and WB was weakly alkaline and within the WQG range of 6.5-9.0; pH values averaged 7.68 at WA and 7.71 at WB.

Conductivity at WB reflected the mine influences (elevated conductivity and sulphate are considered signatures of mine influence). For example, average conductivity values in 2016/2017 were 50 µs/cm at WA and 151 µs/cm at WB. Average sulphate concentrations were 1.34 mg/L at WA and 28.6 mg/L at WB, below the WQG at both stations (Appendix II, Graph 55). Like sulphate, annual average hardness concentrations display a moderate increase from WA to WB with average concentrations of 20.4 mg/L to 35.3 mg/L, respectively.

Total metal concentrations displaying a marginal annual average increases between WA and WB include iron (0.021 mg/L at WA to 0.049 mg/L at WB) and manganese (0.00146 mg/l at WA to

0.0072 mg/L at WB) in 2016/2017, likely attributed to mine related discharge. All total and dissolved metals remained below WQGs, and concentrations were similar to previous years.

The VIO maximum for total phosphorous in streams from May through September is 0.01 mg/L; this threshold was not exceeded at WB as the maximum concentration was 0.005 mg/L. Appendix I, Table (166) displays results of nutrient sampling performed during 2016/2017.

8.2.2 *No Name Outlet (NNO) EMS # E217017 and Long Lake Outlet (LLO) EMS # E219412*

Flow from No Name Lake enters the west end of Long Lake and exits Long Lake at the site known as LLO. LLO discharges to Middle Quinsam Lake upstream of Middle Quinsam Lake outlet (WB). Water quality monitoring at NNO and LLO provides information on changes in water chemistry in both Long Lake and the channel connecting the two lakes. The sampling location on No Name Lake is considered to be situated outside of direct mine discharge but could be influenced by groundwater. Therefore, changes in water chemistry between NNO and LLO represent the incremental mine loading into Long Lake from various inputs, including shallow and deep groundwater (e.g. emanating from 2S/3S), Long Lake Seep discharge, mine related discharge from the South water management system, and other anthropogenic sources (e.g., logging).

As shown in Appendix I, Tables 134 through 139, average TSS concentrations for LLO and NNO remained ≤ 4 mg/L during the three monitoring periods in 2016/2017. Both NNO and LLO exhibited similar pH, averaging 7.57 at NNO and 7.63 at LLO, with no WQG exceedances.

Conductivity and sulphate levels increased between NNO and LLO in 2016/2017, reflecting mine influence on Long Lake. Average conductivity was 38 µs/cm at NNO and 184 µs/cm at LLO. Annual average sulphate concentrations were 1.2 mg/L at NNO and 57 mg/L at LLO. Sulphate concentrations at LLO were higher during spring than summer and fall sampling periods, with no values higher than the WQG. Sulphate concentrations at LLO are cyclic with concentrations highs during summer and decreasing concentrations during fall and winter with higher flow rates and increased dilution, Appendix II, Graph (54). Sulphate is monitored weekly at LLO to assess water quality exiting Long Lake. Appendix I, Table (36) displays rolling average values for sulphate, which provide the most appropriate concentration to compare to the WQG.

Dissolved aluminum concentrations were higher than the WQG average (0.05 mg/L) during fall sampling period at many receiving environment sites. At NNO, the average was just above the WQG (0.0521 mg/L) and at downstream locations LLM and LLO the average was just below the WQG resulting in 0.0473 mg/L at LLO during fall. All other total and dissolved metals were below their WQGs, with many below laboratory DLs.

Water quality data for sites LLO and NNO are presented in Appendix I, Tables (134 to 139) with comparison to WQOs and WQGs. Appendix II, Graph 67 compares discharge with precipitation at LLO.

8.2.3 *Stream 1 – (7S) EMS # E292109 and Lower Wetland Outlet (LWO) EMS #E292112*

The headwaters of Stream 1 are formed by the discharge of 7SSD, which combines with Stream 2 above sampling location 7S. Downstream of site 7S, Stream 1 enters the Lower Wetland then flows into the Quinsam River. Given the aquatic values (fish habitat) in the Quinsam River, the 7S station has been defined as the initial dilution zone for 7-South discharge water. This receiving environment site is used to evaluate the influence of 7-South operations on aquatic receptors. The Lower Wetland Outlet station was established to monitor the cumulative water quality in Stream 1, and to understand overall contributions to the Quinsam River. The Lower Wetland Outlet station has not been representative of water quality from 7SSD nor from 7S.

There was discharge from 7SSD for a total of 12 days in 2016/2017 and 43 days in 2015/2016, indicating the limited amount of loading from the 7-South mine discharge to the Lower wetland.

The average sulphate level of 3.00 mg/L at 7S was well below the WQG (128 mg/L) , which was a direct result of diligent control of releases from the 7SSD sedimentation pond (to maintain an 8:1 dilution ratio) and water management measures employed at 7-South operations.

In 2016/2017, all total and dissolved metals were below WQGs and WQOs at 7S. Average Al-D was approaching the WQG average (0.05 mg/L) in fall (0.0489 mg/L).

Downstream site Lower Wetland Outlet (LWO) had elevated concentrations of TSS and metals, with WQG exceedances for TSS, total and dissolved iron, total copper and dissolved aluminum. These results are consistent with baseline measurements collected by Golder Associates [13] in

[13] Golder Associates. Quinsam 7-South Effluent Technical Assessment Report. 2011

June 2011, which showed WQG exceedances for iron (3.79 mg/L Fe-T and 2.52 mg/L for Fe-D) and aluminum (0.101 mg/L Al-D). Elevated iron and aluminum concentrations at this station are attributed to natural causes as this is a wetland area that most likely has anoxic conditions during low flow. LWO is normally dry during the summer low flow period. The metal source appears to be localized and downstream of 7S, as concentrations were low at 7S throughout 2016/2017 monitoring periods. Water quality data collected during the 2016 late summer early fall sediment and benthic monitoring event also showed elevated Al-D concentrations at the middle and outlet wetland stations. The sediment data showed elevated arsenic, iron and manganese in the middle station but not at the outlet where water quality is collected (Appendix I, Tables 225 - 227). These conditions may be attributed to higher flow conditions during sampling. Refer to Section 9 for a full discussion on sediment results in the Lower Wetland.

All other parameters were below WQGs; results for 7S are displayed in Appendix I, Tables (23 and 24) and Appendix II, Graphs (17 through 21 and 69). Results for LWO are displayed in Appendix I, Tables (143 to 145).

8.2.4 *Quinsam River Downstream Site 1 (QRDS1) EMS # E286930 & 7-South Quinsam River (7SQR) EMS # E292113*

QRDS1 is located approximately 2 km downstream from the MQL outlet (sampling site WB) and upstream of any inputs associated with 7-South operations. QRDS1 was established to monitor groundwater inputs from the underground tailings disposal of 7-South tailings in the 2-North mine and the underground sub-aqueously stored PAG-CCR material in the river barrier pillar. 7SQR is the 7-South Quinsam River monitoring station on the Quinsam River approximately 4 km downstream of QRDS1. 7SQR data are used to evaluate the influence of 7-South mine related discharge to the Quinsam River downstream of the LWO and of groundwater inputs to the Quinsam River from sub-aqueously stored PAG-CCR in the 7-South mine.

The incremental loading associated with discharge from 7-South operation was observed to be negligible in 2016/2017. General parameters were similar for both sites, and TSS values were below the DL in all samples collected.

Sulphate concentrations were similar for the two sites and were well below the WQG (128 mg/L). The annual average sulphate concentration was period was 29 mg/L at both QRDS1 and 7SQR.

Both stations were sampled during the three 5 in 30 sampling periods and 7SQR was also sampled monthly.

Total and dissolved metals concentrations were similar at both stations. At QRDS1, total zinc was higher than the WQG during spring, with a maximum of 0.0927 mg/L (WQG of 0.033 mg/L) and average of 0.0225 mg/L (WQG of 0.0075 mg/L). The maximum of 0.0927 mg/L was considered an outlier as all other results at QRDS1 and 7SQR were below 0.005 mg/L for the entire monitoring period. Arsenic was slightly higher at 7SQR than at QRDS1, with one WQG exceedance observed in August (0.00558 mg/L compared to the maximum-WQG of 0.005 mg/L) at 7SQR.

The VIO maximum for total phosphorous (0.01 mg/L) was exceeded at 7SQR on one sampling event in August (0.0117 mg/L). Appendix I, Table (166) displays nutrient sampling conducted during 2016.

Appendix I, Tables (140 -142 & 146 to 148) and Appendix II, Graphs (55 - 59) display relevant parameters of interest for these sites.

8.2.5 *Iron River*

The Iron River Baseline Summary Report was submitted to the MOE on March 31, 2016. The report reviewed the monitoring data at all sites in the Iron River, summarizing trends and parameters found to be naturally elevated due to the watershed geology and contact with the Benson/Dunsmuir members of the Comox Formation.

As part of the 7-South Area 5 permit application, baseline water quality data were collected at ten stations on the Iron River to gain an understanding of existing water quality and local influences. Additionally, six tributaries were monitored to identify incremental loading.

One year of monthly baseline samples was obtained at all sites to maximize interpretation of seasonal variations and trending on the Iron River. Post-baseline monitoring in 2016/2017 consisted of 5 in 30 and monthly sampling at three stations on the Iron River (IR1, IR6 and IR8) and one station on the Quinsam River, downstream of the confluence of the Iron River (IRQR).

Most general parameters (e.g., TSS, sulphate) had low concentrations at the four stations and remained well below WQGs. Hardness showed seasonal variability, with lower levels in spring

and fall (higher flow) than in summer (low flow). As such, the varying hardness levels at IR1 (upstream of mining operations) were used to calculate WQGs that vary with hardness.

Dissolved aluminum and total arsenic were the two primary parameters of interest in the Iron River. In 2016/2017, there were fewer arsenic WQG exceedances than previously reported; IR8 had WQG exceedances in four of the five samples collected during summer (ranging from 0.00556 mg/L to 0.00886 mg/L). The lower incidence of WQG exceedances in 2016/2017 may be related to the generally higher river flows throughout the year compared to previous baseline sampling as displayed in Appendix II, Graph 70. Al-D concentrations were higher than the WQG during multiple sampling events at all four stations during fall and at IR1, IR6, and IR8 during spring. An inverse relationship between As-T and Al-D was identified: Al-D is elevated during periods of higher flow while As-T is elevated at times of low flow (Appendix II, Graphs 60 to 62). In 2015, for example, As-T exceeded the WQG at IR6 and IR8 in most of the samples collected during the summer while Al-D was above the WQG during fall through winter.

All other parameters of interest were below WQGs at IR1, IR6, and IR8 and all except Al-D were below WQGs at IRQR. Therefore, mixing of the Quinsam and Iron rivers continues to provide sufficient dilution to maintain water quality.

Appendix I, Tables (101 -116) and Appendix II, Graphs (101 to 103) display relevant data for all Iron River sites graphed against flow.

9.0 SEDIMENT QUALITY IN THE RECEIVING ENVIRONMENT

Sediment samples were collected from monitoring stations in five lakes, the Lower Wetland, and the Quinsam River in August through October 2016 and analyzed for a variety of parameters. Parameters were chosen based on constituents commonly found in sediment near coal mines and parameters of interest from previous studies completed in this watershed. The analysis chosen were:

- Total Moisture
- Particle Size
- Paste pH
- Total Organic Carbon
- Total Sulphur
- Total Metals
- Polycyclic Aromatic Hydrocarbons (PAHs)

9.1 LAKES

Gooseneck, No Name, Long, Middle Quinsam, and Lower Quinsam lakes were sampled in 2016 (17 stations total) to evaluate sediment chemistry throughout the watershed near mining operations. No Name, Long, Middle Quinsam, and Lower Quinsam lakes were sampled at the inlet, outlet and deep habitats, and all except Lower Quinsam Lake were sampled at seep areas. Gooseneck Lake (the reference lake) was sampled only in deep habitat. Each lake has different physical characteristics and input sources.

The study design followed for the sediment and benthic invertebrate sampling program is contained in Appendix VI Sediment and Benthic Monitoring Program 2016. It followed a modified Spatial Variance Program (Standard) as defined in MOE (2016).

9.1.1 *METHODS*

At each sampling station, three to six replicate samples (subsamples) were collected using an Eckman sampler. Replicate samples were obtained at 5 m equidistant spacing as indicated in (MOE 2016)[14] to provide representation of each location and to minimize the influences of outlier

[14] MOE. 2016. *Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators, Version 2, June 2016*. Available at: http://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/water_air_baseline_monitoring.pdf

samples. Sediment was released from the sampler into a mixing bowl and observations (depth sampled, texture, colour, presence of living organisms, debris, biofilm, odour, and sheen) were documented and are described in the results section. Sediment was homogenized, placed in labelled sample jars, placed into a cooler with ice packs, and shipped to Maxxam with a chain-of-custody form.

Split samples were obtained at one site per waterbody and were used to identify the quality and consistency of sample collection and preparation methods. To collect a split sample, sediment was obtained using the Ekman sampler and placed into the mixing bowl like any other sample. The materials were mixed thoroughly and two sets of samples were placed into containers from the mixing bowl. Upon receipt of chemical analysis from the laboratory, reported values were used to calculate an RPD between the samples.

The data was organized by sampling station, with results presented for individual replicate samples and for summary statistics (minimum, maximum, mean, standard deviation, % relative standard deviation, and number of sediment guideline exceedances). The range of values for replicate subsamples reflected natural variability at a station and the average value provided an overall summary of concentrations. PAH and metal results were presented in separate tables for ease of comparison and viewing.

Analytical results for PAHs are presented as raw data and normalized to a 1% total organic carbon (TOC) basis, using TOC concentrations measured within samples. For example, a sample containing 5% TOC would have PAH concentrations divided by 5 to yield the normalized value. As PAHs preferentially bind to organic carbon, it is necessary to account for the varying amounts of TOC that may be present to allow consistent comparisons among replicate samples and stations. Care was taken to use the lowest DLs available at Maxxam, but some samples had elevated DLs (higher than sediment guidelines) due to interference from the sample matrix.

Various guidelines were used to assess sediment quality at the monitoring stations. The Canadian Council of Ministers of Environment (CCME) Interim Sediment Quality Guidelines (ISQG) and Probable Effects Levels (PELs) are generic guidelines for several metals and PAHs (CCME 2017)[15]. B.C. has also developed generic ISQGs and PELs, typically the same as for CCME, but with guidelines for additional parameters (MOE 2017). "The ISQG reflects the concentration below which adverse biological effects are expected to occur rarely. The PEL defines the level above which adverse effects are expected to occur frequently." (CCME 2001)[16] A few generic Ontario Sediment Quality Guidelines were integrated into the list of ISQGs and PELs for parameters than did not have a CCME or BC guideline for comparison. TOC adjusted PAH concentrations were compared to the British Columbia Ambient Sediment Quality Guidelines (BCASQG) (MOE 2017[17]). These standards are dynamic as they change proportionate to the varying amounts of TOC observed in the sediment samples. For ease of comparison and reduced workload, these standards have been kept stationary and the PAH result has been adjusted.

For Long Lake, site-specific sediment quality objectives (SQOs) have been developed that recognize the naturally elevated metal concentrations related to local hydrology and geology (SLR 2015). The SQOs were derived from studies completed prior to mining influence in Long Lake (pre 1987). When the background concentration was lower than the ISQG, the ISQG was used as the SQO.

In Appendix I, Tables for metals, parameters of interest, which are of higher concern due to potential toxicity identified in the present study or previous studies, are colour-coded. Parameters highlighted in blue are of highest interest (arsenic, iron, manganese) and those highlighted in orange (cadmium, chromium, copper, mercury and nickel) are considered of secondary interest.

Tables listing guideline exceedances were compiled separately for metals and PAHs. For PAHs, exceedances for raw concentrations and TOC-normalized concentrations were identified.

[15] Canadian Council of Ministers of the Environment, Canadian Sediment Quality Guidelines for the Protection of Aquatic Life available at: File:///C:/Users/kar/Downloads/CEQGchemicals%20(2).pdf

[16] Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. Introduction. Available at: http://ceqg-rcqe.ccme.ca/download/en/317

[17] British Columbia Ambient Sediment Quality Guidelines

9.1.2 *RESULTS*

Results for the sediment and benthic sampling stations are provided in Appendix I, Tables 186 to 190 and 193 to 247.

9.1.2.1 *Gooseneck Lake*

Gooseneck Lake (GNL) is situated approximately 3 km northwest of the mine site office, has a maximum depth of approximately 20 m and covers a surface area of 0.78 km^2. This lake does not receive any mine impacted waters but receives the same inflow water that enters Middle Quinsam Lake via a dam controlled by BC Hydro. GNL outflow does not enter the Quinsam Watershed and ultimately enters Lower Campbell Lake via Snakehead and Beavertail Lakes. GNL has been used as a reference lake in historical baseline studies: *"The selection of this lake as a reference lake includes considerations of practicality and geography; however, no two lakes are identical" (*Golder, 2011[18] *).* Use of GNL as a reference lake needs to consider the many differences among the study lakes.

One station was sampled at Gooseneck Lake, (MGNL) which is situated in the southern portion of the lake at the deepest location (15 m) identified by Quinsam staff. The sediment was described as silty and gelatinous with some small debris, and dark brown in colour with a reddish hue. It had a mild anoxic odour and contained various species of aquatic worms. The average moisture for the five samples was 87.8%. The samples were predominantly composed of sand and silt, with a pH of 5.67.

PAHs were present in relatively low concentrations; with a total PAH average of 0.274 mg/kg. Pyrene and dibenz(a,h)anthracene exceeded ISQGs in some samples, but were well below PELs.

Arsenic, iron, and manganese were higher than ISQGs or PELs at MGNL. Arsenic exceeded the PEL in all replicate samples (17.6 to 25 mg/kg, average of 21.4 mg/kg). Iron exceeded the ISQG in all replicate samples (29,500 to 41,400 mg/kg, average of 36,540 mg/kg). Manganese

[18] Golder (Golder Associates Ltd.) 2010. Integrated Long Lake Sediment Assessment.

exceeded the ISQG in all replicate samples, with one sample exceeding the PEL (781 to 1200 mg/kg, average of 987 mg/kg).

Cadmium, copper, mercury, and nickel were present at concentrations above ISQGs but not PELs.

9.1.2.2 *No Name Lake*

No Name Lake (NNL) lies approximately 3 km south of the mine site office in close proximity to historical operations in the South Mining Area. NNL has a maximum depth of approximately 14 m and covers a surface area of approximately 0.2 km^2. There are two major inlets that deliver water from local precipitation and that are not mine impacted.no point source discharges from mining activity. NNL flows into Long Lake via a connector stream and is also known to be a “losing lake” that delivers water to local aquifers. While NNL Lake is not considered a perfect “control” lake, close proximity and supply of water to LLM make it a suitable reference for Long Lake using the Inlet and deep sites. There are groundwater influences from the 2S PAG-CCR disposal pond and possibly the 2-South mine near the outlet and seep sites (seeps are potentially from 2S Pond). Hence the deep, seep, and outlet sites for No Name Lake are considered to be high impact / near field sites

During the 2016 sediment sampling program, four stations were evaluated on NNL: the inlet on the western portion of the lake, the deepest known area near the lake centre, a site near a potential “seep”, and the outlet near the northeast edge. The highest concentrations of primary metals of interest were located at the deep station and the highest concentrations of PAHs were found at the seep station. Secondary metals of interest were generally found in low levels throughout NNL.

No Name Lake Inlet (NNLI)

NNLI is considered not affected by mine water discharges or land disturbance. Located on the western end of the lake, the inlet receives local catchment runoff through a wetland, with flow rates that correlate to seasonal precipitation and weather patterns. Samples were obtained at depths of 3.8 to 5.0 m and were silty and gelatinous, with substantial fresh plant debris and little odour. Sediment was a medium brown colour with many orange streaks and had average moisture content of 92.0% and a paste pH of 5.73.

Total PAHs concentrations were low (average of 0.0252 mg/kg). Concentrations were lower in samples collected in 2003 and 2004 by Nordin and may be due to local variation, sampling practices, or changing analytical techniques. Two of five replicate samples had 2-methylnaphthalene levels marginally higher than the ISQG, but the average was below the ISQG.

Arsenic, iron, and manganese had average concentrations higher than the PELs. Given the lack of mine influence at NNLI, elevated concentrations are assumed to be from natural sources (local geologic formations). Concentrations measured in 2016 were somewhat higher than reported as baseline in the 1980's prior to mining operations (Sneddon & Kelso, 1983); this may be attributed to difference in sampling techniques and exact sampling locale. A relatively small sample size over a long period is not sufficient to describe temporal trends with a high degree of confidence.

Arsenic exceeded the PEL, ranging from 42.8 to 61.2 mg/kg with an average of 52.6 mg/kg. Similar results were reported in 2009 (40.0 mg/kg; Canadian Water Network, 2009) and 2004 (54.1 mg/kg; Nordin, 2004), but lower results were reported in 2003 (34.7 mg/kg Nordin, 2003) and 1983 (12.5 mg/kg; Sneddon & Kelso, 1983). Iron exceeded the PEL, ranging from 59,000 to 80,500 mg/kg, with an average of 67,420 mg/kg. Elevated concentrations have been observed in the past (ranging 29,100 to 50,800 mg/kg) from and are likely naturally occurring, although iron concentrations reported in 2016 were the highest on record. Manganese exceeded the PEL, ranging from 749-3,030 mg/kg with an average of 1,794 mg/kg. Concentrations measured in 2016 were the highest on record, and were approximately twice as high as reported in the 1983 Sneddon and Kelso baseline study.

There were no ISQG exceedances for any of the secondary metals of interest.

No Name Lake Middle (NNLD)

NNLD is situated near the centre of No Name Lake, adjacent to the other major inlet from the south. This station is also used for routine water sampling. Samples were obtained at a depth of 12.0 m and were gelatinous with silt/clay fractions visible. The sediment was dark brown with a red hue, with a mild anoxic odour. The average moisture content was 88.8%, the dried sample was mostly sand (69%) and paste pH was 5.6.

Total PAHs were present in trace concentrations (average total PAH of 0.079 mg/kg), with most of the PAHs below the DLs in the five subsamples. Only 2-methylnapthalene exceeded the ISQG (2/5 subsamples).

Arsenic, iron, and manganese concentrations were higher at NNLD than at any other lake stations monitored in 2016 and exceeded the PELs in all five replicate samples. Such high concentrations were not expected at this station, given that past monitoring results showed much lower values and no mine related discharges enter No Name Lake in this area. There has been substantial logging activity around this lake in recent years, which is known to lead to substantial sediment and particulate metal loading. Also, it is not known how close the sampling locations were for the various studies. It is possible that increases over time are not a result of increased deposition and mainly reflect high variability in chemistry across small distances.

Arsenic concentrations ranged from 106 to 166 mg/kg, with an average of 133.2 mg/kg, about eight times higher than the PEL and over ten times higher than reported in 1983 (10.7 mg/kg; Sneddon & Kelso, 1983). Iron ranged from 125,000 to 218,000 mg/kg, with an average of 173,000 mg/kg, and manganese ranged from 3,890 to 6,820 mg/kg, with an average of 5,528 mg/kg, higher than PELs.

Of the secondary metals of interest, copper (38.8 mg/kg) and mercury (0.219 mg/kg) exceeded ISQG using average concentrations. One of the subsamples saw a PEL exceedance of selenium at 2.01 mg/kg.

No Name Lake Near Seep (NNLS)

NNLS is on the southeastern shoreline, approximately 10 m from shore near a small drainage channel that transports seepage water to the lake from close to the reclaimed 2-South mining operation. Any deposition of materials from this drainage channel is thought to accumulate in and around NNLS. Samples were obtained at a depth of 5.5 m and consisted of silt and clay, with less organic matter than other samples in No Name Lake. The samples had little organic debris, were dark brown with grey portions of clay and had streaks of red.

The highest PAH concentrations in No Name Lake were reported from NNLS, with total PAH ranging from 0.093 to 0.19 mg/kg and averaging 0.133 mg/kg. Concentrations of 2-methylnaphthalene were higher than the ISQG in all five replicate samples (average of 0.043 mg/kg).

Arsenic, iron, and manganese concentrations were higher than PELs in most replicate samples and using average values. Concentrations in 2016 were comparable to those reported in the 2014 sampling program conducted by QCC staff. Manganese concentrations were lower at NNLS

than at other stations in No Name Lake in 2016 (range of 770 to 1,400 mg/kg, average of 1,112 mg/kg).

Average concentrations of nickel and copper were just above ISQG (16.1 and 35.9 mg/kg respectively).

No Name Lake Outlet (NNO)

NNO is located approximately 20 m south of the drainage channel that delivers water to Long Lake. Samples had high amounts of fresh and decaying plant debris and were gelatinous and spongy, with high algae content. High moisture content (92 to 94%) resulted in increased DLs for PAHs. This area of the lake is shallow (3 to 4 m depth) and has good exposure to sunlight, which promotes plant growth.

Despite the elevated PAH DLs, total PAH concentrations were low, averaging 0.027 mg/kg.

Arsenic, iron, and manganese concentrations were generally lower at NNO than at other stations in No Name Lake. The average arsenic concentration was below the PEL (13.8 mg/kg with a range of 9.43 to 20.8 mg/kg). Individual and average iron concentrations were below the PEL (ranging from 14,600 to 32,900 mg/kg and averaging 22,040 mg/kg). The average manganese concentration was higher than PEL but lower than at the inlet and deep stations (ranging from 364 to 3,570 mg/kg, indicating more dynamic sediment chemistry at NNO.

Secondary metals of interest concentrations were low throughout subsamples and there were no reported ISQG exceedances using average values.

9.1.2.3 *Long Lake*

Long Lake is a long, narrow lake that receives water from No Name Lake and drains into Middle Quinsam Lake. In addition to inputs from No Name Lake, Long Lake receives local runoff from precipitation, groundwater, and point source discharges from mining operations. A significant fault (appropriately name Long Lake Fault) runs through Long Lake from east to west and acts as the division between sedimentary and volcanic bedrocks. The maximum depth of Long Lake is 20 to 21 m.

Long Lake has been a focus of environmental monitoring for effects of mining activities since the 1990s. Study results have been used to refine best practices for water management and resource management. Sediment has been sampled several times, including in the early 1980s

prior to mining. To recognize the naturally elevated background concentrations in Long Lake, SQOs were developed that reflect site conditions (SLR. 2015)

The 2016 sampling program built on the existing dataset by sampling at locations previously identified as of interest. Four sites were sampled: Long Lake Inlet (LLI), on the westernmost portion of Long Lake where water from No Name Lake enters through a wetland; Long Lake Near Seep (LLNS), close to the inputs from the Long Lake Seep; Long Lake Deep, the deepest spot known on the lake and where routine water quality samples are obtained; and Long Lake Outlet (LLO), near the outlet and downstream of all discharges from the South Mining Operations.

Long Lake Inlet (LLI)

LLI is situated upstream of mine-related inputs and is located approximately 10 m from the edge of the wetland where water enters Long Lake. The samples were obtained at a depth of 5 m and were silty and gelatinous, with some decaying plant material and a slight anoxic odour. The top few centimetres were a lighter brown than the remaining layer and contained many small, red aquatic worms. Moisture content averaged 87%, paste pH was 6.50 and the substrate consisted primarily of sand and silt.

Total PAH concentrations were low (average of 0.22 mg/kg). Naphthalene and 2-methylnaphthalene concentrations were higher than their ISQGs but below PELs. Values reported in 2016 were similar to those reported in previous sampling programs.

Arsenic, iron, and manganese concentrations were higher than PELs but not SQOs in all replicate samples. Arsenic concentrations at LLI were similar to those at No Name Lake inlet, with an average of 52.1 mg/kg. Arsenic concentrations at LLI have increased over time (recognizing that some variation in sampling location has also occurred). Average iron concentrations (45,166 mg/kg) were slightly above the PEL and showed little variance among replicate samples. Iron concentrations were slightly higher in 2016 than in previous sampling events. Manganese concentrations were between the ISQG and PEL (average of 728 mg/kg; range of 684-783 mg/kg) in 2016 and were lower than in previous studies.

Cadmium, copper, and nickel had exceedances of ISQGs in some replicate samples. The average copper concentration was below the ISQG. Cadmium exceeded the ISQG in all samples, averaging 0.642 mg/kg, but was well below the SQO. Nickel concentrations were slightly higher than the ISQG in all replicate samples, averaging 17.5 mg/kg. As background nickel concentrations were lower than ISQG, the ISQG was used as the SQO.

Long Lake Near Seep (LLNS)

LLNS is located in the western half of Long Lake slightly downstream from the Long Lake Seep discharges. Situated in the seep IDZ approximately 10 to 15 m from shore, LLNS is situated to evaluate deposition from the seep. The lake is steeply sloped in this area and samples, even though taken close to shore, were obtained at a depth of 15.5 to 16 m. The samples were gelatinous with fine clay, silt and sand, littered with larger debris. The sediment was dark brown with a distinct red surface and contained many red aquatic worms. The average moisture content was 86.3%, paste pH was 6.24 and substrate was composed primarily of sand.

Total PAH concentrations ranged from 0.78 to 1.0 mg/kg, averaged 0.9 mg/kg, and were notably higher than at LLI. Individual PAHs had concentrations higher than the ISQG in some replicate samples and 2-methylnaphthalene was above the PEL in all replicate samples. Comparison with previous sampling programs is challenging because the sampling location has changed over time (Appendix XI, Figure 10).

Arsenic, iron, and manganese concentrations were elevated the five replicate samples, and were higher at LLNS than at other stations in Long Lake, suggesting contributions from the seep. Arsenic ranged from 41.4 to 74.8 mg/kg, averaging 55.4 mg/kg and lower than reported in 2004 and 2010. Iron ranged from 51,000 to 62,000 mg/kg, averaging 55,550 mg/kg and within the range of previous studies. Manganese ranged from 737 to 1,380 mg/kg, averaging 940 mg/kg and higher than some previous studies but lower than in 2004.

Cadmium, chromium, copper, mercury and nickel were higher than ISQGs in some samples; only nickel was above its SQO at LLNS.

Long Lake Deep (LLM)

Long Lake Deep (also referred to as Long Lake Middle or LLM) is located near the centre of the lake at the deepest known portion, and is also used for routine water quality monitoring. Due to its bathymetry, LLM is an ideal location for materials to accumulate in the sediment and has been identified in the past as having high concentrations of parameters of interest. Samples were obtained at a depth of 19.5 m and were silty and sandy, having many fine particles and decaying plant debris. The sediment was a medium brown colour with many orange streaks on the uppermost layer. The average moisture content was 87.3%, paste pH was 5.85, and substrate was composed primarily of sand and silt.

PAH concentrations were higher at LLM than at the other stations in Long Lake and in the other lakes sampled. Total PAH ranged from 2.5 to 2.8 mg/kg, averaging 2.67 mg/kg. Concentrations of some individual PAHs were higher than ISQGs or PELs, including 2-methylnaphthalene (above PEL in all replicate samples, average about five times the PEL) and naphthalene (above PEL in all replicate samples). Naphthalene concentrations normalized to 1% TOC were higher than the BCASQG.

Arsenic, iron, and manganese concentrations were higher at LLM than at the other stations in Long Lake in 2016. Arsenic concentrations averaged 160.3 mg/kg. While somewhat difficult to compare to previous results at this location due to slightly differing GPS coordinates, arsenic concentrations were within the range expected at the seep location, with no sign of an increase over time. Iron concentrations ranged from 104,000 to 119,000 mg/kg, averaging 112,000 mg/kg. While iron was higher at this location that elsewhere in the lake, it did not exceed the SQO and was within the range previously reported. Manganese concentrations were higher than the SQO and averaged 3,240 mg/kg. Maximum manganese concentrations were slightly higher than previously reported at the seep. It is interesting to note that during water sampling at LLM in recent years, manganese concentrations were elevated when DO was low. The assumption is that favorable redox conditions promote dissolution of sediment manganese into the lower levels of the water column.

Copper, chromium, and mercury concentrations were higher than ISQGs, with nickel also higher than the SQO in all subsamples. The source of nickel is not clear, but concentrations have increased over time at LLNS and other stations in Long Lake. Nickel concentrations are about 50% of the PEL.

Long Lake Outlet (LLO)

LLO is downstream of mine inputs into Long Lake, including all discharges from the South Water Management System via LLE. LLO is approximately 75 m upstream from the beginning of the outlet channel. Sediment samples were obtained at depths of 5 to 5.5 m in an area with a high density of floating, decaying logs, rich in plant life, both fresh and decaying. Samples were silty and gelatinous with high amounts of organic material, a mild anoxic odour, and high debris content. The sediment was medium brown in colour and contained many fine, black particles. Moisture content averaged 87%, paste pH was 6.17, and the substrate was composed primarily of silt followed by sand.

Total PAH concentrations were elevated at LLO, ranging from 1.3 to 3.6 mg/kg with an average of 2.18 mg/kg. The maximum value of 3.6 mg/kg was the highest observed at any lake stations sampled in 2016. The average concentration of 2.18 mg/kg was higher than reported in previous studies and indicates an increasing trend. Many individual PAHs were higher than their ISQGs, with 2-methylnaphthalene and naphthalene higher than the PEL (for individual samples and averages). The 1% TOC normalized concentrations of naphthalene also exceeded the BCASQG. Total PAH may be influenced from the amount of floating, decaying logs as wood waste and decaying leaves have been found to contain elevated concentrations of heavy metals and PAH compounds (Meike Nitsche, Nodirjon Nurmatov, Frank Hensgen and Michael Wachendorf.2017).[19]

Arsenic and iron concentrations were higher than the PEL and manganese was just below the PEL, for average and individual samples; levels were below the SQOs. Arsenic concentrations were similar to those reported at LLI in 2016 (average of 47.9 mg/kg) and were in the range reported in previous studies. Iron concentrations were also similar to those reported at LLI in 2016 (average of 53,133 mg/kg), and appear to have increased since 2003. Baseline samples from LLO obtained in 1983 had iron concentrations almost three times higher than reported in 2016 (Sneddon & Kelso, 1983). Manganese concentrations were notably lower at LLO than LLM and were similar to levels seen at LLI in 2016. With an average of 1,034 mg/kg, manganese concentrations were at their lowest since baseline data collection was done and have steadily declined since 2004.

Copper exceeded the ISQG in all replicate samples (average of 50.8 mg/kg) but remained well below the SQO. Nickel concentrations (average of 25.6 mg/kg) were above the SQO and higher than reported for background concentrations.

9.1.2.4 *Middle Quinsam Lake*

Middle Quinsam Lake is part of the Quinsam River system, situated downstream of a BC Hydro diversion dam and just west of the North Mining Operations at Quinsam Coal. The lake receives inputs from the Quinsam River, local groundwater, and precipitation, and is regarded as the

[19]Meike Nitsche, Nodirjon Nurmatov, Frank Hensgen and Michael Wachendorf.2017. Heavy Metals and Polycyclic Aromatic Hydrocarbons in Urban Leaf Litter Designated for Combustion

receiving environment for aggregate discharges from North Mining operations. Flows from Long Lake enter Middle Quinsam Lake near the lower end of the lake, near the outlet to the Quinsam River. The Middle Quinsam Lake outlet is near a bridge close to the mining roads. Middle Quinsam Lake has a maximum depth of approximately 15 m near the lake centre on the southern portion. Four stations were sampled in 2016: the inlet (MQLI), approximately 250 m downstream of the lake inlet; near a potential seep from the coal processing plant (MQLNS); in the deepest area (MQL); and 175 m upstream from the lake outlet and downstream of the channel from Long Lake (MQLO).

Middle Quinsam Lake Inlet (MQLI)

MQLI is in a shallow area approximately 250 m downstream of the inlet. As mine effluent enters a wetland upstream of the defined inlet channel, MQLI is considered affected by mining. Samples were obtained at a depth of 1 to 2 m and were rich in fresh plant material, shells, and debris. Sediment was silty, gelatinous, medium brown colour and rich in organic matter. Moisture content averaged 90%, paste pH was 5.95, and substrate was mainly sand and silt.

Total PAH concentrations were low, ranging from 0.10 to 0.13 mg/kg, with an average of 0.11 mg/kg. 2-methylnaphthalene was marginally higher than the ISQG in all replicate samples, but well below the PEL.

Arsenic, iron, and manganese concentrations were above the ISQGs, but not PELs. The average arsenic concentration of 8.07 mg/kg was lower than at the other three stations in Middle Quinsam Lake. Average concentrations were 30,766 mg/kg for iron and 696 mg/kg for manganese.

Nickel and copper concentrations were higher than ISQGs but well below PELs.

Middle Quinsam Lake Near Seep (MQLNS)

A natural drainage depression originating near the coal processing plant, coupled with surfacing shallow groundwater, discharges water into the lake on the northeastern shoreline. MQLNS was located approximately 30 m offshore of the entry point of this “seep” water to assess whether metals in seep water settle on the lake bottom. Samples were collected at a depth of 1 metre in an area surrounded by wetland rich in fresh plants, shells, benthic invertebrates, and organic debris. The sediment was a medium brown colour and was silty and gelatinous. Moisture content was 94.8%, paste pH was 7.32, and substrate composition was mainly sand.

All PAH concentrations were below DLs.

Arsenic, iron, and manganese concentrations were above ISQGs. Arsenic averaged 9.38 mg/kg; iron averaged 43,840 mg/kg (just above the PEL); and manganese averaged 379.4 mg/kg. Iron was elevated at MQLNS relative to the other stations in the lake and may be associated with elevated iron content measured frequently in the drainage channel discharge.

Middle Quinsam Lake Deep (MQL)

Located in the deepest area of the lake, MQL is a routine water quality monitoring station. Sediment samples came from 13 to 14 m depth and were silty and gelatinous, with numerous red aquatic worms. The samples were medium brown with a green hue, lined with orange streaks and black particles. The moisture content was 92%, paste pH was 6.59 and substrate consisted mainly of sand and silt.

Total PAH concentrations averaged 0.103 mg/kg, similar to other stations in the lake. The only ISQG exceedances observed was 2-methylnaphthalene for two of the three replicate samples collected.

Arsenic and iron concentrations exceeded the ISQG. Average arsenic concentrations were 12.8 mg/kg for arsenic, 36,400 mg/kg for iron, and 354 mg/kg for manganese (lower than the ISQG).

Nickel and mercury concentrations were slightly above ISQGs but well below PELs. Selenium concentrations were higher than the BC alert level of 2 mg/kg in all replicate samples from MQL, with an average of 2.55 mg/kg. While selenium has been observed in trace concentrations throughout the watershed, MQL is the only station with a guideline exceedance. Selenium was present in trace amounts in coal samples analyzed in the past but it is unclear whether this sediment exceedance is directly related to mining discharges.

Middle Quinsam Lake Outlet (MQLO)

MQLO drains into the Quinsam River, conveying water from both Middle Quinsam Lake and Long Lake via an outlet channel near a bridge over the channel that is used for mine traffic. Samples were obtained approximately 100 m downstream of the inlet from Long Lake and 175 m upstream of the bridge. MQLO represents the final deposition area on the lake adjacent to mining activities. Samples were collected in shallow water (1 to 3 m) in an area with high plant debris and numerous crayfish. Samples were silty and gelatinous with minimal odour and a dark brown colour with a green hue. The average moisture content was 93.7%, paste pH was 6.49, and substrate consisted mainly of sand.

All PAH concentrations were below DLs.

Arsenic, iron, and manganese concentrations were higher than ISQGs but not PELs, at concentrations similar to previous studies. Average concentrations were 9.11 mg/kg for arsenic, 26,033 mg/kg for iron, and 722 mg/kg for manganese. These concentrations were similar at the other Middle Quinsam Lake stations so did not reflect additional loading from the Long Lake channel.

Cadmium, copper, and nickel concentrations were above ISQGs but all below PEL. Selenium concentrations were less than half of those observed at MQL.

9.1.2.5 *Lower Quinsam Lake (LQL)*

Lower Quinsam Lake is the furthest downstream monitoring lake for QCC. It is situated approximately 6 km downstream of Middle Quinsam Lake outlet. Lower Quinsam Lake receives all cumulative mine discharges from the three main water management systems at Quinsam Coal. The lake has an area of 1.17 km^2 and a maximum depth of about 21 to 22 m. Sediment chemistry was assessed at four stations: near the inlet (LQLI); the deepest known area (LQL); a second deep area (LQLM); and just upstream of the outlet channel (LQLO). No seeps at Lower Quinsam Lake were identified for sampling.

Lower Quinsam Lake Inlet (LQLI)

LQLI is located 2 km downstream of the Iron River-Quinsam River confluence, at the northern end of the lake. At the inlet, the lake slopes quickly to deep water, and sampling depths were 14 to 17 m only 75 m from the shore. Abundant large woody debris made it difficult for the sampler to penetrate the sediment. Samples were low in organic matter and were predominately composed of sand with little silt and clay. Moisture content was low at 38.7% (likely due to high sand and pebble content) and paste pH was 5.48. The samples contained numerous red aquatic worms along with high amounts of leaves and plant debris on the surface.

Total PAH concentrations were low, with an average of 0.353 mg/kg. Individual PAH compounds, including 2-methylnaphthalene, naphthalene, and phenanthrene had concentrations higher than the ISQGs but well below PELs. Normalized to 1% TOC, only naphthalene was higher than the BCASQG.

Arsenic, iron, and manganese concentrations in Lower Quinsam Lake were lowest at LQLI and increased downstream towards the outlet. At LQLI, arsenic and iron concentrations were higher than PELs averaging 35.7 and 52,160 mg/kg, respectively. Manganese concentrations were higher than the ISQG but lower than the PEL, with an average of 528 mg/kg.

Cadmium, chromium, copper, and nickel concentrations were higher than ISQGs but lower than PELs.

Lower Quinsam Lake Deep 1 (LQL)

LQL is in the northern half of the lake and is used for routine water quality monitoring. Sediment samples were taken at 16 to 17 m depth. The samples had a distinct anoxic odour with a few worms and little to no debris. Samples had distinct layers, with a deep orange colour on the top few millimetres, followed by 2 cm of gray clay and another 7 cm of dark brown sediment. Moisture content averaged 66.8%, paste pH was 5.78, and the substrate was primarily silt with lesser amounts of clay and sand.

Total PAH concentrations were low, with an average of 0.41 mg/kg. There were small exceedances of ISQGs for individual PAH compounds.

Arsenic and iron concentrations at LQL were slightly higher than at LQLI and exceeded the PELs. Average concentrations were 42.2 mg/kg for arsenic and 52,700 mg/kg for iron. Water quality samples from 1 m off the bottom often show elevated iron concentrations when DO levels in deep water are low (Appendix II, 51). Elevated iron concentrations in sediment along with a distinct red tinge at the sediment surface support the theory that iron dissolves and migrates into the water column at times of favourable redox conditions (lower ORP and lower DO). Particulate iron as Fe^{3+} in sediment is reduced to the more soluble Fe^{2+} and migrates into the water column. Although baseline sediment quality is not available, it is inferred that similar conditions occurred prior to any mining activities. High iron concentrations were reported in water during baseline studies in 1983 and 1984 when dissolved oxygen concentrations were low (Norecol, 1983, 1984). These high concentrations of iron in the water quality prior to mining at Quinsam Coal indicate that mine-related inputs are not the cause of high iron concentrations in deep water.

Manganese, cadmium, chromium, copper, and nickel concentrations were higher than ISQGs but not above PELs.

Lower Quinsam Lake Deep 2 (LQLM)

The second deep station LQLM, is about 900 m south of LQL, closer to the lake outlet. There are no additional mine-related inputs between the two deep stations. Samples were taken at depths from 14 to 16 m, and had similar physical characteristics to LQL, including an anoxic odour, minimal debris, and presence of worms. Sediment layering was similar to LQL, but there was an even deeper orange colour on the surface at LQLM. Moisture content averaged 75%, paste pH was 6.12, and substrate was mainly silt but with a higher percentage of sand than at LQL.

Total PAH concentrations were slightly higher at LQLM than at other stations in the lake, averaging 0.50 mg/kg. 2-methylnaphthalene, naphthalene, and phenanthrene concentrations were higher than the ISQGs but not the PELs.

Arsenic, iron, and manganese concentrations were notably higher at LQLM than at LQL and exceeded PELs in all replicate samples. Average concentrations were 87.4 mg/kg for arsenic, 68,020 mg/kg for iron, and 1,338 mg/kg for manganese.

Cadmium, chromium, copper, and nickel concentrations were higher than ISQGs but not PELs.

Lower Quinsam Lake Outlet (LQLO)

LQLO was located 400 m upstream of the defined outlet channel, in an area with high plant debris and many mussels, shells, insects, and eggs. It was necessary to sample here due to increasingly shallow water and high debris closer to the outlet channel. Samples were taken in 1.5 to 3 m depth and were grey and brown in colour, consisting mainly of sand and silt in equal proportions. Moisture content averaged 87.3% and a paste pH was 5.95.

Total PAH concentrations were lower at LQLO than other stations in the lake, with an average concentration of 0.227 mg/kg. 2-methylnaphthalene, naphthalene, and phenanthrene concentrations were higher than the ISQGs but not the PELs.

Arsenic and iron concentrations were slightly lower than at LQLM and averaged 68.0 mg/kg and 64,360 mg/kg respectively. Manganese concentrations were highest in Lower Quinsam Lake at LQLO and exceeded the PEL, averaging 2,082 mg/kg.

Cadmium, chromium, copper, and nickel concentrations exceeded ISQGs but not PELs.

9.2 LOWER WETLAND

The lower wetland is approximately 350 m in length and is situated downstream of 7-South surface disturbance. It receives water from the 7-South Surface Decant Pond (7SSD) via a seasonal connector stream (Stream 1 - 7S). Stream 1 – 7S receives local catchment runoff from near the disturbed portal area and coal stockpile, but does not receive water from mine pools or from dewatering. Most of the surface water is directed back into the mine using sumps, ditches, and pumps to reduce releases to Stream 1 – 7S. Since early 2015, when a secondary pumping system was installed to further minimize 7SSD effluent flows, discharges to Stream 1 have been minimal. From January 1, 2016 to October 5, 2016, when sediment samples were collected, only 1,001 m^3 of water had been released from 7SSD; the discharge was substantially diluted with rainfall and in.

Sediment was sampled in three locations in the wetland: the inlet where Stream 1 – 7S water enters (LWI); the center of the wetland after mixing (LWM); and just before the outlet to the Quinsam River (LWO). Wetland water levels fluctuate seasonally, and range from almost dry during summer to a pond-like state during the rainy season in mid-autumn. During sample collection in October 2016, the first autumn rains delivered large amounts of water to the wetland.

9.2.1 *METHODS*

Samples were collected from the top 2 to 5 cm of substrate in shallow water underneath and around the plentiful plant growth where accessible. Sediment was collected using spoons, placed in labelled jars, then into cooler containing ice packs, and shipped to Maxxam under chain of custody for analysis. Observations (depth sampled, texture, colour and presence of living organisms, debris, biofilm, odour and sheen) were documented and are described in the results section. Three to five replicate samples were collected at each monitoring station. Data were analyzed as discussed in Section 9.1.1.

9.2.2 *RESULTS*

Sediment results for the three wetland sampling stations are provided in Appendix I, 191 and 225 through 227 and 248 to 250.

9.2.2.1 *Lower Wetland Inlet (LWI)*

Located about 25 to 50 m downstream of where Stream 1 enters the wetland, LWI samples were obtained from a small, defined drainage channel within the wetland at a depth of less than 30 cm. The samples were deep brown in colour, had a rich organic odour, and consisted mainly of fine sand and silt with trace amounts of clay. The average moisture content was 89.7% and paste pH was 5.77.

Total PAH concentrations were low (0.0155 mg/kg average) and were lower than at LWM and LWO. No ISQG exceedances were noted for individual PAHs, many of which were below DLs.

Metals concentrations were low in the three samples collected at LWI, with no ISQG exceedances, except for selenium. Selenium concentrations ranged from 1.75 to 2.75 mg/kg (average of 2.10 mg/kg) and exceeded the BC sediment alert level of 2 mg/kg. This was the only wetland station with notable selenium concentrations. Past water sampling in 7SSD indicated selenium concentrations well below the permit limit of 0.016 mg/L.

9.2.2.2 *Lower Wetland Middle (LWM)*

LWM is located approximately 200 m downstream of LWI in a location with slightly deeper water cover. Sediment was collected in an area of less than 30 cm water depth, from a sediment depth of 2 to 5 cm. The samples were deep brown in colour, had a rich organic odour, and consisted mainly of fine sand and silt with trace amounts of clay. The average moisture content was 86.3% and the paste pH was 5.73.

Total PAH concentrations (0.0477 mg/kg average) were higher than at LWI and LWO. Only one ISQG exceedance was noted (2-methylnaphthalene) for one replicate sample; the average was below the ISQG. Most PAH parameters were present at levels below the DLs.

Metals concentrations were low at LWM, with few ISQG exceedances. The only parameter with an average concentration above the ISQG was arsenic (average of 10.0 mg/kg). Iron and manganese concentrations were elevated in some replicate samples but did not exceed PELs.

9.2.2.3 *Lower Wetland Outlet (LWO)*

LWO is located near the outlet to the Quinsam River in a pool of water dammed by beavers and is the final sampling station upstream of the river. Water cover ranged from 0.5 to 1.5 m depth. There were notable amounts of woody debris and plants over the sediment, making sampling

somewhat difficult. The sediment was rich in clay, with an even proportion of sand and silt as reported in the laboratory analysis. Moisture content was 76.2% and paste pH was 5.80.

Total PAH concentrations (average of 0.025 mg/kg) were higher than at LWI but lower than at LWM. There were no ISQG exceedances for individual PAHs.

Metals concentrations were below ISQQs in the three replicate samples.

Based on results from LWO, discharges from 7-South have had no appreciable effects on sediment quality to date at this station.

9.3 QUINSAM RIVER

The Quinsam River flows through several lakes in the Quinsam watershed. Upper Quinsam Lake flows into Wokas Lake, the outflow of which forms the start of the Quinsam River. The river flows east about 5 km into Middle Quinsam Lake, then east again about 10 km into Lower Quinsam Lake and then north another 25 km to join the Campbell River, about 3 km from its estuary. The Iron River, a major tributary of the Quinsam River, enters from the south between Middle Quinsam and Lower Quinsam lakes. Sediment was sampled at three stations currently used to monitor water quality on the Quinsam River: WA (upstream of mine-related discharges), QRDS1 (downstream of Middle Quinsam Lake) and 7SQR (downstream of inputs from the 7-South mining activities and upstream of the Iron River confluence).

9.3.1 *METHODS*

Sediment samples were collected using a spoon to remove fine sediment from around boulders and other slow flowing areas. Sediment was placed in labelled jars, placed in a cooler with ice packs, and shipped to Maxxam under chain of custody for analysis. Observations (depth sampled, texture, colour and presence of living organisms, debris, biofilm, odour and sheen) were documented and are described in the results section. Three to six replicate samples were collected at each station.

9.3.2 *RESULTS*

Results for the three river sampling stations are provided in Appendix I, Tables 192 and 228 to 230 and 251 through 253.

9.3.2.1 *WA Station*

WA, located at the Argonaut Bridge, was sampled to evaluate sediment upstream of any mining discharges. This site served as a reference area for the sediment study, given its location upstream of mine influences, although habitat characteristics differed from those of downstream sites. The sampling station was in an area of dense riparian vegetation near a permanent logging road (Argonaut Main). At WA, the river was approximately 10 m wide, with a maximum depth of 1 m, a velocity of 0.62 m/s, and a flow rate of 1.06m^3/s. Large fluctuations in velocities and flow rates are associated with seasonal rainfall events and water release at the BC Hydro diversion dam upstream. Instream habitat was mainly riffles and rapids, with few depositional areas for sediment to accumulate. The dominant substrate types were small cobbles and pebbles, with sandy/silty interstitial material and a relatively low organic content. Sediment had an average moisture content of 21.6%, with 95.2% sand and small amounts of silt and clay. Paste pH was 7.01.

PAHs in sediment were below the DLs for individual parameters.

Arsenic, iron, and manganese had concentrations higher than ISQGs or PELs in one or more replicate samples. Arsenic concentrations were higher than the PEL (average of 17.8 mg/kg and a range of 9.24 to 24.8 mg/kg). Both iron and manganese had concentrations above the PELs for some replicate samples but average concentrations (41,820 mg/kg iron and 898 mg/kg manganese were below PELs.

Average copper and nickel concentrations were higher than the ISQGs but below PELs. One replicate sample had a mercury level ten times higher than the other two samples (0.81 mg/kg) and higher than the PEL; as a result, the average concentration was higher than the ISQG. This measurement was considered an outlier, suspected to be related to analytical error, as concentrations of other parameters in this replicate sample were not unusually elevated.

9.3.2.2 *QRDS1*

QRDS1, approximately 2 km downstream of the outlet of Middle Quinsam Lake, was selected to monitor sediment chemistry downstream of the North and South water management systems. It is assumed that this section of the Quinsam River receives (or will receive in the future) groundwater sourced from the River Barrier Pillar PAG storage area and other mine-affected waters. The station was near exploration roads in the 2-North mining area and had dense riparian vegetation with partial tree cover. The river was approximately 14 m wide, with a maximum depth

of 0.5 m and a velocity of 0.64 m/s. This section of river contained small riffles, large boulders and, at the time of sampling, had few depositional areas for sediment to accumulate. The dominant rock types were small and large cobble, with coarse sand and silt interstitial material and a low organic content. Sediment had an average moisture content of 16.0% and contained 95.2% sand with small amounts of silt and clay. Paste pH was neutral at 7.26.

PAH were measurable but low in concentration, with an average total PAH concentration of 0.0412 mg/kg. Some individual PAH compounds were above DLs, with 2-methylnaphthalene, naphthalene, and phenanthrene (as observed in MQL) the most abundant. Concentrations of individual PAHs were lower than ISQGs in the three replicate samples.

Arsenic, iron, and manganese concentrations were higher at QRDS1 than at WA or 7SQR, with average concentrations of arsenic (39.5 mg/kg), iron (59,440 mg/kg) and manganese (1,202 mg/kg) higher than the PELs. Although QRDS1 is close to the mining influence in Middle Quinsam Lake, it is unknown if elevated metal concentrations are due to mining activities or natural conditions.

Average chromium, copper, and nickel concentrations exceeded the ISQGs at QRDS1, with chromium (average 38.6 mg/kg) and nickel (30.9 mg/kg) found in the highest concentrations among the three river stations sampled. Copper concentrations (average 58.3 mg/kg), were lower than at WA and lower again at 7SQR, indicating mining discharge has not contributed to copper loading in the sediment.

9.3.2.3 *7SQR*

7SQR is located just upstream of the Iron River-Quinsam River confluence, about 4 km downstream from QRDS1, and downstream of all mine related discharges, including 7-South. The riverbed was 14 m wide, about 1 m deep, contained a few pools and riffles, and had a slower velocity than WA and QRDS1. The station was partially tree covered, dominated by small shrubs, and contained some aquatic plants and periphyton. The riverbed contained many large boulders and had more abundant silty/sandy interstitial material, making sample collection easier than at upstream stations. The average moisture content was 31.6% and paste pH was 6.26. The samples were mainly composed of sand, with higher concentrations of silt and organic matter than at the upstream stations.

Total PAH concentrations were higher at 7SQR than at upstream stations (average of 0.106 mg/kg, range of 0.015 to 0.25 mg/kg). 2-methylnaphthalene, naphthalene, and phenanthrene

concentrations were higher than ISQGs in one or more replicate samples, but only 2-Methylnaphthalene had an average concentration higher than the ISQG.

Arsenic, iron, and manganese concentrations were notably lower than at QRDS1 and were lower than at WA. Only arsenic (average of 17.2 mg/kg) exceeded the PEL, while iron (average of 30,500 mg/kg) exceeded the ISQG and manganese (average of 431 mg/kg) was below the ISQG.

Cadmium concentrations were higher at 7SQR that at upstream stations, with two of the five replicate samples higher than the ISQG and the average concentration (0.465 mg/kg) below the ISQG. Elevated cadmium concentrations have been reported intermittently in discharges from the 7-South mining area since 2012.

10.0 BIOTA MONITORING IN THE RECEIVING ENVIRONMENT

Phytoplankton and zooplankton are monitored every year at one station in each of No Name, Long, Middle Quinsam, and Lower Quinsam lakes. In 2016, benthic invertebrates (and sediment) were also sampled at four locations in each of these four lakes, at an additional reference lake (Gooseneck, one location), at three locations in the Quinsam River, and at three locations in the Lower Wetland, which lies between Middle Quinsam and Lower Quinsam lakes. The sampling sites are shown in Appendix I, Figure 1 and listed in Table 15 with rationale for selection. Reference (control) stations are those upstream of or away from the influence of mine-affected discharges and seepage. Impact stations are those within the influence, and are identified as near field (direct mine influence) and far field (further downstream).

Table 15: Sampling Stations for Biota Monitoring, Quinsam Lakes System, 2016

Habitat Type	Lake	Station	Phyto-plankton	Zoo-plankton	Benthic Invertebrates	Rationale
Lakes	No Name	Inlet			X	reference
		Deep	X	X	X	near field
		Seep			X	near field
		Outlet			X	near field
	Long	Inlet			X	near field
		Deep	X	X	X	near field
		Seep			X	near field
		Outlet			X	near field
	Middle Quinsam	Inlet			X	near field
		Deep	X	X	X	near field
		Seep			X	near field
		Outlet			X	near field
	Lower Quinsam	Inlet			X	far field
		Deep -1	X	X	X	far field
		Deep -2			X	far field
		Outlet			X	far field
	Gooseneck	Deep			X	reference
Rivers	Quinsam	WA			X	reference
		QRDS			X	near field
		7SQ-03			X	far field
Wetlands	Lower Wetland	Inlet			X	far field
		Middle			X	far field
		Outlet			X	far field

This section of the report describes sampling objectives, methods, QA/QC, and results for phytoplankton, zooplankton, and benthic invertebrates. Section 11 discusses results in terms of overall watershed health, related to QCC operations.

10.1 PHYTOPLANKTON

Phytoplankton are photosynthetic microorganisms that live in lakes at depths to where adequate sunlight can penetrate. They are the main primary producers in lakes, converting sunlight, CO2, and water into organic matter, and are the foundation for the aquatic food web (Wetzel 2001). Phytoplankton include algae and cyanobacteria, both of which contain at least one form of chlorophyll (chlorophyll *a*), the major photosynthetic pigment. They are sensitive to changes in water quality (Wetzel 2001). Many lakes have a spring and fall phytoplankton bloom (peak growth period) following the seasonal "overturns" or mixing of the water column, which redistribute nutrients through the water column.

Phytoplankton are monitored annually at one station each in No Name, Long, Middle Quinsam, and Lower Quinsam lakes, in the deepest area of the lakes, where routine water quality monitoring is conducted. Since 2013, phytoplankton samples have been collected at the four lakes once each in the spring, summer and fall 5 in 30 day water sampling periods defined in amended Permit PE 7008. From the 1990s to 2012, Permit PE 7008 required sampling at 1, 4, and 9 m depth in April through September at Long Lake and Middle Quinsam Lake, with No Name Lake added in 2012 and Lower Quinsam Lake added in 2013.

10.1.1 *METHODS*

10.1.1.1 *Field Methods*

In 2016, samples were collected from 1 m depth using a 4 L Beta sampler. Chlorophyll a samples were collected as 1 L raw water samples, shipped to Maxxam Analytics (Burnaby B.C.) and laboratory filtered for analysis. A 250 mL sample was preserved with Lugol's in the field and analyzed for community composition, i.e., counts and identification to lowest practical level (Stantec Consulting Ltd., Burnaby B.C.). Field replicates were collected for QA/QC in April and August 2016.

Laboratory Methods

Organisms were identified to lowest practical level (species where possible) using an inverted microscope. A 27 mL volume of lake water was settled in a chamber. Counts were made at 100X, 400X, and 1000X magnifications, to record the size range of phytoplankton.

Analytical Methods

Statistical tests were conducted to assess the effects of lake (i.e., mine-related effect) and year on the chlorophyll a and total abundance data, using generalized linear mixed effects models (GLMMs). Analysis of variance (ANOVA) was applied to the models to determine the influence of lake and year in the model. GLMMs allow for grouping of variables to account for the repeated measurements during the sampling program and for the resulting variation. The significance of model terms was calculated using the t-statistic and F-statistic. A significant t-statistic indicates the specific level of the variable is significantly different from the intercept. A significant F-statistic indicates that the variable significantly improves the model. Models were fit using R 3.3.1 (R Core Team 2016) 2021 and the R package "lme4" (Bates et al. 2015)[22].

10.1.2 *RESULTS*

10.1.2.1 *Chlorophyll a*

Chlorophyll *a* concentrations provide an indication of overall phytoplankton biomass at any given time and provide a basis for comparing primary production among lakes. Table 16 provides data for samples collected from 1 m depth in 2016 and Appendix IV-1 provides data for 2013 through 2016. Concentrations ranged from below the detection limit of 0.05 µg/L (spring sample from No Name Lake) to 1.51 µg/L (Long Lake, spring) in 2016.

[21] R Core Team. 2016. R: A language and environment for statistical computing. R Foundation for Statistical. Computing, Vienna, Austria. URL https://www.R-project.org/

[22] Bates D, Maechler M, Bolker B, Walker S. 2015. Fitting linear mixed-effects models using lme4. Journal of Statistical Software 67(1): 1-48.

Table 16: Chlorophyll a Concentrations, 1 m Depth, Quinsam Lakes System, 2016

Lake	Chlorophyll *a* (µg/L)		
	Spring (April 13-15)	Summer (Aug. 8-10)	Fall[1] (Nov. 2-4)
No Name	<0.05	0.95	1.14
Long	1.51	0.93	1.05
Middle Quinsam	1.0	0.58	1.14
Lower Quinsam	1.04	0.97	1.02

NOTE:
1. Duplicates pairs taken in Long, Middle Quinsam, and Lower Quinsam Lake had identical values.

Chlorophyll a concentrations varied among lakes and over the three sampling periods. No Name Lake had peak concentrations in summer and fall, Long Lake had peak concentrations in spring, Middle Quinsam Lake had peak concentrations in spring and fall, and Lower Quinsam Lake had no evident peaks. Seasonal trends were as follows in 2016:

- In spring, concentrations were lowest at No Name Lake, intermediate at Middle Quinsam and Lower Quinsam lakes, and highest at Long Lake
- In summer, concentrations were similar at No Name, Long, and Lower Quinsam lakes (0.93 to 0.97 µg/L), and lower at Middle Quinsam Lake (0.58 µg/L).
- In fall, concentrations were similar in the four lakes (1.02 to 1.14 µg/L).

High variability among seasons, years, and lakes was noted between 2013 and 2016 (Figure 10), likely related to variation in timing of spring and fall overturns and in nutrient concentrations.

The chlorophyll *a* concentrations reported for these lakes reflect ultra-oligotrophic conditions (mean concentration less than 1 µg/L, maximum less than 2.5 µg/L), according to the trophic classification system for lakes developed by Vollenweider and Kerekes (1982; cited in Environment Canada 2004)[23]. Permit PE 7008 does not require nutrient analysis for the lakes, and phosphorus, nitrate, and ammonia data were not available to confirm this trophic classification. Chlorophyll *a* results for 2016 are in the range reported from 2013 to 2015 (0.05 to 2.46 µg/L).

[23] Vollenweider, R. and J. Kerekes. 1982. Eutrophication of Waters. Monitoring Assessment and Control. Organization for Economic Co-operation and Development (OECD) Paris. 156 pp. cited in Environment Canada 2004. Canadian Guidance Framework for the Management of Phosphorus in Freshwater Systems. Report No. 1-8. http://publications.gc.ca/collections/Collection/En1-34-8-2004E.pdf

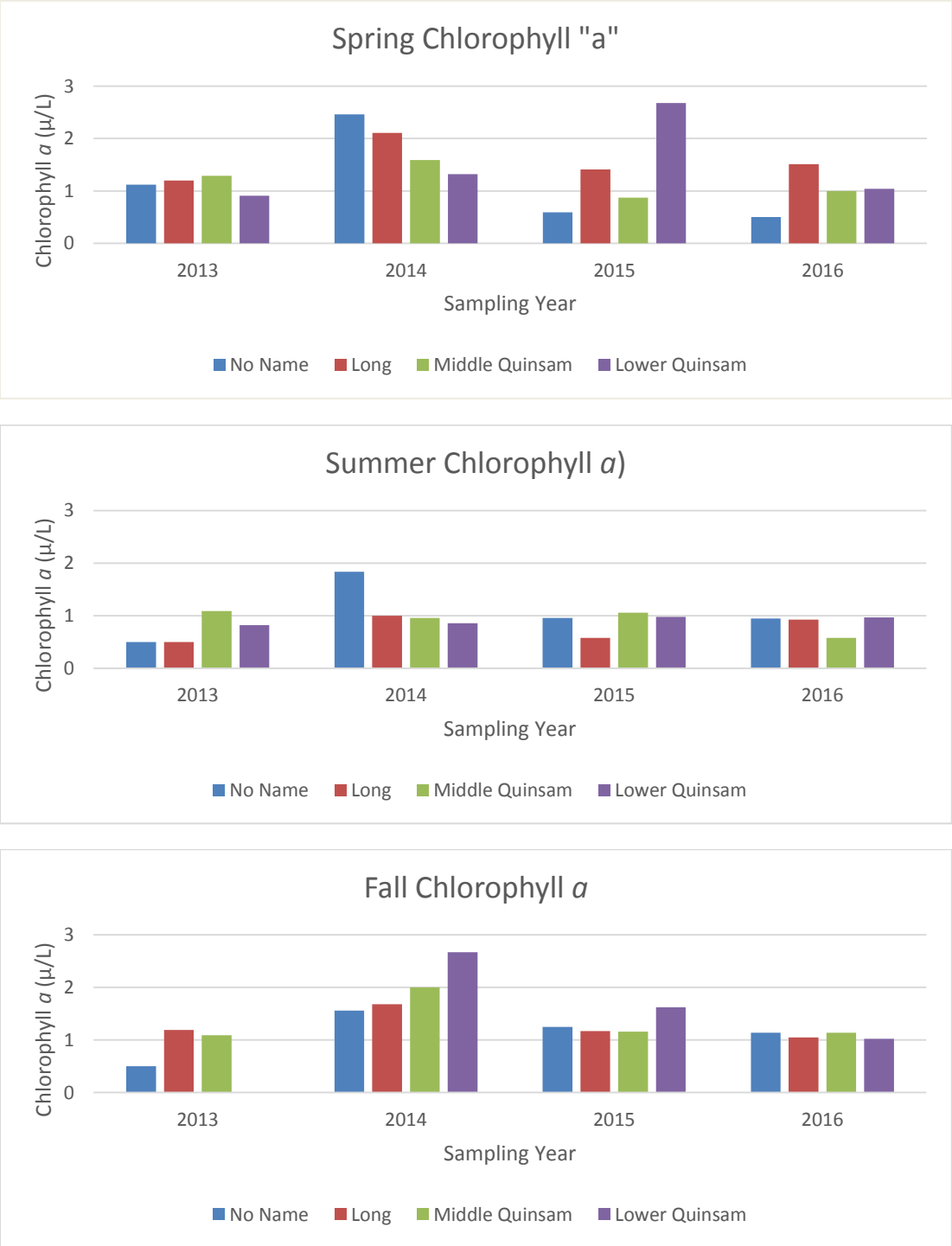


Figure 10: Chlorophyll a (µg/L) at 1 m Depth, Quinsam Lakes System, 2013 – 2016

There were statistically significant differences ($p<0.05$, GLMM, ANOVA) in phytoplankton chlorophyll *a* between years but not between lakes (Table 17), indicating that mine activities do not seem to affect phytoplankton chlorophyll *a*.

Table 17: Result of Statistical Analysis of Differences in Phytoplankton Chlorophyll a by Year and Lake

Variable	Parameter Estimate (SE)	t-value	p of t-stat
Intercept[1]	0.94 (0.21)	4.55	**<0.01**
2014	0.72 (0.17)	4.16	**<0.01**
2015	0.24 (0.17)	1.4	0.17
2016	0.03 (0.17)	0.2	0.84
Lower Quinsam	0.15 (0.17)	0.85	0.4
Middle Quinsam	-0.04 (0.17)	-0.25	0.81
No Name Lake	-0.08 (0.17)	-0.48	0.64
		F-value	**p of f-stat**
Year		7.74	**<0.01**
Lake		0.65	0.59

NOTE:

1. The intercept incorporates both the first levels of Year (2013) and Lake (Long Lake); it is the estimated value of the response variable (abundance) considering both factors.

10.1.2.2 *Phytoplankton Communities*

Phytoplankton taxonomy reports are included in Appendix IV-2 and results are summarized here. Duplicate samples collected for No Name Lake in April and August showed good agreement for the paired samples (within 20% of duplicate samples).

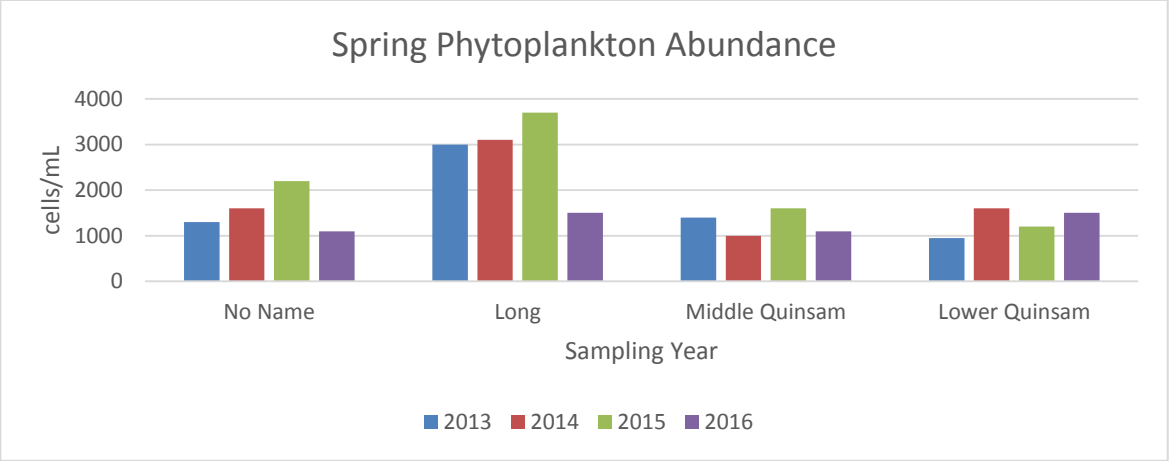
Abundance is summarized in Table 18 as total and by size fraction (identified at 1000X, 400X, and 100X magnifications). Total abundance ranged from 300 to 2,400 cells/mL in 2016. The smallest size fraction (less than 5 µm in size) comprised at least 20% of the total abundance.

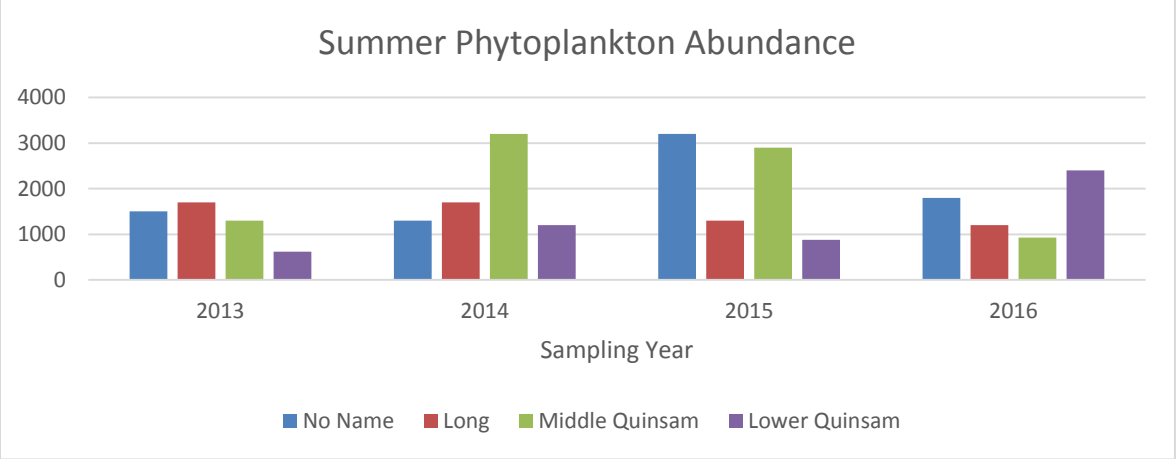
Table 18: Phytoplankton Abundance, Quinsam Lake System, 2016

Lake	Month	Abundance (cells/mL) at 1 m depth			
		Total	< 5 µm (1,000 X)	5 to 25 µm (400 X)	> 25 µm (100 X)
No Name	Spring (April)	1,100	864	240	1.8
No Name (replicate)		970	792	180	1.8
Long		1,500	1,300	240	5.5
Middle Quinsam		1,100	882	240	2.8
Lower Quinsam		1,500	1,200	260	5.4
No Name	Summer (August)	1,800	1,200	500	42
No Name (replicate)		1,900	1,280	595	46
Long		1,200	990	140	22
Middle Quinsam		930	810	116	1.5
Lower Quinsam		2,400	1,850	578	1.4
No Name	Fall (November)	650	600	50	0.4
Long		780	640	140	0.5
Middle Quinsam		610	520	90	3.0
Lower Quinsam		300	250	50	0

In 2016, abundance was greatest in spring (Long and Middle Quinsam lakes) or summer (No Name and Lower Quinsam lakes) and lowest in fall. The highest abundance was recorded in summer at Lower Quinsam Lake (2,400 cells/mL) and the lowest was in the fall, also at Lower Quinsam Lake (300 cell/mL). The fall sample from Lower Quinsam Lake contained large amounts of silt, which may have reduced phytoplankton abundance and impaired to the ability to count the algae. Peak abundance and chlorophyll a concentrations did not always coincide, likely related to changes in size of abundant taxa over the sampling periods.

Variation in total abundance among lakes and through the three seasonal sampling periods for 2013 through 2016 is shown in Figure 11. As noted for chlorophyll a, high variability among seasons, years, and lakes between 2013 and 2016 was likely related to variation in timing of spring and fall overturn and nutrient concentrations. Phytoplankton abundance data for 2016 were consistent with those of previous years.





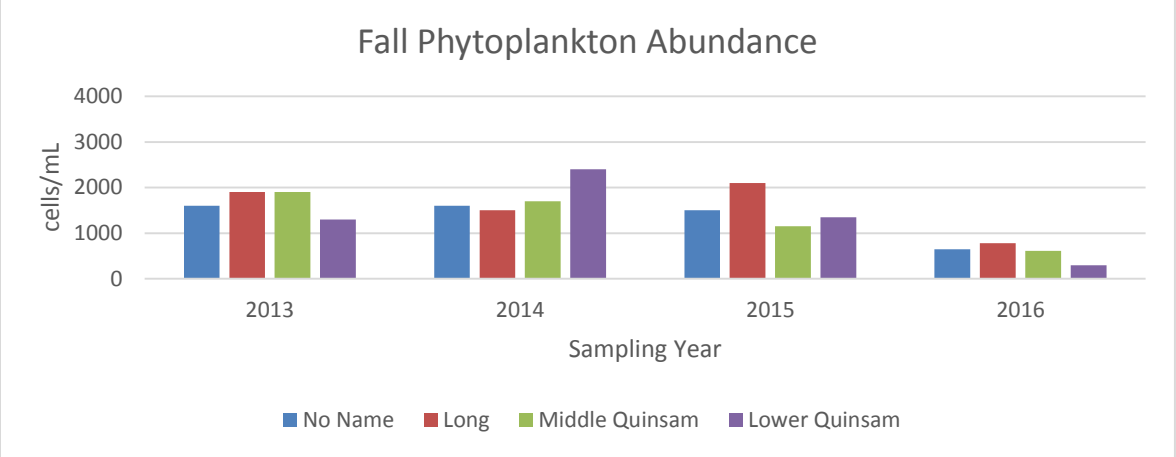


Figure 11: Total Phytoplankton Abundance, 1 m Depth, Quinsam Lakes System, 2013 – 2016

There were statistically significant differences ($p<0.05$, GLMM and ANOVA) in phytoplankton abundance among years but not among lakes (Table 19), indicating that mine activities do not seem to have an effect phytoplankton abundance.

Table 19: Result of Statistical Analysis of Differences in Phytoplankton Abundance by Year and Lake

Variable	Parameter Estimate (SE)	t-value	p of t-stat
Intercept[1]	1885.00 (265.55)	7.1	**<0.01**
2014	285.83 (280.09)	1.02	0.31
2015	384.17 (280.09)	1.37	0.18
2016	-383.33 (280.09)	-1.37	0.18
Lower Quinsam	-648.33 (280.09)	-2.32	**0.03**
Middle Quinsam	-390.83 (280.09)	-1.4	0.17
No Name Lake	-344.17 (280.09)	-1.23	0.23
		F-value	**p of t-statistic**
Year		3.02	**0.04**
Lake		1.81	0.16

NOTE:
1. The intercept incorporates both the first levels of Year (2013) and Lake (Long Lake); it is the estimated value of the response variable (abundance) considering both factors.

Taxon richness (at genus or species level) ranged from 8 (November, Lower Quinsam Lake) to 34 (Lower Quinsam Lake August) in 2016, as shown in Table 20. Richness was highest in either April (No Name and Long lakes) or August (Middle Quinsam and Lower Quinsam lakes) and lowest in November (all lakes).

Table 20: Phytoplankton Taxon Richness, Quinsam Lake System, 2016

Lake	Taxon Richness		
	Spring (April)	Summer (August)	Fall (November)
No Name	30[a]	27[a]	14
Long	32	28	14
Middle Quinsam	25	32	19
Lower Quinsam	26	34	8

NOTE:
[a] Mean of duplicate samples

Very small (<5 µm) chrysoflagellates (*Ochromonas* spp. and *Chromulina* spp.) were the most abundant phytoplankton in samples from all lakes and all dates in 2016, as has been noted since monitoring began in the 1990s (Appendix IV-2). Although these ultra-nanoplankton were very abundant numerically, they contributed little to algal biomass. Small chrysoflagellates are numerically dominant in many lakes. The predominant and common larger phytoplankton taxa are listed in Table 21 and include:

- Chrysophyta (golden algae; *Ochromonas*, *Dinobryon*)
- Cryptophyta (red-brown algae; *Cryptomonas*, *Rhodomonas*)
- Bacillariophyceae (diatoms; *Melosira italica*)
- Cyanophyceae (blue-green bacteria; *Merismopedia*)

Table 21: Predominant and Common Phytoplankton Taxa, Quinsam Lakes System, 2016

Season	Lake	Predominant	Common
Spring (April)	No Name	*Rhodomonas minuta* larger *Ochromonas* spp.	*Cryptomonas* spp.
	Long	larger *Ochromonas* spp.	*Cryptomonas* spp. *Rhodomonas minuta*
	Middle Quinsam	larger *Ochromonas* spp.	*Rhodomonas minuta* *Dinobryon* sp.
	Lower Quinsam	larger *Ochromonas* spp.	*Rhodomonas minuta*
Summer (August)	No Name	*Merismopedia sp.*	*Dinobryon cylindricum* *Rhodomonas minuta* *Cryptomonas* spp. *Ochromonas* spp.
	Long	larger *Ochromonas* spp.	*Rhodomonas minuta* *Dinobryon cylindricum*
	Middle Quinsam	larger *Ochromonas* spp.	*Cryptomonas* spp.
	Lower Quinsam	larger *Ochromonas* spp.	*Melosira italica*
Fall (November)	No Name	*Rhodomonas minuta* larger *Ochromonas* spp.	
	Long	*Rhodomonas minuta*	*Cryptomonas* spp. larger *Ochromonas* spp
	Middle Quinsam	*Rhodomonas minuta*	larger *Ochromonas* spp.
	Lower Quinsam	larger *Ochromonas* spp.	*Rhodomonas minuta* *Cryptomonas* spp.

10.2 ZOOPLANKTON

Zooplankton form the second trophic level in the water column of lakes (secondary producers), grazing on phytoplankton, consuming organic matter, and providing a food source for juvenile fish (Wetzel 2001). Abundance and composition of the zooplankton community vary among lakes due to variation in water chemistry, lake characteristics, and grazing pressures from fish (Wetzel 2001).

Zooplankton are monitored in the Quinsam mine receiving environment annually at one station in each of No Name, Long, Middle Quinsam, and Lower Quinsam lakes. Since 2014, zooplankton samples have been collected once in the spring, summer, and fall during the 5 in 30 water quality sampling periods.

10.2.1 METHODS

10.2.1.1 *Field Methods*

Zooplankton were collected from No Name, Long, Middle Quinsam, and Lower Quinsam lakes three times in 2016 (once during each 5 in 30 set). Samples were collected using a Wisconsin Plankton Sampler, 63 µm a 10 m vertical tow, with one sample collected per lake. Samples were preserved with ethanol and sent to Fraser Environmental Services (Surrey B.C.) for taxonomic analyses.

10.2.1.2 *Laboratory Methods*

Organisms were counted and identified to lowest practical level.

10.2.1.3 *Analytical Methods*

Statistical tests were conducted to assess the effects of lake (i.e., mine-related effect) and year on zooplankton abundance and taxon richness data, using GLMMs. ANOVA was applied to the models to determine the influence of lake and year in the model. GLMMs allow for grouping of variables to account for the repeated measurements during the sampling program and for the resulting variation. The significance of model terms was calculated using the t-statistic and F-statistic. A significant t-statistic indicates the specific level of the variable is significantly different from the intercept. A significant F-statistic indicates that the variable significantly improves the model. Models were fit using R 3.3.1 (R Core Team 2016) and the R package “lme4” (Bates et al. 2015).

10.2.2 *RESULTS*

Detailed zooplankton taxonomic composition results are provided in Appendix IV-3 and summarized below.

Zooplankton abundance in samples collected in 2016 is listed in Table 22. Abundance ranged from 30 organisms/sample (Lower Quinsam Lake, November) to 3,656 organisms/sample (Long Lake, April). In No Name, Middle Quinsam, and Lower Quinsam lakes, maximum abundance was reported in the summer, and in Long Lake, the maximum occurred in spring. Abundance tended to be higher in Long Lake and lower in Middle Quinsam Lake compared to the other lakes (except November, when Middle Quinsam and Lower Quinsam lakes had similar abundance).

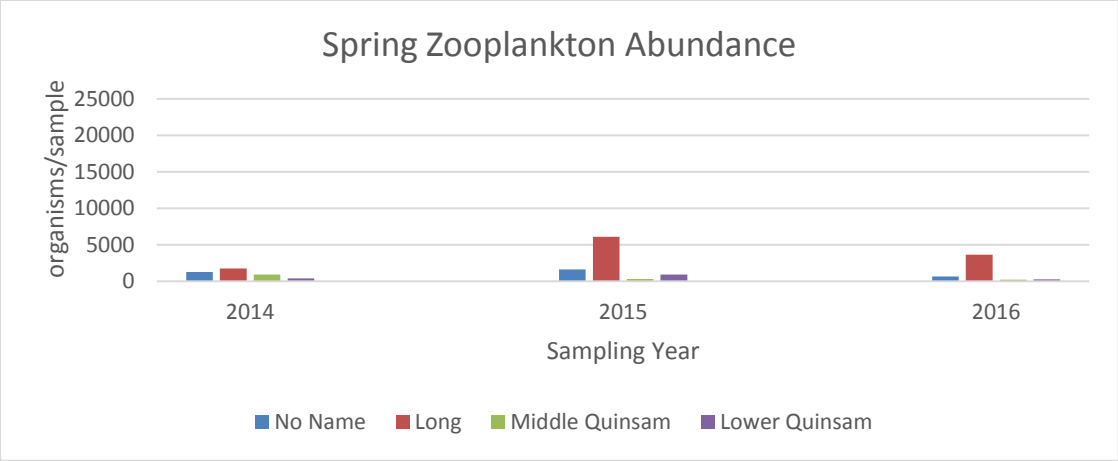
Table 22: Zooplankton Abundance, Quinsam Lake System, 2016 (vertical tow, 0 to 10 m)

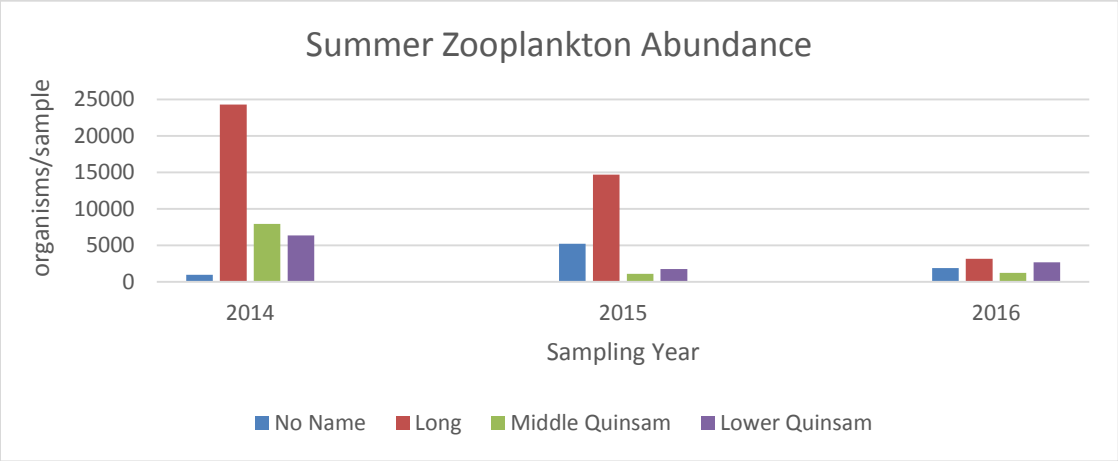
Lake	Month	Abundance (organisms/sample)			
		Total	Copepoda	Cladocera	Rotifera
No Name	Spring (April)	666	395	91	175
Long		3,656	353	83	3,220
Middle Quinsam		213	83	22	108
Lower Quinsam		279	103	38	138
No Name	Summer (August)[1]	1,883	1,236	564	72
Long		3,163	194	1,778	405
Middle Quinsam		1,250	473	772	44
Lower Quinsam		2,707	991	1,569	135
No Name	Fall (November)	288	218	6	64
Long		573	487	49	37
Middle Quinsam		74	32	6	30
Lower Quinsam		30	2	2	26

NOTE:

1. *Chaoborus* (phantom midge) also reported in low numbers in August at Long, Middle Quinsam, and Lower Quinsam lakes

Seasonal and spatial trends are shown in Figure 12 for samples collected in 2014, 2015, and 2016. There has been high variability among lakes, seasons, and years. In general, abundance is highest for the summer samples, following peaks in levels of phytoplankton and organic matter; however, there are exceptions, including low abundance in No Name Lake in summer 2014 and peak abundance in Lower Quinsam Lake in fall 2015. In 2015, abundance was highest in Long Lake during spring and summer and in Lower Quinsam Lake during fall; abundance was lower in No Name and Middle Quinsam lakes than in 2014.





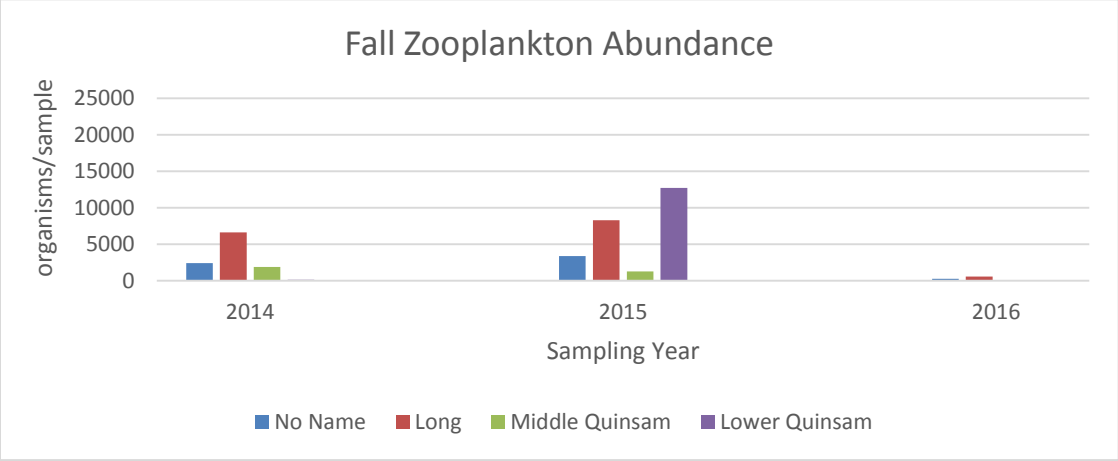


Figure 12: Total Zooplankton Abundance (0 to 10 m Vertical Tows), Quinsam Lakes System, 2014 to 2016

There were statistically significant differences ($p<0.05$, GLMM and ANOVA) in abundance among lakes, but not among years, with highest mean abundance reported for Long Lake, followed by Lower Quinsam Lake, then No Name and Middle Quinsam lakes (Table 23).

Table 23: Result of Statistical Analysis of Differences in Zooplankton Abundance by Year and Lake

Variable	Parameter Estimate (SE)	t-value	p of t-stat
Intercept[1]	8744.83 (1969.18)	4.44	**<0.01**
2015	203.92 (1626.15)	0.12	**<0.01**
2016	-3360.08 (1626.15)	-2.07	**<0.01**
Lower Quinsam	-4878.11 (1877.72)	-2.6	**<0.01**
Middle Quinsam	-6021.33 (1877.72)	-3.21	**<0.01**
No Name Lake	-5712.22 (1877.72)	-3.04	**<0.01**
		F-value	**p of f-stat**
Year		3.03	0.06
Lake		4.48	**0.01**

NOTE:

2. The intercept incorporates both the first levels of Year (2013) and Lake (Long Lake); it is the estimated value of the response variable (abundance) considering both factors.

Taxon richness was calculated at the genus level, omitting unidentified and benthic organisms. In 2016, taxon richness ranged from 6 to 14, and was higher in spring and summer than in fall (Table 24). Taxon richness tended to be highest at No Name and Long lakes.

Table 24: Zooplankton Taxon Richness, Quinsam Lake System, 2016 (vertical tow, 0 to 10 m)

Characteristic	Lake	Spring (April)	Summer (August)	Fall (November)
Number of Genera	No Name	12	10	9
	Long	10	14	6
	Middle Quinsam	9	8	7
	Lower Quinsam	7	10	6
% Juvenile Copepoda and Cladocera in samples	No Name	48%	55%	65%
	Long	6%	24%	77%
	Middle Quinsam	19%	23%	15%
	Lower Quinsam	26%	29%	0%

There were statistically significant differences ($p<0.05$, GLMM and ANOVA) in zooplankton taxon richness among the lakes, but not between years (Table 25), indicating that lake characteristics, including potential mine-related influences, affect the zooplankton abundance.

Table 25: Result of Statistical Analysis of Differences in Zooplankton Taxon Richness by Year and Lake

Variable	Parameter Estimate (SE)	t-value	p of t-stat
Intercept[1]	9.36 (1.00)	9.32	**<0.01**
2015	-1.67 (0.88)	-0.19	0.85
2016	0.08 (0.88)	0.1	0.92
Lower Quinsam	-1.22 (1.01)	-1.2	0.24
Middle Quinsam	-0.56 (1.01)	-0.55	0.59
No Name Lake	1.67 (1.01)	1.64	0.11
		F-value	**p of f-stat**
Year		0.04	0.96
Lake		2.96	**0.05**

NOTE:

1. The intercept incorporates both the first levels of Year (2013) and Lake (Long Lake); it is the estimated value of the response variable (abundance) considering both factors.

Diversity and evenness indices were not calculated because the high proportion of unidentified juvenile Cladocera and Copepoda in the samples (Table 24) would introduce bias into those calculations. Juvenile Cladocera and Copepoda formed a high percentage of samples from No Name Lake on all three sampling dates (48 to 65% of total abundance) and Long Lake in November (77%). Lower proportions (6% to 29%) were reported for Long Lake at other times and for Middle Quinsam and Lower Quinsam lakes on all three dates. The presence of abundant juveniles suggests rapid growth rates.

Zooplankton communities consisted of the larger copepods and cladocerans and the smaller rotifers in 2016 (Figure 13). Composition varied among lakes and seasons:

- No Name Lake – copepods (Cyclopoida and Calanoida) were predominant (over 50% abundance) on all three dates, with rotifers common in April and November and cladocerans common in August; peak abundance occurred in August.
- Long Lake – rotifers were predominant (over 80%) in April, followed by cladocerans in August (approximately 70%) and copepods (over 80%) in November, with peak abundance in April and August.
- Middle Quinsam Lake – rotifers and copepods were predominant in April and November (approximately 40 to 50% each), and cladocerans were predominant in August (approximately 70%) during the peak of zooplankton abundance.
- Lower Quinsam Lake – rotifers and copepods (45 to 50% each) were predominant in April; cladocerans and copepods (40% to 55% each) were predominant in August, during the peak of abundance; rotifers (almost 90%) were predominant in November.

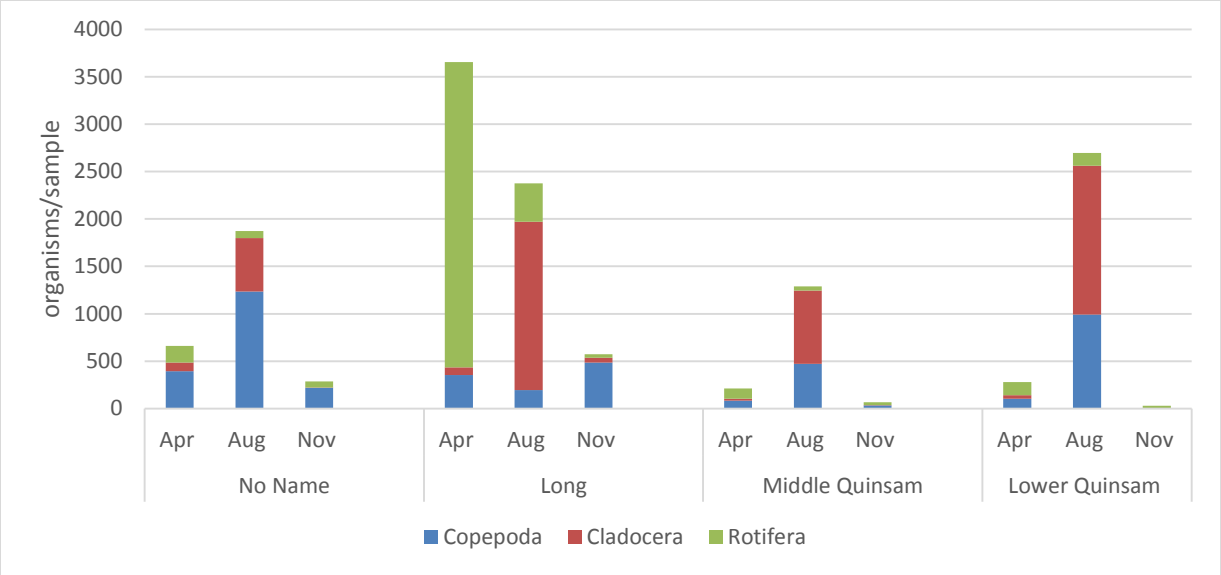


Figure 13: Zooplankton Abundance by Group, Quinsam Lakes System, 2016

Differences in taxonomic composition are related to seasonal conditions, including food supply (phytoplankton and organic matter), and grazing pressures from fish. The larger copepods and cladocerans provide preferred food sources for fish. All four lakes are known to be fish bearing (e.g., salmon and trout species), but there is not enough information about fish populations to estimate grazing pressures on zooplankton.

10.3 BENTHIC INVERTEBRATES

Benthic invertebrates (benthos) are an important component of both lotic (fast flowing) and lentic (slow flowing) aquatic systems, as they consume smaller animals and plants, aid in decomposition of organic material, and are prey for higher trophic levels such as fish. They are considered important monitoring tools for a range of environmental stresses. Benthic invertebrate communities were sampled to evaluate abundance and community composition (common taxonomic groups, taxonomic richness, diversity, and evenness).

Benthic invertebrates and sediment (Section 9) were sampled at 23 stations in 2016 (Appendix VI Table 1 and Appendix I Figure 1), located in five lakes, one wetland, and the Quinsam River.

Samples were collected in September and October 2016, following standard provincial sampling guidance (BC MOE 2016)24 and the study design provided in Appendix VI.

10.3.1 *LAKES*

10.3.1.1 *Methods*

The design of the benthic invertebrate monitoring program was a modified Spatial Variance Program (Standard), as defined by BC MOE (2016). The four lakes were sampled at Inlet, Deep, and Outlet stations (five replicate samples per station). No Name, Long, and Middle Quinsam lakes were also sampled at Seep stations, where groundwater surfaces and enters the lakes (five or six replicates per station). No seeps had been identified for Lower Quinsam Lake.

Field Methods

Five replicate samples were collected per station, each one a composite of three grabs, at the same locations as the sediment samples (Appendix I Figure 1). Samples were collected with an Eckman sampler. The composite sample was sieved in a sieve bag with a 200 µm mesh to remove fine sediment. Sieve contents were gently transferred to a labeled sample jar, rinsing the sieve to collect all the material. Field filtered water was used for rinsing to avoid introducing zooplankton to the samples. Jars were filled no more than half full and preserved with 10% buffered formalin (filled to top). Samples were stored in a cooler and shipped to the taxonomy laboratory with a chain of custody sheet. Two samples per station were archived and were analyzed later if the first three replicates showed high variability.

Sampling depth varied according to habitat within each lake. Observations (depth sampled; sediment vertical profile, texture and color, and presence of living organisms, debris, biofilms, odor, or oily sheen) were recorded. General habitat information from field surveys and total organic carbon (TOC) and particle size data from the sediment analyses are listed in Appendix I Tables186 to192 and summarized in Table 26.

[24] British Columbia Ministry of Environment (BC MOE). 2016. Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators, Version 2, 2016 Available: http://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/water_air_baseline_monitoring.pdf Accessed July 2017

Table 26: General Benthic Habitat Characteristics, Quinsam Lakes System, 2016

Lake	Sampling Site Water Depth (m) and Habitat Characteristics			
	Inlet	**Deep**	**Seep**	**Outlet**
No Name	3.8 – 5.0 m Plant debris minimal odour 13% TOC sand>silt>clay	12 m Minimal debris Mild anoxic odour 12% TOC sand>silt>clay	5.6 m Low debris Mild anoxic odour 11% TOC sand=silt>clay	3.0-4.0 m Coarse organics Odour of decay 19% TOC sand>silt>clay
Long	5.0 m Some plant debris Strong anoxic odour 15% TOC sand>silt>clay	19.5 m Minimal debris Mild anoxic odour 13% TOC sand>silt>clay	12.5 – 16.0 m Some plant debris Mild anoxic odour 15% TOC sand>silt>clay	5.0 – 5.5 m Wood and plant debris Mild anoxic odour 11% TOC silt>sand>clay
Middle Quinsam	– 2.0 m Much plant debris Slight decay odour 12% TOC sand=silt>clay	13.0 – 14.0 m Minimal debris minimal odour 13% TOC sand>silt>clay	1.0 m Much plant debris Slight decay odour 17% TOC sand>silt>clay	1.0 – 3.0 m Much plant debris Mild odour of decay 14% TOC sand>silt>clay
Lower Quinsam	14.0 – 17.0 m Much plant debris Minimal odour 3.7% TOC sand>>silt>clay	16.0 – 17.0 m Minimal debris Odour of decay 4.3% TOC silt>sand>clay 14.0 – 16.0 m Minimal debris Odour of decay 4.2% TOC silt>sand>clay	Not sampled	1.5 – 3.0 m Plant debris Odour of decay 7.4% TOC sand>silt>clay
Gooseneck Lake	Not sampled	15.0 m Some fine debris Medium anoxic odour 13% TOC sand>silt>clay	Not sampled	Not sampled

Laboratory Methods

Samples were sent to Cordillera Consulting Inc. (Summerland B.C.) for taxonomic analysis. Cordillera was responsible for sample reception, sorting, identification, and QA/QC. Samples were sieved in the laboratory at 200 µm mesh. Cordillera's detailed Methods and QC Report is included in Appendix V-1. Organisms were identified to lowest practical level (typically genus for insect and oligochaete taxa, genus or family for other organisms).

For Inlet, Deep, and Outlet stations, three replicate samples per station were analyzed initially. The additional two samples from Inlet and Outlet stations were subsequently analyzed due to high variability among replicates. All replicate samples from seep stations were analyzed, as were all samples from Gooseneck Lake (only Deep station sampled).

Sorting efficiency was assessed in 9 of 92 samples analyzed (10%; 7 from lakes, 2 from Quinsam River): re-sorted samples had at least 90% (90 to 100%) efficiency. Subsampling efficiency was assessed on 10% (6) of the split samples: the data quality objective (subsample count within 20% of the expected count, i.e., total count divided by number of fractions) was met.

Data Analysis Methods

The benthic community was evaluated in terms of overall community composition (common taxonomic groups and ecological relevance) and standard metrics (density, taxon richness, diversity, and evenness). These standard metrics are commonly used to assess differences among sites (Environment Canada 2012)[25].

Density was calculated as organisms/m2, accounting for sample splitting and area sampled. Richness was calculated as number of taxa at the lowest practical level (genus where possible) within a replicate sample.

Simpson's Diversity Index (D) considers the number of taxa present and their abundance (D ranges from 0 to 1; 1 indicates maximum diversity). This index is calculated as:

$$D = 1 - \sum (p_i)^2$$

where:

p_i is the proportion that taxon i contributes to the total number of invertebrates in a sample.

Simpson's Evenness (E) index indicates the degree to which all taxa of the same level are equal in abundance (E ranges from 0 to 1; 1 indicates maximum evenness). This index is calculated as:

$$E = \frac{\left(1 \Big/ \sum (p_i)^2 \right)}{S}$$

[25] Environment Canada. 2012. Metal Mining Technical Guidance for Environmental Effects Monitoring.

where

p_i is the proportion that taxon i contributes to the total number of invertebrates in a sample and S is the total number of taxa in the sample.

Mean values were graphed using R (R Core Team 2016) for comparison within and among lakes. The graphs show median, 25th and 75th percentiles and 1.5 times the interquartile ranges at each station.

Differences among stations for community metrics were assessed using R, grouping stations by habitat type (i.e., Inlet, Deep, Seep, Outlet). After testing for normality and homogeneity of data distribution, data were log-transformed if indicated, and differences among stations for each habitat type were evaluated using the applicable statistical tests. When data were distributed normally and homogenously, a mixed-effects model was used with raw or log-transformed data. When these assumptions were violated, non-parametric tests (Kruskal-Wallis and Dunn's tests) were used.

To test for a mine-related effect, stations were grouped as low impact (no or negligible influence of mine waste water), medium impact (influence of mine waste water, comparable to a far field station) and high impact (influence of mine waste water, comparable to a near field station), as summarized in Table 27. Rationale for categorizing the stations was as follows:

- Gooseneck Lake was a true reference lake (low impact), outside of mine influences, and sampled only in deep habitat
- No Name Lake was considered a reference or low impact station at the Inlet, as there is no known mine influence in that area, but downstream stations (Deep, Seep, and Outlet) were considered high impact/near field because of groundwater influences from the 2S PAG-CCR disposal pond and possibly the 2-South mine near the Outlet and Seep stations.
- Long Lake was categorized as high impact / near field at all stations (Inlet, Deep, Seep, and Outlet) due to mine influences throughout the lake
- Middle Quinsam Lake was categorized as high impact / near field at all stations (Inlet, Deep, Seep, and Outlet) due to mine influences throughout the lake, although it is noted that mine influence is less at the Inlet
- Lower Quinsam Lake was categorized as medium impact / far field at all stations (Inlet, Deep, and Outlet), given its distance downstream of Middle Quinsam Lake (the Quinsam River enters at the head of Lower Quinsam Lake).

Table 27: Classification of Lakes by Degree of Mine Influence for Statistical Testing

Habitat Type	High Impact/ Near Field	Medium Impact/ Far Field	Low Impact/ Reference
Inlet	Middle Quinsam Long Lake	Lower Quinsam	No Name
Outlet	Middle Quinsam Long Lake No Name	Lower Quinsam	
Deep	Middle Quinsam Long Lake No Name	Lower Quinsam (two sites, 600 m apart)	Gooseneck
Seep	Middle Quinsam Long Lake No Name		

Temporal trends were evaluated for Long Lake by comparison with the 2010 data from Golder (2010)[26].

10.3.2 *RESULTS*

Benthic invertebrate taxonomy data for all samples are provided in Appendix V, with QA/QC reports in Appendix V-1, raw data in Appendix V-2, summary statistics (minimum, maximum, mean, median, standard deviation) for community metrics provided in Appendix V-3, and results of statistical tests provided in Appendix V-4.

Benthic invertebrate communities observed in the five lakes were typical of those found in British Columbia lakes. Taxa included Diptera (chironomid, ceratopogonid, and chaoborid midges), Ephemeroptera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisflies), Oligochaeta (aquatic worms), Odonata (dragonflies), Gastropoda (snails and bivalves), and others.

Results are discussed below for general composition first, to provide context for the routine community metrics (abundance, richness, diversity, evenness). Within a given lake, results are presented in order from inlet to outlet. Further discussion of watershed health is provided in Section 11. Because of the diversity of habitat types sampled (Inlet, Seep, Deep, and Outlet), trends are compared statistically among lakes for each habitat type.

[26] Golder Associates 2011. 2010 Integrated Long Lake Sediment Assessment. Report Prepared for Hillsborough Resources Ltd.

The lakes differed in organic content (% TOC) and particle size distribution of sediments (Table 26), which can influence the abundance and composition of benthic invertebrate communities. Lower Quinsam Lake had notably lower % TOC than the other four lakes sampled: average % TOC ranged from 11 to 19% in No Name Lake (highest at Outlet), from 11 to 15% in Long Lake (highest at Inlet and Seep), from 12 to 17% in Middle Quinsam Lake (highest at Seep), 3.7 to 7.4% in Lower Quinsam Lake (highest at Outlet), and 13% in Gooseneck Lake (at Deep). Sediments were generally comprised of sand, followed by silt, and with little clay content; exceptions where silt was predominant or equal to sand content were No Name Lake Seep, Middle Quinsam Lake Inlet, and Lower Quinsam Lake Deep.

Relative Abundance of Taxonomic Groups

The benthic invertebrate communities were characterized by the predominance of Chironomidae (non-biting midges) at most stations, regardless of habitat type. Chaoboridae (phantom midges) were predominant at Middle Quinsam Deep and common at Lower Quinsam Deep 1. The Ephemeroptera, Plecoptera, and Trichoptera (EPT, mayflies, stoneflies, caddisflies) group was more common at Inlet and Outlet than at Deep stations. Pisidiidae (clams) were present in all lakes and did not appear strongly associated with habitat type (e.g., common at No Name Deep and Long Lake Outlet).

The Inlet stations contained mainly Chironomidae, with lower abundance of EPT, Oligochaeta and Pisidiidae (Figure 14). Sampling depths varied and appeared to have a strong influence on community composition and density. No Name Lake was sampled at 3.8 to 5.0 m depth, Long Lake at 5 m, Middle Quinsam Lake at 1.0 to 2.0 m, and Lower Quinsam Lake at 14 to 17 m (Table 26). Substrate was coarser (sand) at Lower Quinsam Lake than at the other lakes (silt). In all four lakes, Chironomidae were predominant; however, overall density was notably lower at the Lower Quinsam Lake Inlet (collected at 14 to 17 m depth due to bathymetry). Oligochaeta were common at No Name and Lower Quinsam Lakes, EPT were common at Middle Quinsam and No Name lakes, and Pisidiidae were common at Long Lake.

Sampling depth appears to have strongly influenced abundance (highest at the shallowest Middle Quinsam and lowest at Lower Quinsam) and composition (more abundant EPT at the shallowest Inlet, Middle Quinsam).

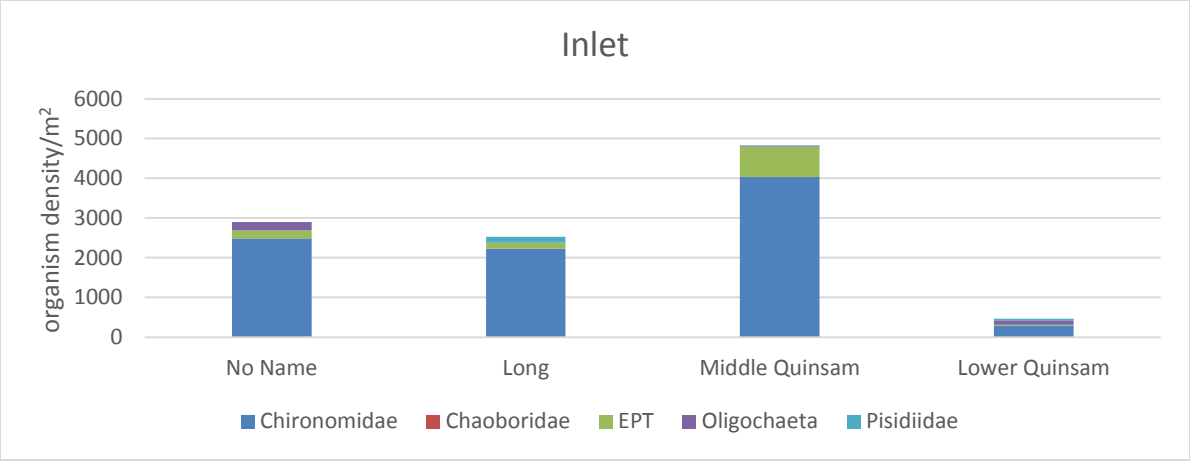


Figure 14: Average Density of Benthic Invertebrate Taxa at Inlet Stations, Quinsam Lakes System, 2016

The six Deep stations varied in composition (Figure 15) and depths sampled. Deep samples were collected at 12 m in No Name Lake, 19.5 m in Long Lake, 13 to 14 m in Middle Quinsam Lake, 16 to 17 m in Lower Quinsam Lake, and 15 m in Gooseneck Lake (Table 26). No Name Lake contained mainly Chironomidae and Pisidiidae, with some Chaoboridae. Long Lake, with lower total density, contained mainly Chironomidae with some Chaoboridae. Middle Quinsam Lake, also with low total density, contained mainly Chaoboridae with some Chironomidae. Lower Quinsam Lake contained Chaoboridae and Chironomidae, with some Oligochaeta. Gooseneck Lake contained mainly Chironomidae. Pisidiidae were common in No Name Lake, which was the shallowest depth sampled in Deep habitat.

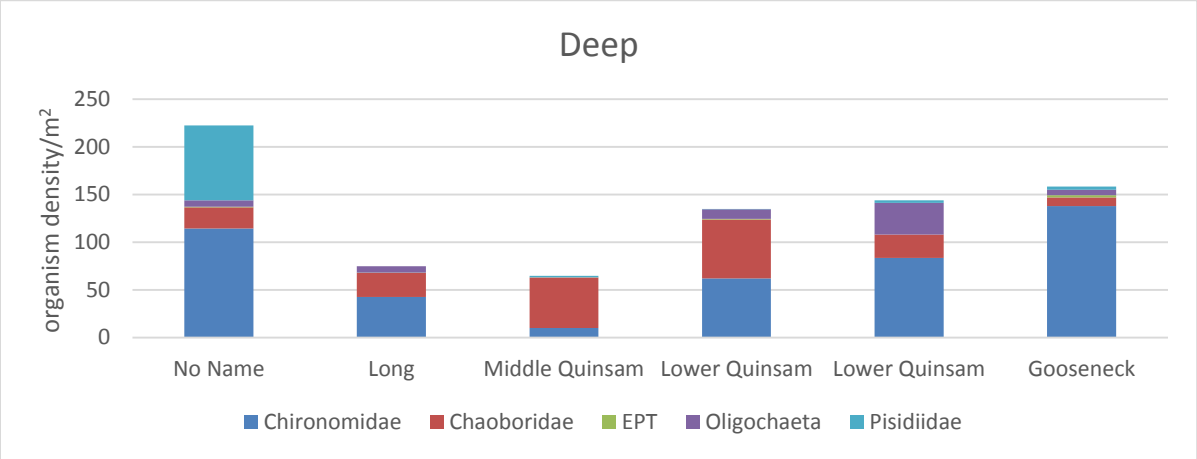


Figure 15: Average Density of Benthic Invertebrate Taxa at Deep Stations

Dissolved oxygen (DO) levels in deep water (hypolimnion) appears to be a major factor in composition of the Deep communities. The phantom midge *Chaoborus* (family Chaoboridae) is tolerant of low DO, and its high abundance in Middle Quinsam and Lower Quinsam lakes corresponds to minimum DO concentrations of 3.0 mg/L and 0 mg/L, respectively during the summer 5 in 30 day sampling period (Appendix 1, Tables 78 and 79). In contrast, the minimum DO in Long Lake was 3.4 mg/L and in No Name Lake was 5.8 mg/L (Appendix 1, Tables 76 and 77). Chaoboridae migrate between oxygenated areas at night to lower oxygen areas during the day (Hillsenoff 2011)[27].

The three Seep stations varied in composition (Figure 16) and depths sampled (Table 26). No Name Lake, sampled at 5.6 m off shore from where a channel conveying surfaced groundwater and other mine contact water enters the lake, consisted mainly of Chironomidae with some Oligochaeta and Pisidiidae common. Density at No Name Seep was lower than at Long and Middle Quinsam Seeps. Long Lake Seep, sampled at 12.5 to 16 m depth in an area with subsurface seepage, contained mainly Chironomidae, with Chaoboridae and Oligochaeta common. Middle Quinsam Seep, sampled at 1.0 m depth near a potential seep from the coal processing plant area, contained mainly EPT and Chironomidae, with some Pisidiidae. The presence of Chaoboridae at the Long Lake Seep was consistent with its presence at the Long Lake Deep station and the low DO levels in deeper water during summer.

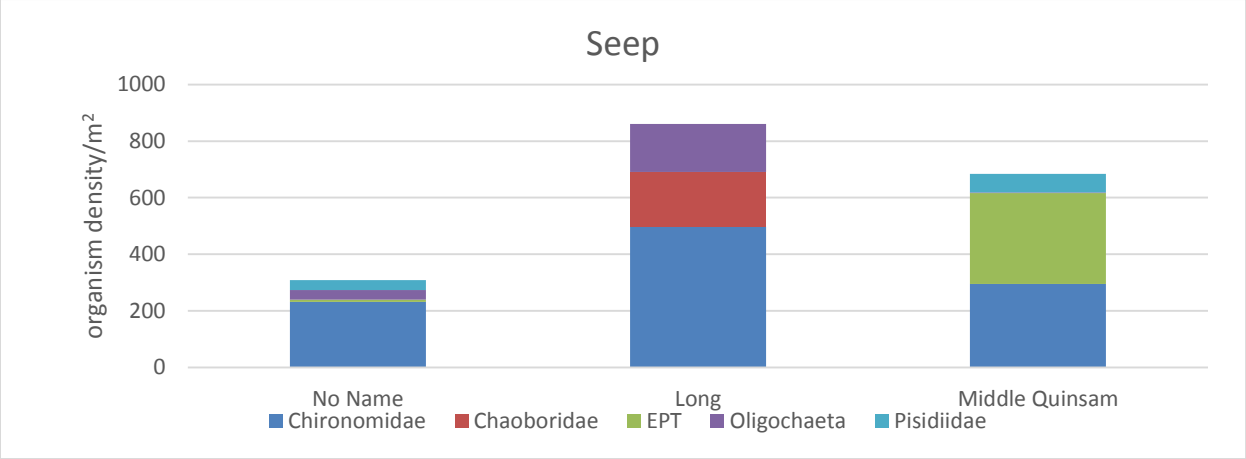


Figure 16: Average Density of Benthic Invertebrate Taxa at Seep Stations

[27] Hillsenhoff, W. 2001. Diversity and Classification of Insects and Collembola. Chapter 17. In: J. Thorp and A. Covich (editors). Ecology and Classification of North American Freshwater Invertebrates. Second Edition. Academic Press, San Diego CA.

Outlet stations varied in composition (Figure 17) and in depths sampled (Table 26). Inlet and Outlet sampling depths within a lake were consistent in No Name, Long, and Middle Quinsam lakes, but not in Lower Quinsam Lake. For Outlets, No Name Lake was sampled at 3.0 to 4.0 m, Long Lake at 5.0 to 5.5 m, Middle Quinsam Lake at 1.0 to 3.0 m, and Lower Quinsam Lake at 1.5 to 3.0 m. Chironomidae and EPT were the most abundant taxa at Outlet stations. In No Name Lake, EPT and Chironomidae were predominant, and in Long, Middle, and Lower Quinsam lakes, Chironomidae were predominant and EPT were common, along with Pisidiidae in Long Lake, and Oligochaeta in No Name, Middle Quinsam, and Lower Quinsam lakes. Density was notably higher at the shallow Middle Quinsam Lake station than at deeper No Name and Long lakes and shallow Lower Quinsam Lake station.

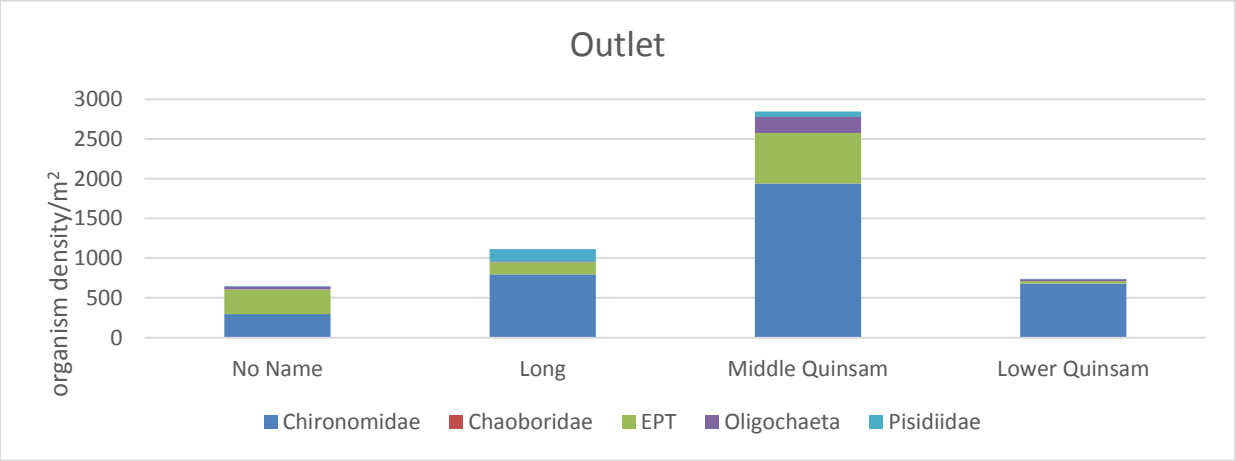


Figure 17: Average Density of Benthic Invertebrate Taxa at Outlet Stations

Density

Density showed a consistent pattern within each lake; highest at the Inlet, considerably lower at the Deep and Seep, and intermediate at the Outlet stations. Higher density at lake inlets and outlets generally occurs due to their shallow water, high DO, coarse substrate, and complex habitat, which supports higher abundance than in deep habitat (low DO, fine substrates). Habitat conditions in the Quinsam lakes generally followed this trend (Table 26).

Mean density ranged from 948 organisms/m^2 (Middle Quinsam Lake Deep) to 87,200 organisms/m^2 (Middle Quinsam Lake Inlet). There was high variability among replicates within a given station, particularly for Inlet and Outlet stations (Figure 18). Spatial trends for mean density were as follows:

- At Inlet stations, range of 14,522 (Lower Quinsam Lake) to 87,200 organisms/m^2 (Middle Quinsam Lake), with 57,900 and 53,100 organisms/m^2 at No Name and Long lakes, respectively
- At Deep stations, range of 950 organisms/m^2 (Middle Quinsam Lake) to 3,200 organisms/m^2 (No Name), with 1,100 organisms/m2 at Long Lake and 2,100 and 2,400 organisms/m^2 at the two Lower Quinsam Lakes stations and 2,400 organisms/m^2 at the Gooseneck Lake reference station
- At Seep stations, range of 1,900 organisms/m^2 (Long Lake) to 11,800 organisms/m^2 (Middle Quinsam Lake), with 5,483 organisms/m^2 at No Name Lake
- At Outlet stations, range of 14,500 organisms/m^2 (Lower Quinsam Lake) to 47,600 organisms/m^2 (Middle Quinsam Lake), with 22,600 organisms/m^2 at Long Lake and 23,600 organisms/m^2 at No Name Lake.

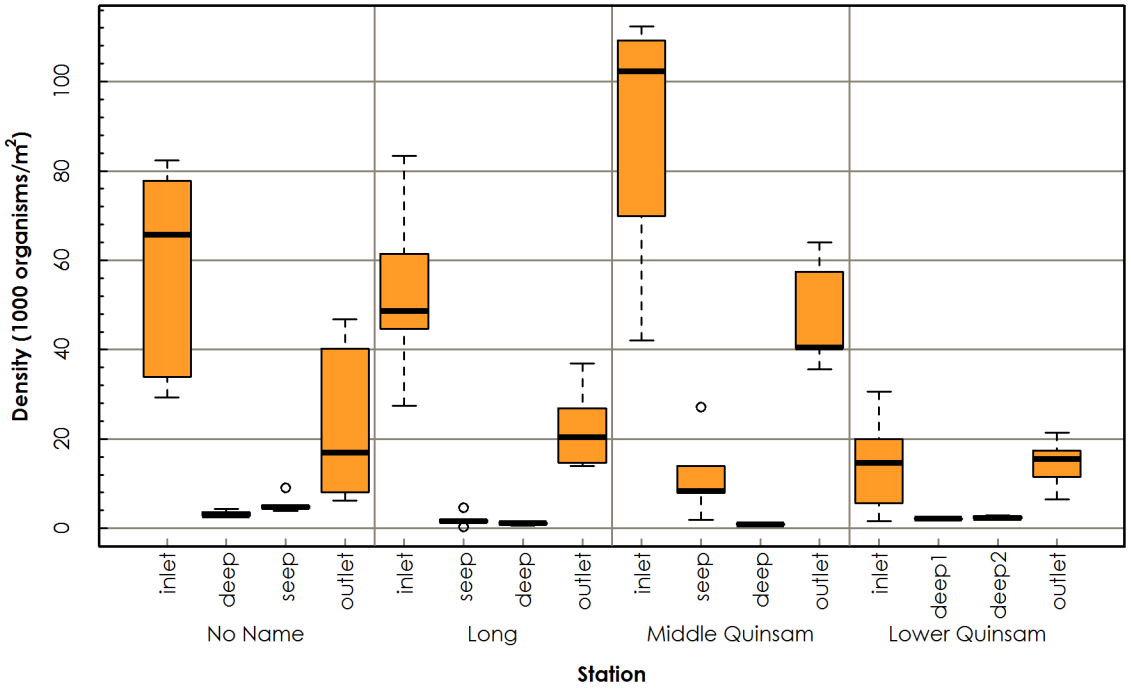


Figure 18: Benthic Invertebrate Density in Lakes, 2016

(Black bars indicate the median, boxes indicate the 25th and 75th percentiles, whiskers indicate the range within 1.5 times the interquartile range, and circles indicate outliers)

There were statistically significant differences in density ($p<0.05$, GLMM or non-parametric test; Appendix V-4), as follows:

- For Inlet stations, density differed between high impact (Long and Middle Quinsam) and low impact (No Name) or medium impact (Lower Quinsam) stations, but differences between pairs were small

- For Deep stations, density differed between high impact (Long, Middle Quinsam, and No Name) and medium (Lower Quinsam) or low impact (Gooseneck) stations, with lower density at high impact stations
- For Seep stations, the comparisons were significant for deep seeps (No Name and Long Lake) compared to Deep stations but not for shallow seeps (Middle Quinsam) compared to shallower stations (Lower Quinsam Outlet.
- For Outlet stations, there were no significant differences among lakes.

Taxon Richness

Mean taxon richness at the lowest practical level ranged from 7 to 36. Within a lake, taxon richness was generally similar at Inlet and Outlet stations, lower at Seep, and consistently lowest at Deep stations (Figure 19). As noted for density, habitat conditions at lake inlets and outlets typically support higher taxa richness than at deeper areas. Among lakes, richness was generally highest at No Name and Long lakes, and lower at Middle and Lower Quinsam lakes. Spatial trends for mean taxon richness were as follows:

- At Inlet stations, range of 22 to 36, highest at Long Lake, intermediate at No Name Lake and lowest at Middle Quinsam and Lower Quinsam lakes
- At Deep stations, range of 8 to 14, higher at No Name than Long, Middle Quinsam, and Lower Quinsam lakes, and higher again at the reference lake (Gooseneck Lake: 18 taxa)
- At Seep stations, range of 7 to 27, highest at No Name Lake, intermediate at Middle Quinsam Lake, and lowest at Long Lake
- At Outlet stations, range of 29 to 32, similar for the four lakes.

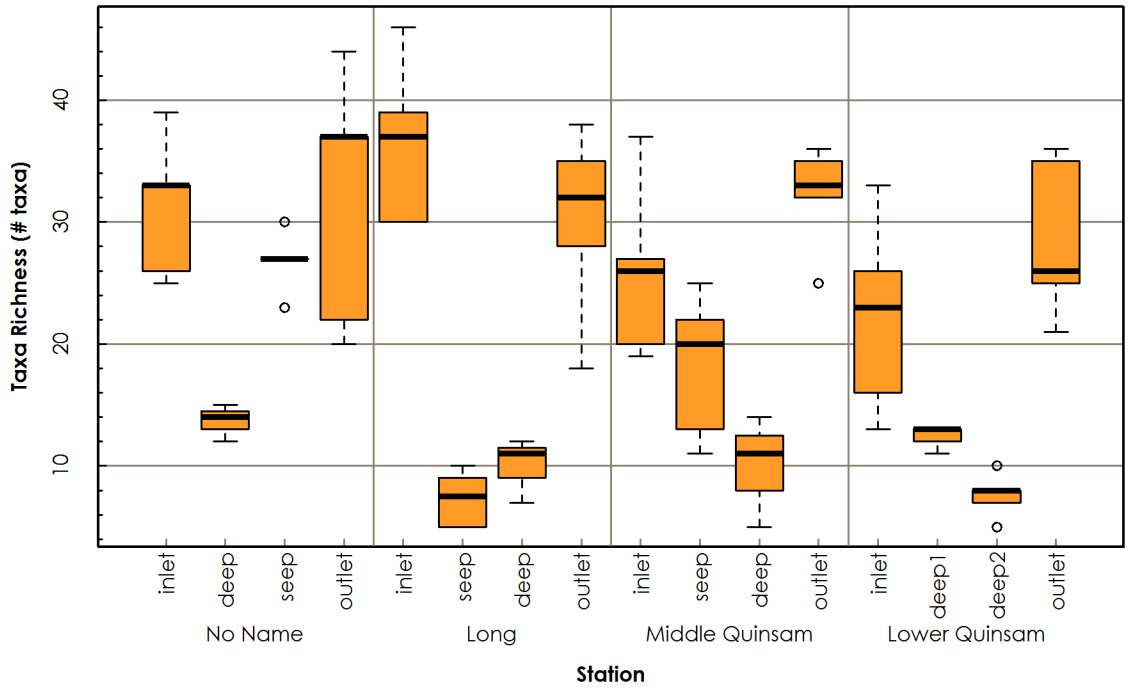


Figure 19: Benthic Invertebrate Taxa Richness in Lakes, 2016

(Black bars indicate the median, boxes indicate the 25th and 75th percentiles, whiskers indicate the range within 1.5 times the interquartile range, and circles indicate outliers)

There were statistically significant differences in richness ($p<0.05$, GLMM or non-parametric test; Appendix V-4) for Deep stations (low impact Gooseneck higher than the medium and high impact stations), but not for Inlet, Seep, and Outlet stations.

Diversity

Diversity (Simpson's Index of Diversity) showed a similar pattern to density and richness; generally highest at Inlet and Outlet, lower at Seep, and lowest at Deep stations (Figure 20). Mean diversity ranged from 0.57 to 0.91. A value of 1.0 indicates maximum diversity. Spatial trends were as follows:

- At Inlets, range of 0.84 to 0.91, higher at No Name Lake than at the other three lakes
- At Deeps, range of 0.57 to 0.82, highest at Gooseneck and No Name lakes, intermediate at Long and Lower Quinsam lakes, and lowest at Middle Quinsam Lake
- At Seeps, range of 0.71 to 0.87, higher at No Name than Long and Middle Quinsam lakes
- At Outlet sites, range of 0.82 to 0.90, similar among the four lakes.

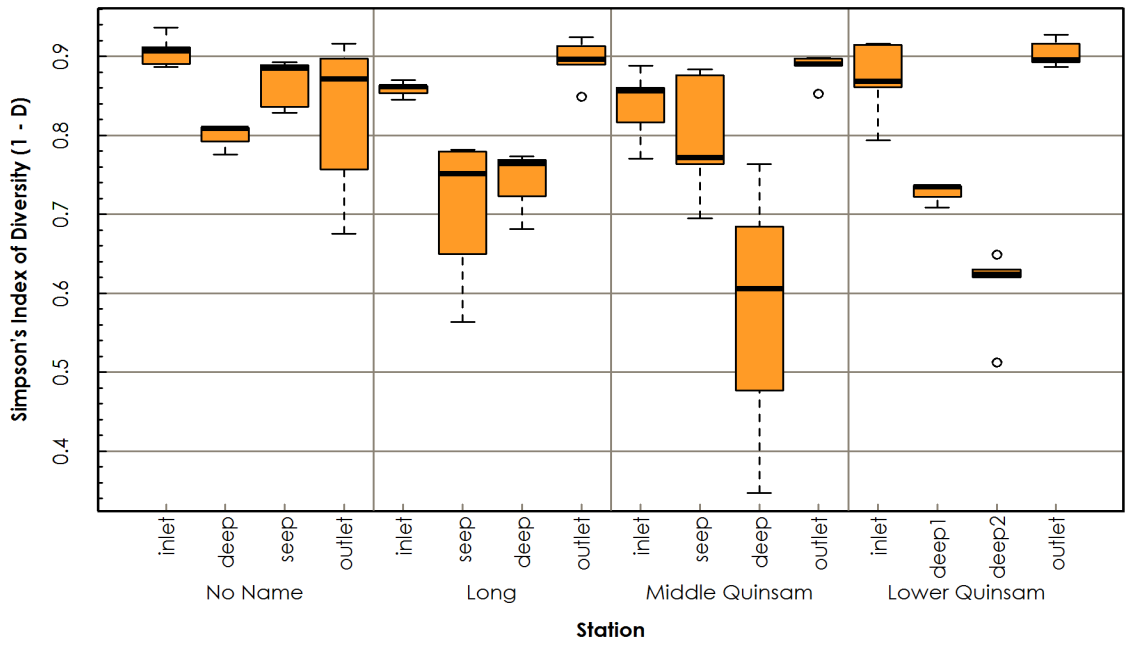


Figure 20: Benthic Invertebrate Diversity in Lakes, 2016

(Black bars indicate the median, boxes indicate the 25th and 75th percentiles, whiskers indicate the range within 1.5 times the interquartile range, and circles indicate outliers)

There were statistically significant differences in diversity ($p<0.05$, GLMM or non-parametric test; Appendix V-4) among stations for Inlets (high differed from low but not medium impact), Deep (low differed from medium and high impact), and Seep versus Shallow sites (medium differed from low and high impact). There were no significant differences among Outlet stations or for deep Seeps compared to Deep stations.

Evenness

Mean Simpson's Evenness ranged from 0.20 to 0.55, with no consistent pattern or association with habitat type. A value of 1.0 reflects maximum evenness. Within a lake, mean evenness was highest in No Name Lake at the Deep station, in Long Lake and Middle Quinsam Lake at the Seep stations, and in Lower Quinsam Lake at the Outlet station (Figure 21).

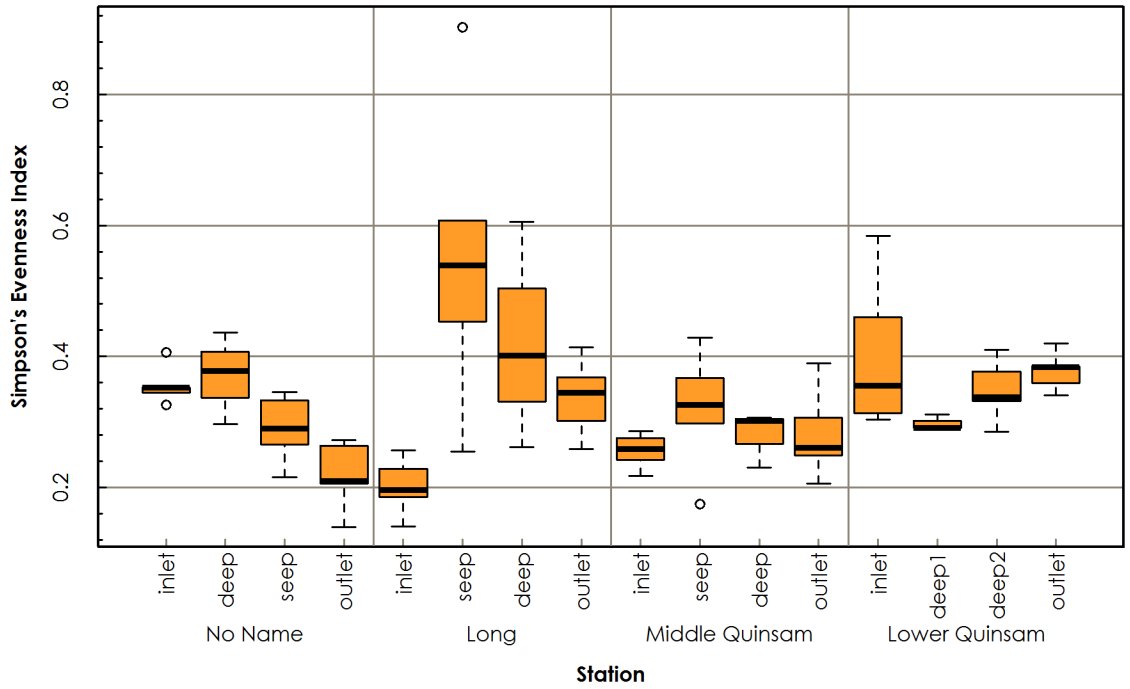


Figure 21: Benthic Invertebrate Evenness in Lakes, 2016

(Black bars indicate the median, boxes indicate the 25th and 75th percentiles, whiskers indicate the range within 1.5 times the interquartile range, and circles indicate outliers)

There were statistically significant differences ($p<0.05$, GLMM or non-parametric test; Appendix V-4) in diversity among stations for Inlets (high impact differed from low and medium) and Seep versus deep stations (high impact differed from low impact). There were no significant differences among Deep or Outlet stations or for Seeps compared to shallow stations.

Summary for 2016 Lake Data

The benthic invertebrate communities recorded are typical for the habitats sampled. Chironomidae and Chaoboridae are commonly found in fine-grained sediment of shallow and deep areas of lakes and Chaoboridae and some Chironomidae favour low oxygen conditions. EPT are commonly associated with coarser substrate, shallower water, and higher dissolved oxygen levels, which are usually found at lake inlets and outlets (Wetzel 2001). Community composition did not show obvious evidence of mine influence. The high impact Inlet stations (Middle Quinsam and Long Lake), did not have distinctly different community composition compared to the medium impact (Lower Quinsam Lake), or low impact Inlet (No Name Lake) stations. The same was true for the Outlet stations. Composition varied among the high impact

Deep stations, but the medium impact site (Lower Quinsam Lake) had similar composition to the high impact Deep station (Long Lake). The reference lake, Gooseneck Lake, supported similar community composition to the Deep stations in the mine-influenced lakes, with Chironomidae pre-dominant and small proportions of Oligochaeta, and EPT present.

There were statistically significant differences for some endpoints and habitat types ($p<0.05$; mixed effects model, non-parametric tests):

- Inlet stations had significant differences for density, diversity, and evenness (high impact stations Long and Middle Quinsam differed from medium impact Lower Quinsam Lake and low impact No Name Lake. There were no significant differences among lakes for taxon richness. Inlet samples from Lower Quinsam Lake were taken substantially deeper than at the other lakes, which resulted in lower density and taxon richness at this medium impact station. Density was lowest at the medium impact station (Lower Quinsam) and diversity and evenness were lowest at high impact lakes.
- Deep stations had significant differences for density (high differed from medium and low impact stations) and for taxon richness and diversity (high and medium differed from low impact), typically lower at high impact (Long and Middle Quinsam) than medium (No Name) and low (Gooseneck) impact stations and similar to the medium impact (Lower Quinsam) station, with evenness showing no significant differences among stations.
- For Seep stations, trends among sites were challenging to identify, given the variation in water depths and mine influence at the stations sampled and the lack of a low or medium impact Seep station. Density and evenness were highest at the deep (12 to 16 m) Long Lake, intermediate at the shallow Middle Quinsam (1.0 m) and lowest at the shallowest (5.6 m) No Name Seep stations. Taxon richness and diversity were highest at medium depth No Name, intermediate at shallow Middle Quinsam, and lowest at deep Long Lake stations. Seeps compared to Deep stations had a significant difference for density (high differed from low but not medium impact stations). Seeps compared to shallow stations had a significant difference for diversity (medium impact differed from both high and low impact stations).
- Outlets had no significant differences for any of the metrics tested.

Among these differences, the ones that could be statistically significant and ecologically relevant (i.e., related to the mine influence and not to habitat differences among lakes) are those for Deep stations, given the stability of these stations and distance from confounding influences such as inlet and outlet depths. Density was significantly lower at Long and Middle Quinsam stations (high impact), compared to No Name, Lower Quinsam, and Gooseneck stations. Taxon richness and diversity were significantly lower at Long and Middle Quinsam stations than at No Name and Gooseneck stations.

In addition to potential mine-related effects on the benthic community, the lower abundance recorded at all habitat stations in Lower Quinsam Lake compared to the other lakes may reflect

overall lower productivity, as seen in the lower %TOC content of sediment at Lower Quinsam (3.7 to 7.4%) compared to the other lakes (11 to 19%). The lakes with higher sediment organic content are those with greater wetland development in the vicinity, which also likely moderate the flow responses from rainfall events into the lakes.

Comparison to Previous Studies

Nordin (2006)[28] studied water, sediment, and benthic invertebrate communities of No Name, Long, Middle Quinsam, and Upper Quinsam lakes in 2003 and 2004. Lake inlets and outlets were sampled in littoral habitat. Results for the benthic communities indicated no differences in density and diversity or in relative proportions of EPTs and chironomids between inlets and outlets of each lake, although some localized changes were identified that could reflect mine influence.

Golder Associates (2011) conducted an integrated sediment study of Long Lake in 2010, which included assessment of sediment and porewater chemistry, laboratory toxicity tests, and the benthic invertebrate community to assess effects of mine-related discharges, particularly the seep on the south shore of the lake and a discharge channel. Samples were collected from 17 nearshore stations, four deep stations, inlet, and outlet of Long Lake, and from two deep stations in Gooseneck Lake. Five stations sampled in 2010 corresponded to the Inlet, Deep, Seep, and Outlet stations in Long Lake and one of the Deep stations sampled in Gooseneck Lake for this 2016 study. The 2010 samples were collected in early April, whereas the 2016 samples were collected in late September.

Results from 2010 generally were similar to those from the 2016 studies: in 2010, abundance and taxon richness were higher at Inlet and Outlet stations than at Deep and Seep stations, and at many near shore stations on the south shore close to the Seep or the north shore downstream of the Seep. The most abundant taxa in 2010 were nematodes, chironomids, oligochaetes, molluscs and amphipods in near shore stations, and nematodes, chironomids, and oligochaetes in deep stations (along with a few Chaoboridae). This was similar to results for 2016 samples, except that nematodes were rare at all stations and Chaeoboridae were common at the Deep station in 2016 samples (possibly related to different sampling times of the studies). Taxon richness values were

[28] Nordin, R. 2006. An evaluation of the sediment quality and invertebrate benthic communities of Long and Middle Quinsam Lakes with regard to local coal mining activity. Prepared for BC. Ministry of Environment.

similar in the two studies (Golder reported an average of 30 for Inlet, 35 for Outlet, 2 to 7 for Deep, 10 for Seep in Long Lake and 10 to 16 for Deep in Gooseneck Lake).

10.3.3 *QUINSAM RIVER*

Benthic invertebrate samples were collected from three stations within riffle habitat on the Quinsam River (Appendix I Figure 1):

- WA: 1.32 km upstream of Middle Quinsam Lake, and upstream of Quinsam Mine influences, in an area of mainly cobble and pebble substrate and forested riparian area
- QRDS1: 2.4 km downstream of Middle Quinsam Lake (which receives inputs from the North Mine Site and from Long Lake but does not include 7 South Mining discharges), in an area of mainly cobble and pebble substrate and forested riparian area
- 7SQR: 5.25 km downstream of QRDS1 and downstream of all discharges from Quinsam Mine to the Quinsam River, in an area of large boulder and cobble substrates and forested riparian area.

10.3.3.1 *Methods*

Benthic invertebrate samples were collected from stream sites using a kick net, following Environment Canada's Canadian Aquatics Biomonitoring Network (CABIN) protocol (Reynoldson et al. 2001)[29] and analyzed using the Reference Condition Approach (RCA). Habitat data including channel morphology, canopy cover, substrate, water velocity and canopy cover were collected at each site following CABIN protocols (Appendix V-5).

Field Methods

Samples were collected on September 14 through 16, 2016. At each station, the riffle habitat for sampling was defined and substrates were kicked for three minutes, with flow carrying invertebrates into the kicknet. Large and deeply embedded rocks were rubbed by hand to loosen organisms. The area was traversed in a zigzag pattern from bank to bank. The net was removed from the water, and the sample rinsed carefully into a container, taking care to remove organisms

[29] Reynoldson, T.B., C. Logan, T. Pascoe, and S.P. Thompson. 2001a. CABIN Invertebrate Biomonitoring Field and Laboratory Manual. National Water Research Institute, Environment Canada. Burlington, ON. 53 p. http://cabin.cciw.ca/intro.asp

clinging to the net (using forceps). Samples were preserved with 10% buffered Formalin in a 1:3 ratio (Formalin:sample). Samples were labelled inside and outside with site code, sampling date, and the number of jars (i.e. 1 of 3, 2 of 3, etc.). Sampling information (the person kicking, typical depth of kicked area, sampling time, number of sample jars required to contain the sample) was recorded on field sheets.

Laboratory Methods

Samples were sent to Cordillera Consulting for taxonomic analysis. Cordillera was responsible for sample reception, sorting, identification, and QA/QC (sorting and sub-sampling efficiency). The detailed Methods and QC Report from Cordillera (2016) is included in Appendix V-1. Organisms were identified to lowest practical level (typically genus for insect and oligochaete taxa, genus or family for other organisms). Samples were split, if required, with a minimum of 300 organisms counted and identified.

Sorting efficiency was assessed in 9 of 92 samples analyzed (10% of samples, 7 from lakes and 2 from the Quinsam River). All re-sorted samples had at least 90% (90 to 100%) efficiency. Subsampling efficiency was measured on 10% of the samples that were subsampled (five lake samples). The five samples met the data quality objective (a subsample count should be within 20% of the expected count, i.e., total count divided by number of fractions).

Data Analysis Methods

Taxonomic data were analyzed at the family level, as per the CABIN protocol, and using the 2010 BC Coastal RCA model. Data were also summarized for taxa richness, EPT taxa richness, Simpson's Index of Diversity, and Simpson's Evenness, as described in Section 10.3.1.1.

10.3.4 *RESULTS*

Habitat

CABIN field sheets are presented in Appendix V-5. Key habitat data are summarized in Table 28. In situ water quality data collected at the time of sampling are presented in Appendix I, Tables 184 to 185. Station WA is considered a reference station, QRDS1 a near-field station and 7SQR a far-field station.

Water depth, water velocity, and substrate composition were similar at WA and QRDS. The most downstream station, 7SQR, was deeper, with lower velocity water and higher boulder content

than at the upstream sites. Temperature, pH, and dissolved oxygen levels were similar at the three sites. However, conductivity increased from upstream (47.8 µS/cm2 at WA) to downstream of Middle Quinsam Lake at QRDS1 (145.6 µS/cm^2) and 7SQR (135.5 µS/cm^2), reflecting the influence of mine drainage on the Quinsam River.

Table 28: Habitat Characteristics of Benthic Invertebrate Stations, Quinsam River, 2016

Station	Channel Width (m)	Wetted Width (m)	Mean Velocity (m/s)	Mean Depth (m)	Substrate (% composition)			
					Boulder	Cobble	Gravel	Pebble
WA	11.7	11.3	0.62	0.34	3	53	11	33
QRDS1 [a]	18.7	13.9	0.64	0.34	2	54	10	36
7SQR	25.4	14.4	0.18	0.60	35	51	3	11

Note:
[a] also 8% sand

Table 29: In Situ Water Quality at Benthic Invertebrate Stations, Quinsam River, 2016

Station	Dissolved Oxygen (mg/L)	pH	Specific Conductivity (µS/cm)	Water temperature (°C)
WA	7.09	7.5	47.9	16
QRDS1	7.82	7.8	145.6	17
7SQR	7.83	7.3	135.5	15

Sediment particle size in samples collected for chemical analysis was mainly sand at WA and QRDS1 and sand with greater silt content at 7SQR. The % TOC in sediment was notably lower than in the lake stations, and the average ranged from 2.9% (7SQR) to 3.2% (QRDS1).

Benthic Invertebrate Community

Full taxonomic results are provided in Appendix V-2. Table 30 presents a summary of community indices at the family level for benthic invertebrate at the river stations:

- Abundance was highest at WA, the upstream station (1,525 organisms/sample), intermediate at QRDS (798 organisms/sample), and lowest at 7SQR, the most downstream station (338 organisms/sample. Low abundance at 7SQR was likely attributable to predominance of boulders at 7SQR; cobble, gravel, and pebble substrates typically support higher invertebrate abundance than boulder substrate.
- Family-level richness varied little across sites, from 20 families at WA to 23 families at 7SQR.

- EPT richness at the genus level was similar at the three stations (16 to 17 taxa)
- Simpson's Diversity Index was high, ranging from 0.79 (WA) to 0.87 (7SQR), with a value of 1.0 reflecting maximum diversity.
- Simpson's Evenness Index was low, ranging from 0.24 (WA) to 0.33 (7SQR), with a value of 1.0 reflecting maximum evenness.

The higher richness, diversity, and evenness found at 7SQR compared to upstream stations indicate mine-related discharges are not adversely affecting the benthic community.

Table 30: Benthic Invertebrate Community Family-Level Indices, Quinsam River, 2016

Index	WA	QRDS1	7SQR
Abundance (organisms/sample)	1,525	798	338
Family Richness	20	22	23
EPT Richness (genus level)	16	17	16
Simpson's Diversity Index	0.79	0.84	0.87
Simpson's Evenness Index	0.24	0.29	0.33

Table 31 shows community composition at the Quinsam River stations. EPT were predominant at all three stations, with notably higher abundance at WA and QRDS (62% and 69%, respectively) than at 7SQR, downstream (38%), likely associated with differences in substrate composition. Ephemeroptera (notably Baetidae, Heptageniidae, and Leptophlebiidae) were more abundant that Plecoptera or Trichoptera. True flies (Diptera, including Chironomidae) were common at the three sites (9% to 28%) and Oligochaeta (aquatic worms) were common at QRDS and 7SQR (13% and 15%, respectively).

In general, EPT organisms are associated with clean water (coarse substrates, well oxygenated, low organic enrichment) and Oligochaeta and Chironomidae are considered tolerant of fine sediments, organic enrichment and lower DO (which can be due to polluted conditions), although there are exceptions (Barbour et al. 1999)[30].

[30] Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. U.S. Environmental Protection Agency; Office of Water; Washington, D.C. EPA 841-B-99-002.

Table 31: Benthic Invertebrate Community Composition, Quinsam River, 2016

Taxon	WA	QRDS1	7SQR
EPT	62%	69%	38%
Diptera	28%	9%	26%
Oligochaeta	6%	13%	15%
Other	4%	9%	21%

The benthic invertebrate community data were evaluated using the 2010 BC Coastal RCA model. The predictor variables used for the RCA model were: average depth, bankfull width, number of national parks in the watershed, and percent alpine area in the watershed. Based on environmental characteristics at the Quinsam River sampling sites, the three sampling sites were predicted using reference group three.

Table 32 provides a summary of how the Quinsam River benthic invertebrate communities at the three sampling stations sit in relation to the three vectors in reference group 3 ordination space. Figures 22 through 24 illustrate the location of the stations in reference group 3 ordination space for the first two vectors. All three Quinsam River stations fall outside of the 90% probability ellipse on at least one occasion and are classified overall as mildly divergent from the reference condition or "potentially stressed" category (Table 32).

Table 32: Table 32: Quinsam River 2016 Assessments Based on Reference Condition Approach

Station	Reference Group	Probability of Site in Group	Vector 1 vs 2	Vector 1 vs 3	Vector 2 vs 3	Overall
WA	3	0.75	Mildly Divergent	Similar to Reference	Mildly Divergent	Mildly Divergent
QRDS1	3	0.57	Similar to Reference	Mildly Divergent	Similar to Reference	Mildly Divergent
7SQR	3	0.95	Similar to Reference	Mildly Divergent	Mildly Divergent	Mildly Divergent

Since 10% of stations that are similar to the reference condition are expected to fall outside the 90% probability ellipse, the invertebrate community at the Quinsam River sampling sites was compared to the reference group community for further evaluation.

The invertebrate community at station WA was mildly divergent from reference group 3 primarily due to total invertebrate abundance, number of EPT individuals, % Ephemoptera that are Baetidae, and % Plecoptera. In 2016, site WA had greater total invertebrate abundance than the reference group 3 mean (1,445 vs 732), greater number of EPT individuals (950 vs 567) than the reference group 3 mean and greater % Ephemeoptera that are Baetidae (83 vs 28), while the reference group 3 mean had a greater % Plecoptera (24 vs 4) (Table 33). This benthic invertebrate community composition is indicative of Quinsam River conditions upstream of the Quinsam Mine.

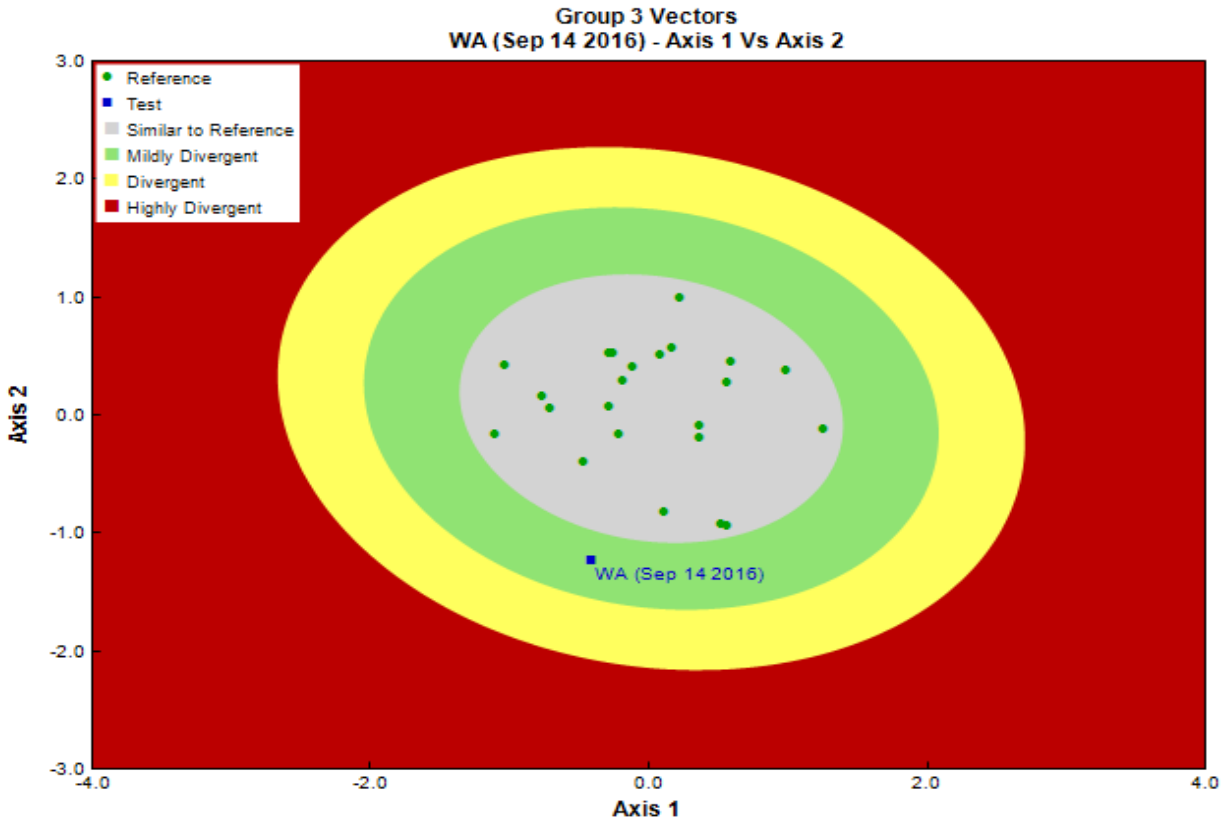


Figure 22: Benthic Invertebrate Community at WA Compared to the Reference Condition

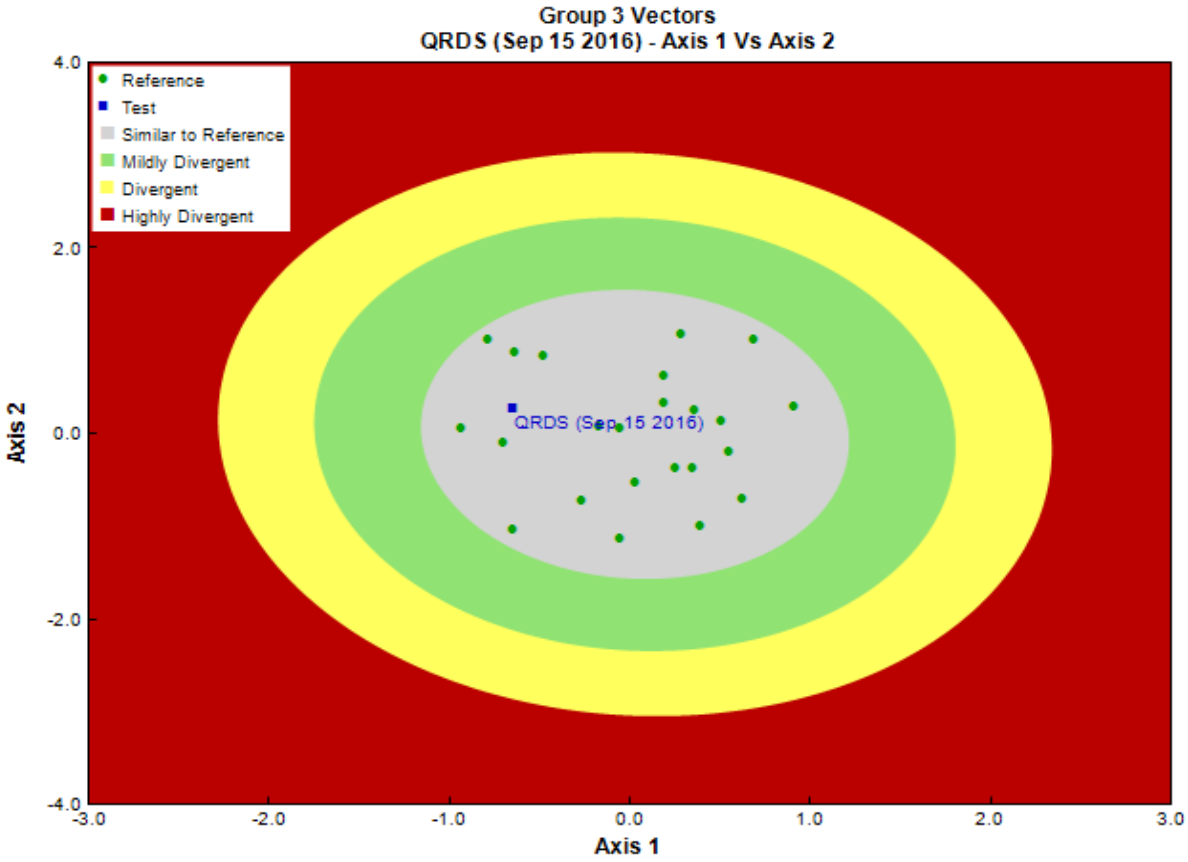


Figure 23: Benthic Invertebrate Community at QRDS1 Compared to the Reference Condition

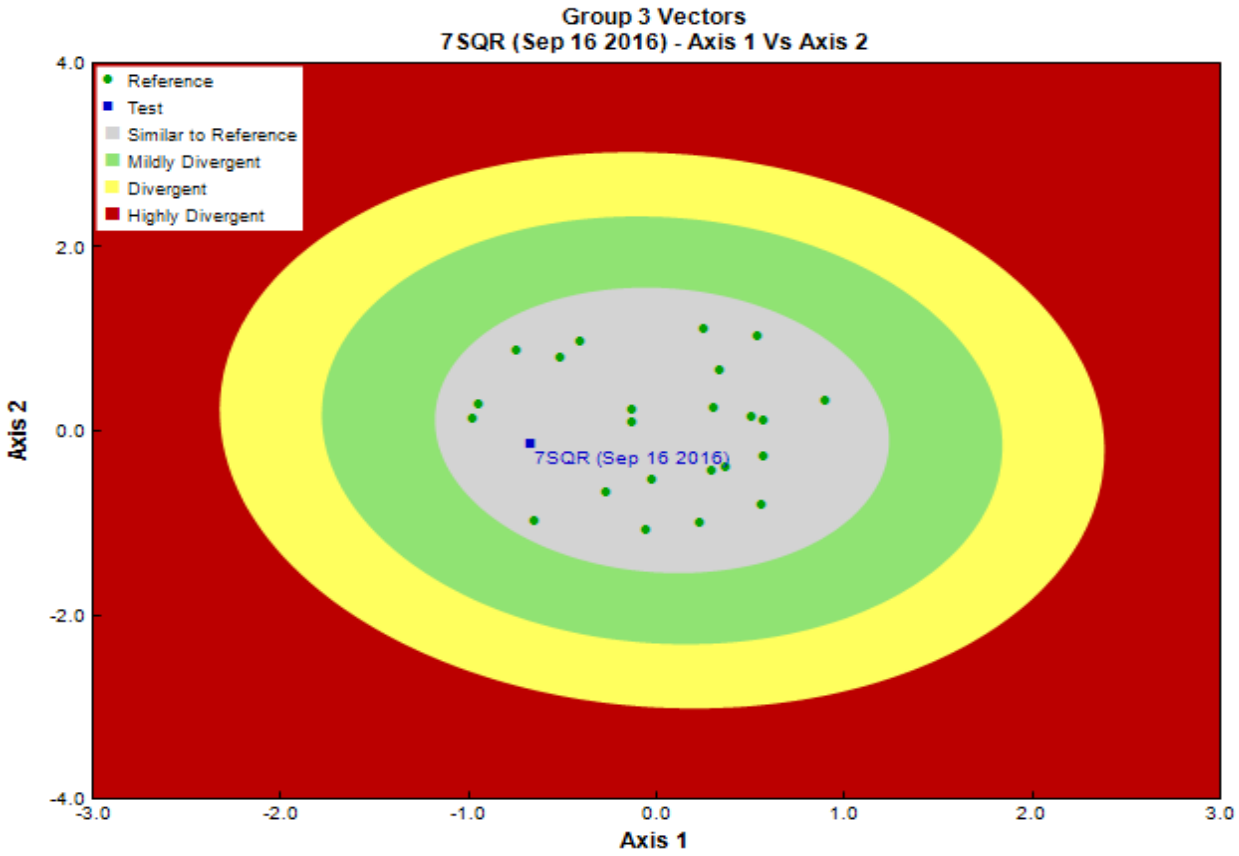


Figure 24: Benthic Invertebrate Community at 7SQR Compared to the Reference Condition

The invertebrate community at station QRDS was mildly divergent from the reference group 3 primarily due to a greater % Ephemeroptera (62% vs 40%), greater % Ephemeroptera that are Baetidae (41 vs 28), and the presence of Coleoptera (9% vs 0.2%) at QRDS, while the reference group 3 mean has a greater % Chironomidae (15% vs 3%)s and % Plecoptera (24% vs 6%) (Table 33). The similarity of the benthic community at site QRDS to the reference condition, the community at WA, and abundance of Ephemeoptera and Coleoptera at QRDS indicates good quality aquatic habitat and water quality and that mining activities in the watershed do not appear to adversely affect the benthic invertebrate community at QRDS1.

The invertebrate community at station 7SQR was mildly divergent from the reference group 3. This was due to the reference group 3 mean having greater % EPT individuals (71 vs 41), greater EPT individuals (567 vs 130), and higher % Plecoptera (24 vs 4) and station 7SQR haing greater % Ephemeroptera that are Baetidae (59% vs 28%) and the presence of Odonata taxa (Table 33). The difference in % Ephemeroptera that are Baetidae and % Plecoptera between the reference

group mean and site 7SQR is also found at the other two Quinsam River stations and therefore is not indicative of a disturbed site. Station 7SQR has a greater depth than the reference group 3 average (60 cm vs 23 cm) and greater bankfull width (25 m vs 15 m) and is dominated by boulder substrates. The differences in the benthic invertebrate community between 7SQR and the reference group 3 may be due to differences in habitat more than to mining influences. Station 7SQR also had Odonata and Oligochaeta, two taxa that are found in slow water with fine substrates, indicating that an area with slow water was included in the benthic sampling area.

Table 33: Benthic Invertebrate Metrics for the Quinsam River Sampling Sites and the BC Coastal Model Reference Group 3 Mean

Metric	Quinsam River Stations			Reference Group 3 Mean	Standard Deviation
	WA	QRDS 1	7SQR		
Total Abundance	1445	798	338	732	638
Total No. of Taxa	18	21	23	19	4
Shannon-Wiener Diversity	2	2	2	2	0
Simpson's Diversity	1	1	1	1	0
Pielou's Evenness	1	1	1	1	0
% EPT Individuals	66	69	41	71	22
% Ephemeroptera	53	62	25	40	20
% Ephemeroptera that are Baetidae	83	41	59	28	26
% Plecoptera	4	6	4	24	16
% Tricoptera	9	1	11	7	8
% Coleoptera	0	9	0	0	1
EPT Individuals (Sum)	950	550	130	567	533
EPT taxa (no)	9	10	9	11	2
Ephemeroptera taxa	4	4	3	4	1
No. EPT individuals/Chironomids+EPT Individuals	1	1	1	1	0
Plecoptera taxa	2	3	2	4	1
Trichoptera taxa	3	3	4	3	1
Coleoptera taxa	1	1	0	0	0
Chironomidae taxa (genus level only)	1	1	1	1	0
Diptera taxa	4	5	4	3	1
Odonata taxa	0	0	2	0	0
% of 2 dominant taxa	58	49	42	54	12
% of 5 dominant taxa	77	79	77	79	9
% of dominant taxa	44	26	26	37	14
No. Clinger Taxa	15	17	15	15	3

10.4 SUMMARY FOR RIVER STATIONS

The RCA model results (mildly divergent from the reference condition) and individual metrics (family richness, EPT richness, EPT predominance) indicate that the three sampling stations on the Quinsam River do not show signs of adverse effects from mine-related discharges. The Quinsam River supports a variety of insect taxa that indicate clean water conditions and provide abundant prey for fish.

10.4.1 *COMPARISON TO HISTORICAL DATA*

Environment Canada sampled the Quinsam River at sites upstream and downstream of Middle Quinsam Lake using the CABIN protocol as part of an overall study of the Quinsam watershed (Strachan et al. 2010)31. The upstream station (close to WA) was sampled in 2003, 2005, and 2006; the downstream station (close to QRDS) was sampled in 2006; and sites lower in the watershed were also sampled. The results for the upstream station varied, with a category of "potentially stressed" assigned in 2003 and 2006 and a category of "not stressed" assigned in 2005 (classification terms in use at that time). Results for the downstream station indicated a category of "not stressed" in 2006. The sampling sites appear to be similar in location to stations WA and QRDS, sampled in 2016, and the results are similar to those obtained in 2016. The "not stressed" category indicates healthy communities that are equivalent to reference conditions.

10.4.2 *WETLAND SITES*

Three areas in the Lower Wetland lying between Middle Quinsam and Lower Quinsam lakes were sampled in fall 2016 for benthic invertebrate communities: Inlet, Middle, and Outlet (Appendix XI, Figure 1). The Lower Wetland is approximately 350 m long, is situated downstream of 7-South surface disturbance, and receives inputs from the 7-South Surface Decant Pond via Stream 1. The wetland water levels fluctuate through the year (Section 9.2).

[31] Strachan, S., A. Ryan, H. McDermott, and C. MacKinlay. 2010. Benthic Invertebrate and Water Quality Assessment of the Quinsam River Watershed in British Columbia 2001-2006. GBAP Report #EC/GB/07/85.

10.4.2.1 *Methods*

Field Methods

Although water levels were low prior to sampling, rainfall prior to the October 2016 sampling trip had raised water levels in the wetland. Samples were collected from areas considered to be wetted throughout the year:

- Inlet station was sampled 25 to 50 m downstream of where Stream 1 enters the wetland, at a water depth of less than 30 cm; samples had a rich organic odour and consisted mainly of fine sand and silt
- Middle station was sampled approximately 200 m downstream of the Inlet station, in water less than 30 cm deep; samples had a rich organic odour and consisted mainly of fine sand and silt
- Outlet station was sampled near the outlet to the Quinsam River in an area dammed by beavers, in 0.5 to 1.5 m of water; samples were rich in clay, with sand and silt.

Field methods for wetland samples were the same as for lakes (Section 10.3.1.1). Five replicate samples were collected per station, each one a composite of three grabs, at the same locations as the sediment samples (Appendix I, Figure 1). Observations (depth sampled; sediment vertical profile, texture and color, and presence of living organisms, debris, biofilms, odor, or oily sheen) were recorded. The composite sample was sieved in a sieve bag with a 200 µm mesh size to remove excess sediment. The sieve contents were gently transferred to a labeled sample jar, rinsing the sieve with water to collect all the material. Jars were filled no more than half full and preserved with 10% buffered formalin (filled to top). Samples were stored in a cooler and shipped to the taxonomy laboratory with a chain of custody sheet.

Laboratory Methods

Samples were sent to Cordillera Consulting for taxonomic analysis. Cordillera was responsible for sample reception, sorting, identification, and QA/QC of sorting and sub-sampling efficiency. Five replicate samples were analyzed at the Outlet station (given high variation noted for the first three samples analyzed) and three replicate samples were analyzed at each of the Inlet and Middle stations. The detailed Methods and QC Report from Cordillera (2016) is provided in Appendix V-1. Organisms were identified to lowest practical level (typically genus for insect and oligochaete taxa, genus or family for other organisms).

Sorting efficiency was assessed in 9 of 92 samples analyzed (10% of samples, 7 from lakes and 2 from the Quinsam River): all re-sorted samples had at least 90% (90 to 100%) efficiency.

Subsampling efficiency was measured on 10% of the samples that were subsampled (six samples): the data quality objective (a subsample count should be within 20% of the expected count, i.e., total count divided by number of fractions) was met for the six samples.

Data Analysis

Data were analyzed as described for lake samples (Section 10.3.1.1). Community composition by major taxonomic group was summarized. Density, richness, EPT richness, Simpson's Index of Diversity, and Simpson's Evenness indices were calculated. Results were graphed to show differences among stations.

Statistical significance of differences among stations were tested using ANOVA and the non-parametric Kruskal Wallis Test. However, due to the unbalanced study design and the inability to meet assumptions of normality and homogenous variances, the results are not presented.

10.4.3 *RESULTS*

Results are discussed below for general benthic invertebrate community composition, and for individual metrics (abundance, richness, diversity, evenness). Further interpretation of results in terms of watershed health is provided in Section 11.

Sediments at the Inlet and Middle wetland stations were mainly sand with some silt and at the Outlet station was approximately equal proportions of silt and sand (Appendix I Table 191). The average % TOC was 31% at the Inlet, 18% at the Middle, and 7% at the Outlet (Appendix I Table 182), where water depth was notably higher than at upstream stations.

Community Composition

Benthic invertebrate taxonomic composition varied widely among the three wetland stations (Figure 25). Oligochaeta were predominant and Mollusca were common at the Inlet and Middle stations. Chironomidae, Oligochaeta, and Mollusca were predominant at the Outlet station, in roughly equal proportions. These taxa are common in areas of slow flowing water, fine sediment, and abundant organic matter (Barbour et al. 1999).

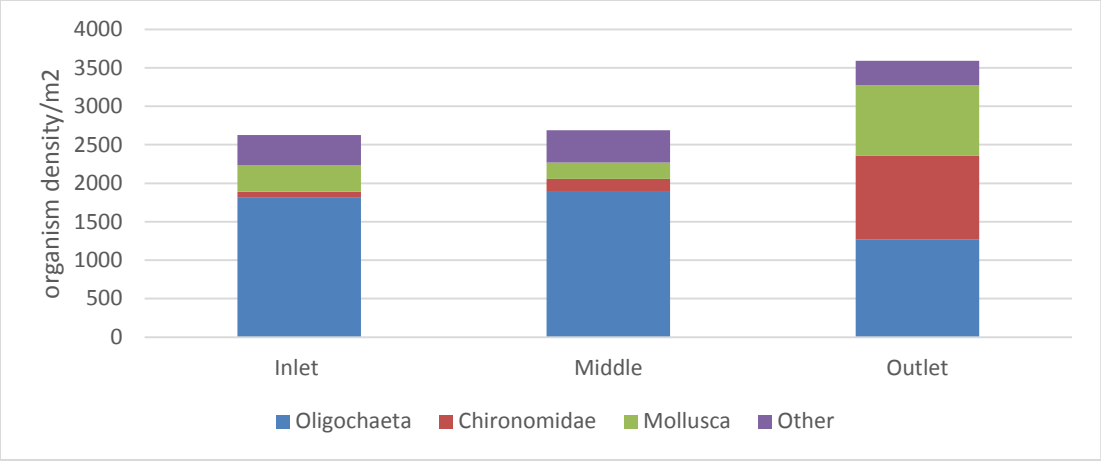


Figure 25: Average Density of Common Taxa in the Lower Wetland, 2016

The most common taxa were Diptera (mainly non-biting midges of the family Chironomidae, including *Polypedilum* and *Tanytarsus*), Oligochaeta (aquatic worms, mainly Lumbriculidae and Tubifinae), and Mollusca (mainly freshwater clams of the family Pisidiidae, including *Sphaerium* and *Pisidium*).

Density

Density of benthic invertebrates in the Lower Wetland samples ranged from 981 to 6,984 organisms/m^2, with mean values ranging from 2,626 to 3,521 organisms/m^2 (Table 34). Mean density was higher at the Outlet than at Inlet and Middle stations. Variability was higher at the Outlet (five replicate samples) than at the Inlet (three replicates) and Middle (three replicates). Five replicates were analyzed at the Outlet due to high observed variability in the first three replicates analyzed.

Table 34: Benthic Invertebrate Density in the Lower Wetland, 2016

Station	Number of Samples	Density (organisms/m^2)			
		Minimum	Maximum	Mean	Standard Deviation
Inlet	3	1,847	3,117	2,626	47
Middle	3	2,309	3,117	2,636	29
Outlet	5	981	6,984	3,521	193

Taxon Richness

Taxon richness was calculated at the lowest practical level (genus where possible) and ranged from 5 to 18 per sample, with a mean of 10 to 12 taxa per station (Table 35). Mean taxon richness was lowest at the Inlet, intermediate at the Middle, and highest at the Outlet station. Taxon richness calculated as total number of taxa per site (Table 35) increased downstream, from 19 (Inlet), to 28 (Middle), to 37 (Outlet). The increase in richness with distance downstream may be due to habitat differences among stations or to recruitment with distance downstream.

Table 35: Taxon Richness in the Lower Wetland, 2016

Station	Number of Samples	Taxon Richness (organisms/sample)				Total Taxa per Site
		Minimum	Maximum	Mean	Standard Deviation	
Inlet	3	5	13	10	4	19
Middle	3	9	18	14	5	28
Outlet	5	7	18	12	4	37

Diversity

Simpson's Diversity Index was calculated at the lowest practical level (genus where possible). Mean diversity ranged from 0.52 to 0.75 (Table 36). A value of 1 indicates maximum diversity. Diversity was lowest at the Middle (0.52) and highest at the Outlet (0.75).

Table 36: Simpsons Diversity Index in the Lower Wetland, 2016

Station	Number of Samples	Diversity			
		Minimum	Maximum	Mean	Standard Deviation
Inlet	3	0.37	0.77	0.63	0.22
Middle	3	0.37	0.74	0.52	0.20
Outlet	5	0.63	0.84	0.75	0.08

Evenness

Simpson's Evenness Index was calculated at the lowest practical level (genus where possible). Evenness ranges from 0 to 1, with a low value indicating predominance of one or a few species and high values indicating relatively equal numbers of individuals belonging to each species. Evenness ranged from 0.09 to 0.64, with mean values of 0.32 at the Inlet, 0.18 at the Middle, and

0.39 at the Outlet sites (Table 37). This reflects the predominance of a few taxa at each station, particularly for the Middle station.

Table 37: Simpsons Evenness Index in the Lower Wetland, 2016

Station	Number of Samples	Evenness			
		Minimum	Maximum	Mean	Standard Deviation
Inlet	3	0.31	0.33	0.32	0.01
Middle	3	0.09	0.25	0.18	0.08
Outlet	5	0.21	0.64	0.39	0.17

10.5 Summary for Wetland Stations

Benthic Invertebrate samples from the Lower Wetland contained a range of organisms typical of slow flowing water and fine sediment (Barbour et al. 1999), with Chironomidae, Oligochaeta, and Mollusca most abundant. The wetland sites were similar in overall composition, aside from greater abundance of Chironomidae and Mollusca and lower abundance of Oligochaeta at the deeper Outlet station compared to the shallower Inlet and Middle stations. The differences in density, taxon richness, evenness and diversity were not assessed statistically, given the differences in replicate samples analyzed per station, but results suggest that mine water is not adversely affecting benthic communities. General conditions (water depth, % TOC) differed notably for the Outlet compared to the Inlet and Middle stations and likely contributed to the differences in benthic communities among stations.

11.0 Summary and Watershed Health Evaluation

The Quinsam River is the major watercourse in the watershed. It flows into and out of Middle Quinsam Lake and into and out of Lower Quinsam Lake (Appendix XI, Figure 1). The Iron River, a large tributary, enters the Quinsam River upstream of Lower Quinsam Lake. The main human activities in the watershed are the Quinsam Coal mine, logging, water diversion for hydro-electric generation, and, near the mouth, a federal salmon hatchery. Several salmonid species occur throughout the watershed.

The study lakes (Appendix XI, Figure 1) varied in their exposure to mine-related discharges: Gooseneck Lake is the reference lake; No Name Lake is upstream of most of the mine discharges, but receives some inputs; Long Lake and Middle Quinsam Lake receive surface

water discharges and groundwater seepage; and Lower Quinsam Lake is downstream of mine discharges.

The study lakes differ notably in physical characteristics, which make distinguishing natural vs. mine-related influences on the aquatic communities challenging:

- No Name Lake is relatively shallow (maximum depth of 14 m) and has a surface area of 0.2 km^2. It is fed by water that has travelled through an extensive wetland area upstream of the inlet; sediment is typically sand with silt and little clay, with TOC levels of 11 to 19%.While close to historical mine activities in the South Mine area, the lake is mainly unaffected by mine discharges; pH is often naturally lower than the BC WQG of 6.5.

- Long Lake is deep (maximum depth of 20 to 21 m), long (surface area of 0.15 km^2), receives inputs from No Name Lake, and has a residence time of 72 to 178 days (Kangasniemi 1989)[32]. The Long Lake outlet flows through a stream into Middle Quinsam Lake. Sediment is typically sand with silt and little clay, and with 11 to 15% TOC. Hypolimnetic waters often become anoxic during summer and early fall. A geological fault through the middle of Long Lake is a divide between sedimentary and volcanic bedrocks. The lake receives mine-related inputs from sediment pond discharges and groundwater seeps.

- Middle Quinsam Lake has a maximum depth of 15 m with a surface area of 0.76 km^2, receives inputs from the upper Quinsam River at its inlet and from Long Lake near its outlet, and has a residence time of 17 to 38 days (Kangasniemi 1989). Sediment is typically sand with silt and little clay, and with 12 to 17% TOC. Hypolimnetic waters often become anoxic during summer and early fall. The lake receives mine-related inputs from sediment pond discharges and groundwater seeps.

- Lower Quinsam is deep (maximum depth of 21 to 22 m), large (surface area of 1.17 km^2), and approximately 10 km downstream from Middle Quinsam Lake. Sediment is typically sand with silt and little clay, and TOC ranges from 4 to 7% TOC, lower than No Name, Long, Middle Quinsam, and Gooseneck lakes (11 to 19% TOC).

- Gooseneck Lake, used as a reference lake, is deep (maximum depth of 20 m) and has a surface area of 0.78 km^2. It drains into the Campbell River watershed. Sediment consists of sand with silt and little clay, with 13% TOC.

Effluent Permit PE-7008 requires routine monitoring of effluent, groundwater, and surface water quality, and phytoplankton and zooplankton communities in the receiving environment. There is also a requirement to monitor sediment and benthic invertebrates and to bring together results of the programs into an overall assessment of health of the Quinsam River watershed near the Quinsam Mine. Each monitoring component provides evidence that can be used to assess

[32] Kangasniemi, B. 1989. Campbell River area Middle Quinsam Lake sub-basin water quality assessment and objectives. Technical Appendix. Water Management Branch, MOE.

whether, and to what degree, discharges from the Quinsam Mine currently affects health of aquatic organisms in the lakes, Lower Wetland, and Quinsam River.

Concerns about effects of Quinsam Mine discharges on water and sediment quality in receiving environment lakes were identified in previous studies, including Nordin (2006)[33], Cullen et al. (2010)[34], Cullen and Reimer (2010)[35], Golder (2011)[36], and SLR Consultants (2015)[37]. Pre-mining conditions were described in Kangasniemi (1989). These previous studies focused on Long Lake, particularly sediment. Long Lake receives large inputs of mine-affected discharges and sediments have a greater frequency of guideline exceedances compared to lake water. Most recently, MOE retained SLR to review previous studies, assess sediment quality and potential aquatic effects in Long Lake, and develop site-specific sediment quality objectives (SQOs) for Long Lake that reflect background (pre-mining) metal concentrations (SLR 2015). The SLR study described nine metals considered chemicals of potential concern (above CCME sediment quality guidelines) for Long Lake: arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, and selenium; and developed background concentrations for these metals. PAHs were also identified as a chemical of potential concern.

The review of Long Lake sediment chemistry from prior to onset of mining (pre-1987) to 2014 identified spatial variation in concentrations of some metals: arsenic and lead increased between the inlet and outlet and arsenic, cadmium, mercury, and selenium concentrations were significantly higher in deep (more than 9.1 m depth) than shallow (less than 9.1 m depth)

[33] Nordin, R. 2006. An evaluation of the sediment quality and invertebrate benthic communities of Long and Middle Quinsam Lakes with regard to local coal mining activity.

[34] Cullen et al. 2010. An environmental investigation of the Quinsam watershed. Prepared for Canadian Water Network

[35] Cullen, W. and D. Riemer. 2010. Interim report to the Quinsam Coal Environmental Technical Review Committee: Update on three studies: Long Lake seep sampling, Long term mussel monitoring program and cage mussel experiment.

[36] Golder Associates. 2011. 2010 integrated Long Lake sediment assessment, interpretive report. Prepared for Hillsborough Resources Limited by Golder Associates.

[37] SLR Consulting Ltd. 2015. Sediment quality, toxicity, and bioavailability review with background assessment based on current knowledge of sediment dynamics and interpretation of pre and post mining sediment concentrations and distribution. Long Lake at Quinsam Coal Mine, Campbell River BC. Prepared for BC Ministry of Environment by SLR, Vancouver BC.

sediments (SLR 2015). Based on the studies reviewed, SLR concluded the following for Long Lake:

- Background concentrations (and SQOs) are higher than CCME PELs for arsenic, iron, and manganese; higher than ISQGs for cadmium, chromium, and copper; and lower than ISQGs for lead and nickel. Background concentrations were not determined for mercury due to potential for cross-contamination in samples, or for selenium due to lack of baseline data.
- Coal mining activities have not resulted in increased concentrations of cadmium, chromium, copper, iron, lead, and mercury in Long Lake sediments.
- Concentrations have increased over time for nickel (throughout the lake), manganese (middle part of the lake), and arsenic (eastern part of the middle lake).
- The naturally occurring anoxic or low DO conditions in the hypolimnion of Long Lake from summer into fall result in a change in redox conditions at the sediment-water interface, often resulting in increased concentrations of iron, manganese, and arsenic in deep waters of the lake.
- Laboratory sediment toxicity test results from Golder (2011), indicated some toxicity, but this could not be attributed to a particular location or "effect gradient" within Long Lake, so could not be used to distinguish whether effects were due to natural conditions or mining activities. The exception was sites downstream of the Seep, which had elevated iron and arsenic concentrations, and presented a more obvious source of toxicity.
- Benthic invertebrate community assessments at inlet, outlet, north, and south shorelines, seeps, and deep habitats (Golder 2011) also could not confirm whether observed differences in abundance and taxon richness were associated with mining activities.
- Fish tissue data (rainbow and cutthroat trout collected by MOE in 2007) in No Name, Long, Middle Quinsam, and Upper Quinsam lakes indicated elevated mercury levels in fish from all four lakes (unrelated to mining) and arsenic, manganese, and lead concentrations two times higher in Long Lake than in the other three lakes. Note: there are no tissue consumption guidelines for these metals.

Arsenic levels, sources (natural vs. anthropogenic) and bioavailability in the Quinsam watershed, including Long Lake, were examined by Cullen et al. (2010) and Cullen and Reimer (2010). The authors determined that Long Lake sediment composition did not resemble potential sources of arsenic at Quinsam Mine (settling ponds, drainage channels, coal). They concluded that arsenic in Long Lake did not come from waste rock piles or coal handling but that the Seep and possibly other groundwater sources could be major sources of arsenic in lake sediments, along with weathering and oxidation of arsenic in rock formations in the watershed (including waste rock at the mine). Groundwater monitoring programs conducted by QCC indicate elevated dissolved arsenic levels in wells placed in 'shallower' Dunsmuir Member sandstones, particularly in the area

of the #4 coal zone in the North and 7-South mining areas, associated with natural geological sources (QCC 2017[38] and Lorax 2011[39]). Monitoring of the Long Lake Seep indicates arsenic and iron levels have decreased since 2011and arsenic and manganese levels in seep water have been below WQGs since 2011 (Section 7.2.3), indicating this previously identified metal source is not currently of concern.

Cullen (2010) assessed arsenic bioavailability in lake sediments using physiologically based metal extraction. The tests mimic extraction of arsenic in the human gastrointestinal system. The results indicated that arsenic bioavailability is similar among the lakes in the Quinsam watershed (Cullen 2010). However, the SLR (2015) review suggested that it would have been more relevant to extract arsenic using acids and enzymes more typical of sediments and benthic invertebrates. As a result, SLR (2015) concluded the Cullen (2010) test results did not provide a good measure of arsenic bioavailability to benthic invertebrates.

The previous studies and monitoring conducted by QCC for Permit PE 7008, have found elevated concentrations of sulphate and various metals in Long Lake water and elevated metals in the sediment of Long Lake and other lakes in the area. However, the previous studies have not been able to establish cause and effect relationships between mining activities, metal concentrations and effects on the aquatic communities (Golder 2011, SLR 2015). The current study provides further investigation into potential influence of mine operations on environmental conditions in the Quinsam River watershed.

[38] Quinsam Coal 2016-2017 Annual Groundwater Monitoring Report. Submitted to Ministry of Energy and Mines and Ministry of Environment

[39] Lorax Environmental and Enterprise Geoscience Services Ltd. (2011). Appendix I 4 South Mine Groundwater Evaluation. In Mine Permit (C-172) Amendment Appendices K-N (Vol. Volume 4, pp. 4-1, 4-12, 4-13, 4-13, 4-35, 5.3,6-47, 6-55). Burnaby, B.C.

11.1 SUMMARY OF WATER QUALITY RESULTS FOR RECEIVING ENVIRONMENT

Water samples were collected from No Name, Long, Middle Quinsam, and Lower Quinsam lakes in three 5 in 30 day sampling periods at 1 m, 4 m, 9 m, and 1 mb (Section 8). Samples were also collected according to this schedule at three stations in the Quinsam River. Conductivity and sulphate are indicators of mine-affected discharges and increased between the inlets and outlets of Long Lake and Middle Quinsam Lakes (Section 8.2.2).

In the three sampling periods in 2016, water quality in the lakes generally met BC WQGs (Appendix I, Table 3):

- In spring, the only WQG exceedances were:
    - Sulphate in Long Lake deep water (9 m and 1 mb), with a maximum just above the WQG of 128 mg/L
    - pH in No Name Lake deep water (9 m and 1 mb), just below the WQG of 6.5
- In summer, the following WQG exceedances were reported:
    - DO in deep water below the site specific WQO of 3 mg/L in Middle Quinsam and Lower Quinsam lakes (low in all four lakes)
    - Sulphate at or below the WQG (highest at Long Lake at 1 mb)
    - Total and dissolved iron above WQGs in deep water of Lower Quinsam Lake
- In fall, the following WQG exceedances were reported:
    - Sulphate in Long Lake at 1 mb (average of 131 mg/L), just above the WQO
    - Manganese in Long Lake (just above the WQG on two occasions, maximum of 1 mg/L compared to WQG of 0.8 mg/L)
    - Dissolved aluminum in No Name Lake and Lower Quinsam Lake (just above the WQG of 0.05 mg/L) at various depths.

Water monitoring results indicate generally good water quality in the lakes, with sulphate the main parameter associated with mine discharges, and present just above the WQG in deep water of Long Lake. The sulphate WQO was derived conservatively for the Quinsam Lake system, as defined in the permit, using hardness at the upstream river station WA (notably lower than in Long Lake). Sulphate concentrations in Long Lake do not suggest potential for adverse effects to aquatic life. The low magnitude exceedances of WQGs for other parameters (e.g., pH, dissolved aluminum, total and dissolved iron, and manganese) are typically associated with natural conditions and do not suggest potential for adverse effects on aquatic life.

Long, Middle Quinsam, and Lower Quinsam lakes naturally develop low DO levels in deep water (hypolimnion) during the summer, and the low DO levels extend into the fall sampling period. In fall of 2016, DO levels in deep water of Long Lake were higher and concentrations of iron and manganese at the sediment-water interface (1 mb depth) were lower than in previous years. This was likely influenced by the unusually high precipitation and water levels in fall 2016. As noted by SLR (2015) and earlier studies, low oxygen levels near the sediment-water interface can result in increased mobilization of iron, manganese and arsenic, which are sensitive to fluctuations in reducing and oxidizing (redox) conditions. In 2016, however, there were only rare, low magnitude exceedances of WQGs for iron and manganese in deep water of Long Lake and none for arsenic. In Long Lake, sediment arsenic levels were elevated above PELs but in 2016, concentrations in water were at least ten times lower than the WQG of 0.005 mg/L at all depths sampled.

The 2016 water quality results for the four sampled lakes were consistent with those reported in recent years (Quinsam Coal 2016 and earlier reports)[40] and reflect the high level of compliance with permit conditions for sediment ponds and discharges at mine infrastructure. There was a higher number of permit exceedances at mine site monitoring stations in 2016, related to elevated TSS during times of high precipitation events (Section 7).

At the three Quinsam River sites upstream and downstream of Quinsam Mine, sulphate and conductivity were indicators of mine-related inputs. For example, mean sulphate increased from 1.33 mg/L at WA (upstream of Middle Quinsam Lake and mine related inputs) to 28.6 mg/L at WB and 29.0 mg/L at QRDS (downstream of Middle Quinsam Lake and mine related inputs), and remained at 29.0 mg/L at 7SQR (further downstream of mine influences). Conductivity and total metals concentrations showed similar spatial trends. However, there were only infrequent exceedances of WQGs (Appendix I, Table 3): arsenic at 7SQR (one date during summer) and zinc at QRDS (one occasion during spring, considered an outlier).

The water quality monitoring results for lakes, Quinsam River, and at the mine site indicate overall compliance with permit requirements and do not suggest a current source of concern for aquatic biota in the receiving environment.

11.2 SUMMARY OF SEDIMENT QUALITY RESULTS FOR RECEIVING ENVIRONMENT

[40] Quinsam Coal. 2016. Quinsam Coal Annual Water Quality Monitoring Report 2015-2016. Report prepared by Quinsam Coal

Sediment samples were collected in fall 2016 from Inlet, Deep, and Outlet stations in No Name, Long, Middle Quinsam, and Lower Quinsam lakes, Seep stations in No Name, Long, and Middle Quinsam lakes, and one Deep station in Gooseneck Lake (Section 9). Sediment in the lakes consisted mainly of sand and silt. TOC levels were high (11 to 19%) in all lakes except Lower Quinsam (4 to 7%). Sampling depths varied among stations and reflected bathymetry at each location (e.g., inlet sampling depth ranged from 1 to 2 m in Middle Quinsam Lake to 14 to 17 m in Lower Quinsam Lake). Many samples from deep waters contained visible signs of iron deposits (red or orange streaks or hue) and a mild anoxic odour, indicating reducing conditions.

PAH concentrations were measured in the sediment samples and compared to guidelines for total PAH and individual PAH parameters. Mean total PAH concentrations were below the BC sediment guideline of 4.0 mg/kg; levels were low in Gooseneck (0.27 mg/kg), No Name (up to 0.03 mg/kg), Middle Quinsam (up to 0.11 mg/kg), and Lower Quinsam Lake (up to 0.41 mg/kg) and higher in Long Lake (up to 2.8 mg/kg in Deep and Seep samples). There were exceedances of ISQGs for 2-methylnaphalene, naphthalene, and phenanthrene in samples from all five lakes. Total PAH levels reflected an association with Quinsam Mine operations in Long Lake, but not Middle Quinsam Lake, although the maximum total PAH and individual PAH concentrations would not be expected to result in adverse effects on aquatic biota.

Metal concentrations were compared to CCME ISQGs and PELs (CCME 2017[41]) and to SQOs developed for Long Lake (SLR 2015). “The ISQG reflects the concentration below which adverse biological effects are expected to occur rarely. The PEL defines the level above which adverse effects are expected to occur frequently.” (CCME 2001). However, site-specific conditions should be considered in evaluating these generic guidelines as background concentrations may be elevated, particularly in mining areas, and organisms may be adapted to existing conditions. The SQOs provide this site-specific context for metals with concentrations higher than the generic guidelines.

There were numerous guideline exceedances both in lakes unaffected by mine activities (i.e., background or baseline conditions) and in mine-affected lakes. Cadmium, chromium, copper, mercury, and nickel were present at concentrations above ISQGs but below PELs at many stations. While cadmium, chromium, copper, and mercury concentrations did not appear to be

[41] Canadian Council of Ministers of Environment (CCME). 2017. Canadian Environmental Quality Guidelines. Available at: http://ceqg-rcqe.ccme.ca/en/index.html

related to mine activities, nickel concentrations have increased over time in Long Lake and Middle Quinsam Lake. As noted by SLR (2015) and considering the small magnitude guideline exceedances and conservatism in the guidelines, concentrations of all these metals are below levels that suggest a toxicity concern for aquatic biota.

The main metals of concern are arsenic, iron, and manganese. Concentrations of these metals were higher than PELs at stations in four of the lakes, and as a result, suggest a potential risk of adverse effects to aquatic biota. Sediment concentrations of these metals in 2016 were generally in the previously reported range (summarized in SLR 2015). The exception is No Name Lake Deep samples, which had notably higher concentrations of all three metals than previously reported (SLR 2015).

Mean arsenic concentrations were higher than the PEL of 17 mg/kg in all stations from, Long, Lower Quinsam, and Gooseneck lakes, in all stations from No Name Lake except the outlet and were higher than the ISQG of 5.9 mg/kg but below the PEL at all stations in Middle Quinsam Lake and the outlet of No Name Lake (Figure 26). Mean concentrations ranged up to 160 mg/kg, highest at Long Lake Deep, and were also elevated at No Name Deep. Samples from Long Lake were lower than the SQO of 927 mg/kg developed by SLR (2015). Arsenic concentrations were lowest in Middle Quinsam Lake (above the ISQG but not the PEL).

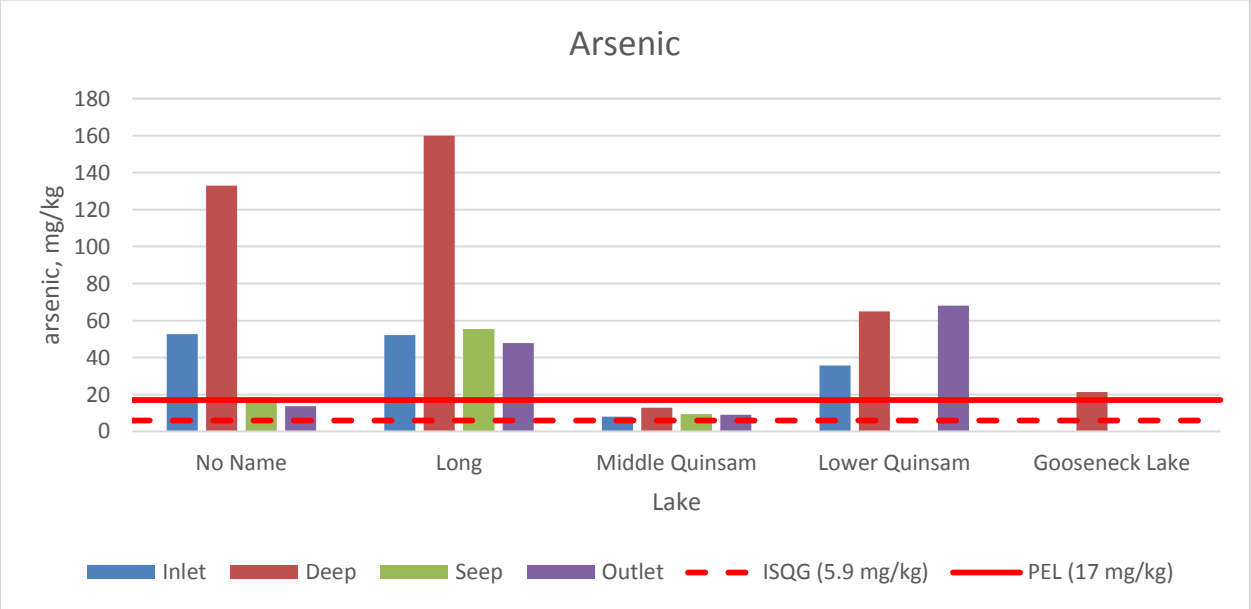


Figure 26: Mean Arsenic Concentrations in Sediment, Quinsam Lakes System, 2016 (Long Lake SQO = 927 mg/kg for whole lake, 89 mg/kg in west lake, and 1046 in east lake)

Mean iron concentrations were higher than the PEL of 43 766, mg/kg at the Inlet and Deep stations from No Name, at all stations except the Inlet from Long Lake and all stations from, Lower Quinsam Lake. All stations in Middle Quinsam and Gooseneck Lakes had concentrations higher than the ISQG of 21,200 mg/kg but below the PEL (Figure 27). Mean concentrations ranged up to 173,000 mg/kg, highest at No Name Lake Deep, and were also elevated in Long Lake Deep. Samples from Long Lake stations were lower than the SQO of 155,000 mg/kg developed by SLR (2015). Iron concentrations were lowest in Middle Quinsam and Gooseneck lakes (above the ISQG but not the PEL).

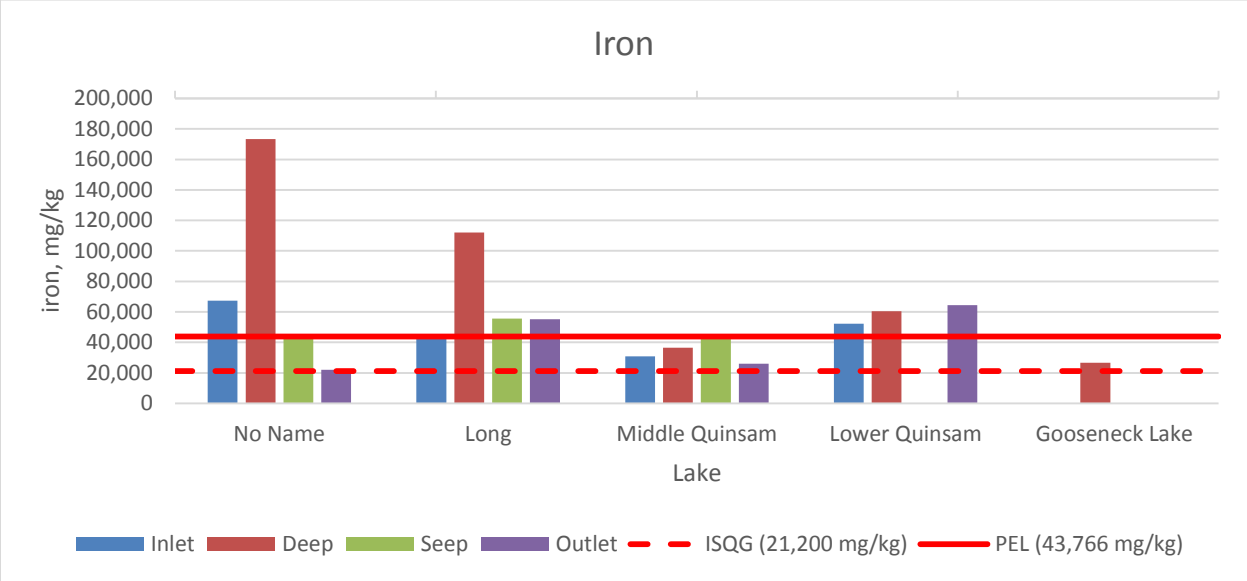


Figure 27: Mean Iron Concentrations in Sediment, Quinsam Lakes System, 2016 (Long Lake SQO = 155,000 mg/kg

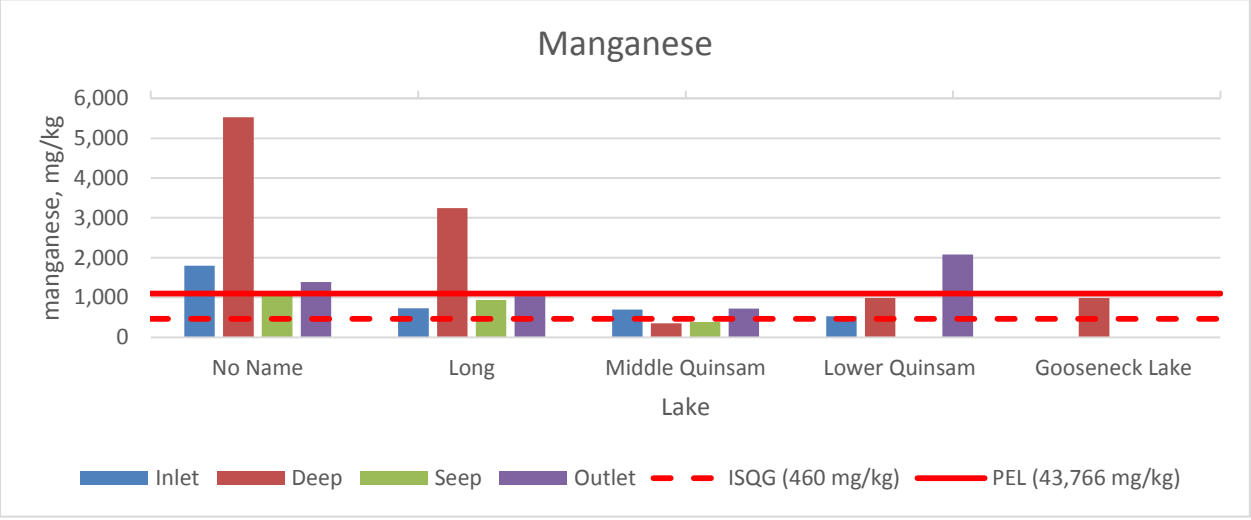


Figure 28: Mean Manganese Concentrations in Sediment, Quinsam Lakes System, 2016 (Long Lake SQO = 2,040 mg/kg)

Mean manganese concentrations were higher than the PEL of 1,100 mg/kg in three stations from No Name Lake (Inlet, Deep and Seep), Long Deep and Lower Quinsam Outlet, and were higher than the ISQG of 460 mg/kg but below the PEL at all stations in Middle Quinsam, Long Lake Inlet Seep and Outlet, Lower Quinsam Inlet and Deep, and Gooseneck Deep (Figure 28). Mean concentrations ranged up to 5,528 mg/kg, highest at No Name Lake Deep, and were also elevated in Long Lake Deep. Samples from Long Lake Deep were above the SQO of 2040 mg/kg developed by SLR (2015). Manganese concentrations tended to be lowest and near or below the ISQG in Middle Quinsam Lake.

With concentrations of arsenic, iron, and manganese higher than PELs at several stations, these metals are of potential concern for adverse effects on aquatic biota. However, in many cases, the concentrations cannot be directly attributed to discharges and seepage from Quinsam operations. Additional considerations are the naturally elevated levels measured in Long Lake prior to mining (current levels are below the SQOs for arsenic and iron, but not manganese), No Name, Lower Quinsam, and Gooseneck lakes, and the lower concentrations in Middle Quinsam Lake, which does receive mine inputs.

SLR (2015) concluded that the elevated iron concentrations in sediment, along with a distinct red tinge at the sediment surface of several lakes, support the theory that iron dissolves and migrates into the water column at times of favourable redox conditions (lower oxidative-reductive potential and lower DO). During times of favourable redox conditions, particulate iron as Fe^{3+} in sediment is reduced to the more soluble Fe^{2+} and migrates into the water column.

11.3 SUMMARY OF PHYTOPLANKTON RESULTS FOR LAKES

Phytoplankton were sampled at 1 m depth three times a year (spring, summer, fall) in No Name, Long, Middle Quinsam, and Lower Quinsam lakes (Section 10.1). This sampling approach has been used consistently since 2013. Chlorophyll *a* and total phytoplankton abundance data collected between 2013 and 2016 were statistically similar among the four lakes but differed among sampling years ($p<0.05$, GLMM, ANOVA), indicating year to year variability (Section 10.2).

The low chlorophyll *a* levels measured in all four lakes in 2016 and historically reflect ultra-oligotrophic conditions (mean concentrations less than 1 µg/L, maximum less than 2.5 µg/L) of these lakes (Vollenweider and Kerekes 1982).

The phytoplankton communities in all four lakes have a small bloom in the spring and fall and have a predominance of small flagellates (chrysophytes and cryptophytes) throughout the year. The blue-green bacterium *Merismopedia* sp. was common in No Name Lake during summer 2016, as noted since sampling began in that lake in 2013. The presence of *Merismopedia* in No Name Lake but not the other lakes may be associated with runoff from the surrounding wetland areas. This is the main difference in composition of surface water samples noted since 2013.

In 2016, taxon richness was similar among the four lakes, and was higher in spring and summer (25 to 34 taxa) than in fall (8 to 19 taxa).

Phytoplankton results for 2016 were consistent with those of previous years, and do not suggest adverse effects on phytoplankton communities in Long or Middle Quinsam lakes, both of which receive direct inputs of mine-affected water.

11.4 SUMMARY OF ZOOPLANKTON RESULTS FOR LAKES

Zooplankton are sampled in a vertical tow from surface to 10 m depth three times a year (spring, summer, fall) in No Name, Long, Middle Quinsam, and Lower Quinsam lakes (Section 10.2). This approach has been used consistently since 2014.

In 2016, zooplankton abundance was highest in the spring (Long Lake) or summer (No Name, Middle Quinsam, Lower Quinsam) and lowest in the fall. Abundance tended to be highest in Long Lake, intermediate in No Name and Lower Quinsam Lake, and lowest in Middle Quinsam Lake during spring and summer. Taxon richness was also higher in the spring and summer than in the fall, ranging from 6 to 14 taxa per sample.

Zooplankton abundance and community composition has varied among lakes and seasonally from 2014 through 2016. In general, zooplankton abundance is highest for summer samples following peaks in phytoplankton and organic matter. However, there are exceptions, when numbers peak in spring or fall. There were statistically significant differences ($p<0.05$, GLMM and ANOVA) in abundance among lakes, but not among years, with highest mean abundance reported for Long Lake, followed by Lower Quinsam Lake, then No Name and Middle Quinsam lakes. Similarly, there were statistically significant differences ($p<0.05$, GLMM and ANOVA) in taxon richness among lakes, but not between years (higher mean richness at No Name Lake than at Long, Middle Quinsam, and Lower Quinsam lakes).

The zooplankton communities consisted of larger Cladocera and Copepoda, which are common prey for small fish, and smaller Rotifera, which are important recyclers of organic matter in lakes (Wetzel 2001). Predominant taxa varied among lakes. During times of peak abundance in 2016, No Name contained mainly Copepoda and Cladocera (summer peak); Long Lake contained mainly Rotifera (spring peak) and Cladocera (summer peak); and Middle Quinsam and Lower Quinsam lakes contained mainly Cladocera and Copepoda (summer peaks).

The differences in abundance, taxon richness, and composition indicate that general lake characteristics (e.g., grazing by fish, timing of phytoplankton blooms) affect the zooplankton community. There was no evidence of adverse effects of mine-related discharges on the zooplankton of Long and Middle Quinsam lakes, given that maximum abundance is typically reported in Long Lake, typical zooplankton taxa are present in all four lakes, and taxa that provide prey for fish are abundant.

11.5 SUMMARY OF BENTHIC INVERTEBRATE RESULTS FOR LAKES

Benthic invertebrate communities are commonly used to monitor aquatic environments, due to their sensitivity to environmental stressors and ability to reflect site conditions over a long period of time (Barbour et al. 1999; Environment Canada 2012). In the current study, benthic invertebrates are particularly useful for evaluating watershed health and ecological relevance of the observed elevated arsenic, iron, and manganese concentrations in sediment.

Benthic invertebrate samples were collected in fall 2016 from Inlet, Deep, and Outlet stations in No Name, Long, Middle Quinsam, and Lower Quinsam lakes, Seep stations in No Name, Long, and Middle Quinsam lakes, and one Deep station in Gooseneck Lake (Section 10.3.1). Sediment samples were also collected and analyzed at these sites.

As noted in the introduction to Section 11, habitat characteristics that influence benthic communities (substrate composition, TOC, sampling depth, anoxic conditions in deep water) varied among the lakes, and were related to differences in large morphology (bathymetry, hydrology) and the surrounding landscape. For example, sampling depth varied among lakes for a given habitat type (inlet sampling depth ranged from 1 to 2 m in Middle Quinsam Lake to 14 to 17 m in Lower Quinsam Lake). Substrate in all four lakes tended to be mainly sand with silt and with high TOC levels (11 to 19%), except in Lower Quinsam (4 to 7%). The lakes varied in their exposure to mine-related discharges: Gooseneck Lake is the reference lake; No Name Lake is upstream of most but not all mine discharges; Long Lake and Middle Quinsam Lake receive

surface water discharges and groundwater seepage; and Lower Quinsam Lake is downstream of mine discharges.

Benthic invertebrate communities were typical of British Columbia lakes. Taxa included Diptera (chironomid, ceratopogonid, and chaoborid midges), Ephemeroptera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisflies), Oligochaeta (aquatic worms), Odonata (dragonflies), Gastropoda (snails and bivalves), and others. Chironomidae (non-biting midges) were predominant at most stations. Chaoboridae (phantom midges), which tolerate very low DO levels, were predominant or common at Middle Quinsam and Lower Quinsam Deep stations. Ephemeroptera, Plecoptera, and Trichoptera (EPT) were most common at Inlet and Outlet stations, where habitat is more diverse than at Deep stations. Pisidiidae (clams) were present in all lakes and did not appear strongly associated with particular habitat types. Table 38 provides a summary of differences among lakes and habitat types.

Table 38: Summary of Lake Benthic Community Metrics

Habitat Type	Community Metric			
	Density	Taxon Richness	Evenness	Diversity
Inlet	High impact (Long and Middle Quinsam) differed from low impact (No Name) and medium impact (Lower Quinsam), but differences between pairs were small	No significant differences among lakes.	High impact (Long and Middle Quinsam) differed from low impact (No Name) but not medium impact (Lower Quinsam),	Diversity lower at high impact (Long and Middle Quinsam) than at low (No Name) and medium (Lower Quinsam).
	Middle Quinsam > No Name and Long > Lower Quinsam	Long > No Name, Middle Quinsam and Lower Quinsam	No Name and Lower Quinsam > Long and Middle Quinsam	No Name > Long, Middle Quinsam and Lower Quinsam
Deep	Differed between high impact (Long, Middle Quinsam, No Name) and medium (Lower Quinsam)/low impact (Gooseneck),	Higher for low impact Gooseneck Lake (mean of 18) than medium and high impact lakes (mean of 8 to 14)	Low impact (Gooseneck) differed from medium and high impact lakes	No significant differences among lakes
	No Name > Lower Quinsam and Gooseneck > Long and Middle Quinsam	Gooseneck > No Name > Long and Middle Quinsam > Lower Quinsam	Long and No Name > Gooseneck, Lower Quinsam and Middle Quinsam	Gooseneck and No Name > Long > Middle Quinsam > Middle Quinsam
Seep	No significant difference for shallow seeps (Middle Quinsam) compared to shallower stations (Lower Quinsam Outlet). Significant differences for deep seeps (No Name and Long) compared to Deep stations	No significant differences among lakes	Significant difference for Seep versus Shallow sites (medium differed from low and high impact). No significant differences for deep Seeps (Long and No Name) compared to Deep stations	No significant differences for Seep vs. Shallow stations. Significant difference for Seep versus deep stations (high impact differed from low impact).
	Long > Middle Quinsam > No Name	No Name > Middle Quinsam > Long	Long > Middle Quinsam and No Name	No Name > Middle Quinsam > Long
Outlet	No significant differences among lakes	No significant differences among lakes	No significant differences among lakes	No significant differences among lakes
	Middle Quinsam > Long > No Name and Lower Quinsam	Middle Quinsam > Lower Quinsam > No Name and Long	Lower Quinsam and Long > Middle Quinsam and No Name	Lower Quinsam, Long, and Middle Quinsam > No Name

NOTE:
Statistical significance ($p<0.05$) determined using GLMM or non-parametric tests (Appendix V-5).

Inlet stations had significant differences between lakes for density, diversity, and evenness (high impact Long and Middle Quinsam differed from medium impact Lower Quinsam Lake and low impact No Name Lake) but not for taxon richness. The Lower Quinsam Inlet station was deeper than at the other lakes, had lower density and taxon richness, and resembled Deep stations rather than other Inlet stations. The Middle Quinsam Inlet was shallower than at the other lakes, and had higher invertebrate density than the other Inlet stations. With the large differences in habitat conditions (sampling depth, % TOC), and varying trends for community metrics, it was not possible to distinguish whether sediment metal concentrations or mine discharges are having an adverse effect on benthic communities of Long and Middle Quinsam Lakes at the Inlet stations.

For Seep stations, trends among sites were challenging to identify, given the variation in water depths, mine influence, and the lack of a low or medium impact Seep stations for comparison (all Seep stations were considered high impact). Benthic invertebrate density and evenness were highest at the 12 to 16 m deep Long Lake station, intermediate at the 1.0 m deep Middle Quinsam station, and lowest at the 5.6 m deep No Name station. Taxon richness and diversity had the opposite trend, and were highest at No Name, intermediate at Middle Quinsam, and lowest at Long Lake stations. As noted in Section 7.2.3, arsenic, manganese and iron concentrations at the Long Lake Seep have decreased in recent years, with many concentrations below the WQGs.

Seep invertebrate communities compared to those at Deep station had a significant difference in density (high differed from low but not medium impact stations). Seep invertebrate communities compared to those at shallow stations had a significant difference in diversity (medium impact differed from both high and low impact stations). Long Lake Seep had lower invertebrate richness and diversity than other Seep stations and then Long Lake Deep. However, the Long Lake Seep benthic community did not appear adversely affected by groundwater seepage, given that density was higher than other Seep stations and Long Lake Seep had similar taxonomic composition to Long Lake Deep. For the shallow Middle Quinsam Seep, there were few significant differences when compared to other shallow sites (only for evenness). The Middle Quinsam Seep community composition was similar to Inlet and Outlet stations in Middle Quinsam Lake and there was a high proportion of pollution sensitive EPT taxa at the Seep. These are indications of a lack of adverse effect at the Seep.

Outlets had no significant differences among the lakes for benthic invertebrate density, taxon richness, evenness, or diversity. Indicating that overall mine influences within a lake are not adversely affecting the invertebrate communities at the Outlets.

Of the four types of habitat sampled, Deep habitats are less influenced by the differences in morphology (bathymetry, wetland influence) that were found at the Inlet, Outlet, and Seep stations. Deep sediments are also less disturbed by annual flushing of the lakes, and may provide a more stable, long-term repository for metals.

Benthic invertebrate communities at the Deep stations had statistically significant differences in density (lower at high impact Long and Middle Quinsam than medium and low impact No Name, Lower Quinsam, and Gooseneck stations), taxon richness and diversity (lower at high and medium than low impact stations), with evenness showing no significant differences among stations. These invertebrate community characteristics in Long and Middle Quinsam Deep stations suggest adverse effects or stresses on the benthic communities. The results do not indicate the stress is mine-related, given that arsenic, iron, and manganese concentrations in sediment are among the highest reported for the study lakes in Long Lake but are not elevated in Middle Quinsam Lake, and that the metals concentrations in Long Lake sediment are naturally elevated.

11.5.1 *Summary of benthic invertebrate results for Quinsam River*

Benthic invertebrate communities in rivers are commonly used to monitor aquatic effects, given their sensitivity to environmental conditions and ability to reflect site conditions over a long period of time (Barbour et al. 1999; Environment Canada 2012). In the current study, they are particularly useful for evaluating watershed health and ecological relevance of differences in water and sediment chemistry observed in the Quinsam River. The use of the reference condition approach (RCA) to biomonitoring allows comparison of benthic invertebrate communities both within the Quinsam River watershed and to other watercourses in the 2010 BC Coastal RCA dataset.

The Quinsam River was sampled at three locations in September 2016: WA upstream of Middle Quinsam Lake (reference), QRDS1 downstream of Middle Quinsam Lake, and 7SQR, downstream of all mine influences and upstream of Lower Quinsam Lake. Results presented in Section 10.3.2 indicate that the three stations support typical riffle communities of benthic

invertebrates, including predominance of organisms that require clean, high DO water (EPT taxa) and similar taxon richness and high diversity at the three stations.

The RCA model results for the three Quinsam River sampling sites (mildly divergent from the reference condition) and individual metrics (family richness, EPT richness, EPT predominance) indicate that the three sampling stations do not show signs of adverse effects from mine-related discharges. The Quinsam River supports a variety of insect taxa that indicate clean water conditions and provide abundant prey for fish.

11.6 CONCLUSION

Water in lakes of the Quinsam River watershed near Quinsam Mine and in the Quinsam River itself is generally of good quality, meeting WQGs and WQOs on most sampling dates. Sulphate remains slightly higher than the WQO in deep water (9 m and 1 mb) of Long Lake. Low DO levels in deep waters are common during summer and early fall in all four lakes and the reference Gooseneck Lake, which can result in mobilization of arsenic, iron, and manganese. Concentrations of these metals in deep water were lower in 2016 than in earlier years. No Name, Long, Middle Quinsam, and Lower Quinsam lakes support phytoplankton communities typical of ultra-oligotrophic conditions and distinct zooplankton communities in each lake that provide typical prey for fish. There were no indications of adverse effects of mine discharges on the plankton communities of lakes (density, taxonomic richness, composition).

Sediment in the study lakes contains elevated levels of several metals. Arsenic, iron, and manganese concentrations are higher than PELs in Long Lake, which is affected by mine discharges, and in some areas of No Name and Lower Quinsam lakes, which have notably lower mine influence than Long Lake. However, concentrations of these metals are lower than the PELs (albeit higher than ISQGs) in sediment of Middle Quinsam Lake, which receives the majority of mine discharges. The sediment data for these lakes indicate the influence of limnological conditions (morphology, residence time of water), localized geology and groundwater quality on concentrations of arsenic, iron, and manganese. The results of this 2016 study and earlier reports (summarized in SLR 2015) illustrate the challenges attributing the elevated arsenic, iron, and manganese concentrations in lake sediments to Quinsam Mine operations. There are naturally elevated concentrations in the reference Gooseneck Lake, in relatively unaffected No Name and Lower Quinsam lakes, and in the pre-mining database for Long Lake. Currently, arsenic, iron, and manganese levels in Long Lake sediment are below the SQOs developed to reflect pre-mining background conditions (SLR 2015), suggesting current levels in Long Lake do not reflect a mine influence.

While levels of arsenic, iron, and manganese are low in discharges from the mine, they can be elevated in groundwater seeps entering Long Lake (Golder 2011, Cullen 2011, SLR 2015). However, seep monitoring conducted since 2011 has shown a notable decline in concentrations of these metals (Section 7.2.3), and groundwater monitoring indicates naturally elevated concentrations in wells established in the Dunsmuir rock formation. The presence of anoxic or suboxic conditions in lake deep waters during the summer and early fall (which develop naturally in the study lakes) leads to conditions where metals that are sensitive to changes in the redox

environment can be mobilized and enter the deep waters of the lakes. The amount of mobilization varies from year to year: in 2016, there were only rare and low magnitude WQG exceedances for iron in Long Lake. However, in earlier years, the concentrations of iron and manganese were higher in Long Lake and Lower Quinsam Lake. Results of this 2016 study and earlier studies, summarized in SLR (2015) cannot conclusively identify a mine-related source for these metals in Long Lake, aside from possible localized sources from seeps, in addition to naturally elevated levels observed in other lakes in the watershed.

With concentrations of arsenic, iron, and manganese above the PELs in some lakes, there is a concern for potential aquatic toxicity, particularly for benthic invertebrates that inhabit the sediment, regardless of whether the metals come from natural or mine-related sources. Effects on benthic invertebrate communities were evaluated through sediment toxicity tests (Golder 2011) and benthic invertebrate community assessments (Nordin 2006, Golder 2011, the 2016 study).

Results of standard laboratory toxicity tests of Long Lake sediment on growth of the amphipod *Hyalella azteca* and chironomid larva *Chironomus tentans* did not identify consistent trends for toxicity results, except in localized areas around the seep(s), an effluent discharge location on the shore of Long Lake, and in two of four samples of deep sediment (Golder 2011). Taken together, the samples from inlet, outlet, near shore and deep areas of Long Lake showed no obvious relationship between contaminant concentration and survival and growth of the test species, aside from the localized effects noted above (Golder 2011).

Results of the 2016 lake benthic invertebrate community study were generally similar to previous studies (Nordin 2006, Golder 2011). The inlets and outlets of No Name, Long, Middle Quinsam, and Lower Quinsam lakes supported diverse communities of benthic invertebrates and showed some lake-specific trends related to bathymetry, morphology, and surrounding land characteristics (e.g., presence of wetlands). Differences among the lakes appeared to be related more to these differences in habitat than to differences in water or sediment quality and mine influences. Benthic invertebrate communities in deep habitats had lower density, taxon richness, and diversity in Long and Middle Quinsam lakes (greater mine influence) than in No Name, Lower Quinsam, and Gooseneck lakes (lesser mine influence lakes and reference lake). Although a link with mine operations cannot be ruled out, there was no consistent relationship between metal levels in sediment and effects on benthic communities (high metals in Long, No Name, and Lower Quinsam lake vs. low levels in Middle Quinsam Lake), especially because sediment concentrations are naturally elevated in these lakes.

The benthic invertebrate community sampling in the Quinsam River, conducted using the CABIN protocols and assessed using the reference condition approach, also did not provide signs of adverse effects from mine-related discharges. The stations upstream (WA) and downstream (QRDS1 and 7SQR) were ranked similarly as mildly divergent from the reference condition (undisturbed coastal BC rivers and streams) and contained mainly insect taxa that indicate clean water conditions and provide abundant prey for fish (mayflies, stoneflies, and caddisflies).

In conclusion, the 2016 benthic invertebrate and sediment quality study conducted for Quinsam Mine added to the body of knowledge about the watershed. Results of the lake surveys indicated no adverse effects on phytoplankton and zooplankton communities in Long and Middle Quinsam Lakes. Results for benthic communities were less conclusive, indicating reduced abundance and diversity in Deep habitats of Long and Middle Quinsam lakes, but it was not possible to attribute this to a mine-related effect; interpretation of results was confounded by the influence of naturally elevated background levels of sediment metals and the challenges finding sampling areas with similar habitat characteristics in all five lakes. Differences among lakes for either Inlet or Outlet habitats were minor, suggesting overall effects on lake benthic communities are limited and localized. The river sampling program provided the most definitive information about watershed health, with the three sampling stations upstream and downstream of the mine showing similar results (mildly divergent from the reference conditions), and not indicating a mine-related effect downstream of the Quinsam Mine. In lakes and the Quinsam River, benthic invertebrate organisms typical of the habitats sampled were present, and would provide prey sources for fish.

11.7 RECOMMENDATIONS

The following recommendations for future monitoring programs are made:

- Add analysis of nutrients (total and dissolved phosphorus, ortho-phosphate, nitrate, nitrite, ammonia, total Kjeldahl nitrogen) to the lake water monitoring program, to support evaluation of the oligotrophic status of the lakes and to provide background data should changes in arsenic loadings to the lakes occur in the future (relationship between arsenic mobilization in sediment/water interface, DO levels in deep water, and increase in trophic status and organic matter loading to sediments).
- Consider additional monitoring of seep areas in Long Lake to assess success of mitigation measures implemented in recent years. Further characterize habitat, and, sediment water quality conditions at the No Name and Middle Quinsam Seeps.

12.0 CLOSING

Water quality in the Middle Quinsam Sub-Basin remained consistent with previous years and is considered to be in good condition with little appreciable impacts associated with coal mining. The majority of parameters of concern were below Provincial guideline and objective levels indicating minimal health risk to sensitive aquatic receptors. For example, sulphate concentrations were recorded below its respective guideline during all sampling events in three out of four lakes sampled; this trend signifies water management features and controls at the mine site are effective.

This year, Quinsam experienced permit limit exceedances for TSS in the North and at 7-South mostly attributed to precipitation events. However, during all events TSS levels recorded were not detectable at downstream monitoring sites and, therefore, not considered detrimental to the receiving environment. Quinsam was diligent in monitoring the downstream receiving environment and the results demonstrated that the risk to aquatic receptors was minimal.

Faulty equipment causing missing discharge data was replaced and remedial measures were developed and implemented to mitigate future occurrences and ensure compliance with effluent permit conditions. These include:

- A new ISCO automated composite sample was purchased for 7SSD
- Hard power was brought to 7SSD and Settling Pond #4 ensuring power at all times
- A new Signature flow meter was purchased for Settling #4 discharge
- Frequent site inspections
- Reduced pumping and discharging at 7SSD

It is anticipated that these efforts will assist in reducing permit limit exceedances & data gaps throughout out 2017-18 monitoring year.

Parameters of interest and those displaying elevated concentrations in the lakes include total and dissolved iron (LQL 1mb) & total manganese (LLM 1mb) both of which are associated with anoxic concentrations at depth. Dissolved aluminum displayed elevated concentrations as a result of the flush in some lakes (NNL & LQL).

The relationship between low DO and elevated manganese in Long Lake 1 metre from bottom sample has been demonstrated in Appendix II, Graph (34). This pattern of elevated manganese at depth has become more evident since the initiation of the 5 in 30 monitoring in 2013. Previously there were occasional exceedances occurring during monthly sampling over summer and fall and all events were associated with low DO.

When surface water quality emanating from the South Water Management System is examined there does not appear to be a correlation between mine related discharge and Long Lake manganese concentrations. The only surface sampling location displaying elevated manganese is the 4-South Lower ditch (4SLO) displaying elevated but stable manganese concentrations throughout the year averaging 1.48 mg/L. Total manganese concentrations at monitoring site LLE remained well below guideline levels with an average concentration of 0.0521mg/L for the reporting year (Although, it is questionable if discharge at LLE actually impacts the LLM sampling location). The Long Lake Seeps (LLS & LLSM) had an average concertation of 0.244 mg/L with no individual monthly samples exceeding the guidelines.

However, manganese concentrations (dissolved fraction) in the historical mining zones (e.g. 2-South & 4-South) within close proximity to Long Lake were thought to be contributing to elevated manganese influencing water column concentrations through both shallow and deep groundwater in the lake. Monitoring well MW00-2 situated next to the 3S pit sampled on quarterly basis, was the only well that displayed elevated dissolved manganese concentrations averaging 2.546 mg/L. The 2-South mine pool groundwater well MW00-4 situated on the southern side of Long Lake does not display elevated manganese with average concentrations resulting in 0.005 mg/L.

Nested (deep and shallow) groundwater wells (QU10-09 D & S) situated across from the 4-South mine and developed to capture any seepage emanating from the mine are low as well, averaging 0.092 mg/L and 0.398 mg/L for deep and shallow, respectively. The host rock formations and anoxic conditions are believed to be cause of the elevated manganese in Long Lake. Sediment results displayed elevated concentrations collected from the deep sampling location on Long Lake averaging 3,240 mg/kg. In comparison No Name Lake deep site manganese sediment concentrations averaged 5,520 mg/kg but water quality in the deep sampling site does not show elevated concentrations. This is likely because the lake does not experience anoxic conditions and does not readily leach from the sediment.

Quinsam anticipates that the efforts invested into the reclamation projects will continue to contribute to improved water quality in Long Lake. This will be determined over the next few years as vegetation starts to become established within the area and concentrations of parameter loading start to decline.

Once again depth profiling has resulted in low pH conditions exceeding lower water quality guidelines of 6.0 observed in No Name Lake during all seasons and Long Lake during fall. However, there is little concern as the slightly acidic conditions are likely naturally occurring.

The Iron River was added to the receiving environment monitoring program during the 2014/2015 monitoring period as a result of the 7-South Area 5 mine approval. This development has been postponed until the demand for thermal coal increases. This system experiences naturally elevated concentrations (above water quality guidelines) of aluminum and arsenic; aluminum is present throughout the system (i.e. from IR1 through IR8) whereas arsenic is primarily detected below the sandstone unit of the Dunsmuir member contact represented by monitoring location IR6. These parameters have continued to be observed throughout 2016-17 monitoring in this system with less frequent exceedances of arsenic during low flow sampling. The main intention is to develop water quality objectives reflective of baseline conditions.

Quinsam Coal will continue to focus on site wide water management with a target of mitigating parameter of interest concentrations in the receiving environment. To date, Quinsam has demonstrated that the existing mine related controls and features implemented have been effective at reducing concentrations of certain parameters (e.g. sulphate). This trend is expected to persist and will be highlighted by future monitoring programs.

In closing, Quinsam trusts the information herein addresses the environmental responsibilities and provisions applicable to effluent permit PE: 7008 specifically section 4.2.7 iii).

This report has been reviewed by an appropriate qualified professional as signed below. Should you have any questions or concerns please contact the undersigned at Quinsam Coal Environmental Department 250-286-3224 Ext 225.

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Appendix I

Appendix I
List of Tables

Table 1	Description of Effluent, In-Mine Releases & Receiving Environment Monitoring Sites
Table 2	Summary of Permit Limit Exceedances & Permit Non-Compliances (April 1st, 2016 through March 31st, 2017)
Table 3	Summary of Water Quality Guideline Observations at Receiving Monitoring Locations
	North Mine - Weekly / Monthly In-Mine Releases Surface Water Quality Monitoring
Table 4	Settling Pond #4 Permitted Decant for the North Mining Operation (WD)
Table 5	2-North Pit Sump CCR Water Cover (WP)
Table 6	2-North Portal Sump Effluent (2NPS)
Table 7	Culvert, at Middle Quinsam Lake Road (WC)
Table 8	South Dyke Sump (SDS)
	Seep Monitoring North Mine Operation
Table 9	Seep Near Plant (PDS)
Table 10	Groundwater / Surface Water from 2N Area at Road (PDSR)
	South Mine - Weekly / Monthly In-Mine Releases Surface Water Quality Monitoring
Table 11	Settling Pond # 1 - Permitted Decant for South Mining Operation (SPD)
Table 12	Long Lake Seep Passive Treatment System (LLSTS) Settling Pond Effluent (SPEFF)
Table 13	LLSTS and Settling Pond #1 Combined Discharge, Bio cell Downstream (BDS)
Table 14	2 South Pit in Pit Water Cover - CCR Water Cover (2S)
Table 15	3 South Pit- South Pit Main Sump Water - CCR Water Cover (3S)
Table 16	3 South 77 Adit Pit- Exploration pit from 1977 (3S77)
Table 17	4 South Lower- Culvert Downstream of Access Road (4S-LO)
Table 18	South Pit Culvert- Culvert, downstream of Settling Pond #1 discharge (SPC)
	Initial Zone of Dilution for South Mining Operation
Table 19	Long Lake Entrance - Last wetland prior to entering Long Lake near the outlet - IDZ (LLE)
	Seep Monitoring South Mine Operation
Table 20	Seep into Long Lake (LLS)
Table 21	Middle Seep into Long Lake (LLSM)
	7-South Mining Area
Table 22	7 South Surface Decant - Permitted discharge location for the 7-South Mining Operation (7SSD)
	Initial Zone of Dilution for 7-South Mining Operation
Table 23	Stream 1 - Downstream of the 7SSD discharge, prior to entering the Lower Wetland Outlet (IDZ) (7S)
Table 24	Stream 1 - Average Water Quality Compared to (5 in 30) Average Water Quality Guidelines (IDZ) (7S)
	Total Suspended Solid Results From Settling Ponds
Table 25	Settling Pond # 4 - Daily Total Suspended Solid Results (WD)
Table 26	Settling Pond # 1 - Total Suspended Solid Results (SPD)
Table 27	7-South Surface Decant - Total Suspended Solid Results (7SSD)
	Discharge from Settling Ponds - Water Quantity & 7S Dilution Ratio
Table 28	Discharge from Settling Pond # 4 (April - September, 2016)
Table 29	Discharge from Settling Pond # 4 (October 2016 - March, 2017)
Table 30	Discharge from Settling Pond # 1 (April 1st, 2016 - March 31st, 2017)
Table 31	Discharge from Settling Pond # 1 (October 2016 - March, 2017)
Table 32	Discharge from 7-South Surface Decant (April 1st, 2016 - March 31st, 2017)
Table 33	Dilution Ratio: 7S vs 7SSD Discharge (April-October 2016)
Table 34	Dilution Ratio: 7S vs 7SSD Discharge (November 2016 -March 2017)
	Weekly Sulphate Results & Rolling Averages
Table 35	Weekly Sulphate Results at WD, SPD, SPEFF & BDS
Table 36	Weekly Sulphate Results & Rolling Averages at LLE & LLO
Table 37	Biweekly and Weekly TSS Results From WC, SPC, SPEFF and BDS
	Weekly Field Conductivity (us/cm) & pH Measurements
Table 38	Field Conductivity (us/cm) & pH (North Mine Area & 7-South)
Table 39	Field Conductivity (us/cm) & pH (South Mine Area)
Table 40	Field Conductivity (us/cm) & pH (Rivers & Wetland)
	Quality Control Quality Assurance For Water Quality
Table 41	Relative Percent Difference Values Greater Than 20%
Table 42	Sample Blanks

Appendix I
List of Tables

	Precipitation Results (mm)
Table 43	Daily Precipitation (mm)
	6 Year 2011-2017 Summary Statistics
Table 44	2011-2012 Statistics
Table 45	2011-2012 Statistics
Table 46	2012-2013 Statistics
Table 47	2012-2013 Statistics
Table 48	2012-2013 Statistics
Table 49	2012-2013 Statistics
Table 50	2012-2013 Statistics
Table 51	2013-2014 Statistics
Table 52	2013-2014 Statistics
Table 53	2013-2014 Statistics
Table 54	2013-2014 Statistics
Table 55	2013-2014 Statistics
Table 56	2013-2014 Statistics
Table 57	2014-2015 Statistics
Table 58	2014-2015 Statistics
Table 59	2014-2015 Statistics
Table 60	2014-2015 Statistics
Table 61	2014-2015 Statistics
Table 62	2014-2015 Statistics
Table 63	2015-2016 Statistics
Table 64	2015-2016 Statistics
Table 65	2015-2016 Statistics
Table 66	2015-2016 Statistics
Table 67	2015-2016 Statistics
Table 68	2015-2016 Statistics
Table 69	2016-2017 Statistics
Table 70	2016-2017 Statistics
Table 71	2016-2017 Statistics
Table 72	2016-2017 Statistics
Table 73	2016-2017 Statistics
Table 74	2016-2017 Statistics
	Middle Point Barge Loading Facility
Table 75	Middle Point Barge Loading Facility
	Physical Water Quality from Lakes-Depth Profiling
Table 76	No Name Lake Depth Profiling (NNL)
Table 77	Long Lake Depth Profiling (LLM)
Table 78	Middle Quinsam Lake Depth Profiling (MQL)
Table 79	Lower Quinsam Lake Depth Profiling (LQL)
	Receiving Environment - Lakes -5 in 30 Water Quality Monitoring
Table 80	No Name Lake 1 Metre Depth - Spring (NNL1)
Table 81	No Name Lake 1 Metre Depth - Summer (NNL1)
Table 82	No Name Lake 1 Metre Depth - Fall (NNL1)
Table 83	No Name Lake 4 Metre Depth - Spring (NNL4)
Table 84	No Name Lake 4 Metre Depth - Summer (NNL4)
Table 85	No Name Lake 4 Metre Depth - Fall (NNL4)
Table 86	No Name Lake 9 Metre Depth - Spring (NNL9)
Table 87	No Name Lake 9 Metre Depth - Summer (NNL9)

Appendix I
List of Tables

Table 88	No Name Lake 9 Metre Depth - Fall (NNL9)
Table 89	No Name Lake 1 Metre from Bottom Depth - Spring (NNLB)
Table 90	No Name Lake 1 Metre from Bottom Depth - Summer (NNLB)
Table 91	No Name Lake 1 Metre from Bottom Depth - Fall (NNLB)
Table 92	Long Lake 1 Metre Depth - Spring (LLM1)
Table 93	Long Lake 1 Metre Depth - Summer (LLM1)
Table 94	Long Lake 1 Metre Depth - Fall (LLM1)
Table 95	Long Lake 4 Metre Depth - Spring (LLM4)
Table 96	Long Lake 4 Metre Depth - Summer (LLM4)
Table 97	Long Lake 4 Metre Depth - Fall (LLM4)
Table 98	Long Lake 9 Metre Depth - Spring (LLM9)
Table 99	Long Lake 9 Metre Depth - Summer(LLM9)
Table 100	Long Lake 9 Metre Depth - Fall (LLM9)
Table 101	Long Lake 1 Metre from Bottom Depth - Spring (LLMB)
Table 102	Long Lake 1 Metre from Bottom Depth - Summer (LLMB)
Table 103	Long Lake 1 Metre from Bottom Depth - Fall (LLMB)
Table 104	Middle Quinsam Lake 1 Metre Depth - Spring (MQL1)
Table 105	Middle Quinsam Lake 1 Metre Depth - Summer (MQL1)
Table 106	Middle Quinsam Lake 1 Metre Depth - Fall (MQL1)
Table 107	Middle Quinsam Lake 4 Metre Depth - Spring (MQL4)
Table 108	Middle Quinsam Lake 4 Metre Depth - Summer (MQL4)
Table 109	Middle Quinsam Lake 4 Metre Depth - Fall (MQL4)
Table 110	Middle Quinsam Lake 9 Metre Depth - Spring (MQL9)
Table 111	Middle Quinsam Lake 9 Metre Depth - Summer (MQL9)
Table 112	Middle Quinsam Lake 9 Metre Depth - Fall (MQL9)
Table 113	Middle Quinsam Lake 1 Metre from Bottom Depth - Spring (MQLB)
Table 114	Middle Quinsam Lake 1 Metre from Bottom Depth - Summer (MQLB)
Table 115	Middle Quinsam Lake 1 Metre from Bottom Depth - Fall (MQLB)
Table 116	Lower Quinsam Lake 1 Metre Depth - Spring (LQL1)
Table 117	Lower Quinsam Lake 1 Metre Depth - Summer (LQL1)
Table 118	Lower Quinsam Lake 1 Metre Depth - Fall (LQL1)
Table 119	Lower Quinsam Lake 4 Metre Depth - Spring (LQL4)
Table 120	Lower Quinsam Lake 4 Metre Depth - Summer (LQL4)
Table 121	Lower Quinsam Lake 4 Metre Depth - Fall (LQL4)
Table 122	Lower Quinsam Lake 9 Metre Depth - Spring (LQL9)
Table 123	Lower Quinsam Lake 9 Metre Depth - Summer (LQL9)
Table 124	Lower Quinsam Lake 9 Metre Depth - Fall (LQL9)
Table 125	Lower Quinsam Lake 1 Metre from Bottom Depth - Spring (LQLB)
Table 126	Lower Quinsam Lake 1 Metre from Bottom Depth - Summer (LQLB)
Table 127	Lower Quinsam Lake 1 Metre from Bottom Depth - Fall (LQLB)
	Receiving Environment - Rivers -5 in 30 Water Quality Monitoring
Table 128	Middle Quinsam Lake Inlet-Spring (WA)
Table 129	Middle Quinsam Lake Inlet - Summer (WA)
Table 130	Middle Quinsam Lake Inlet - Fall (WA)
Table 131	Middle Quinsam Lake Outlet - Spring (WB)
Table 132	Middle Quinsam Lake Outlet - Summer (WB)
Table 133	Middle Quinsam Lake Outlet -Fall (WB)
Table 134	Long Lake Outlet - Spring (LLO)
Table 135	Long Lake Outlet - Summer (LLO)
Table 136	Long Lake Outlet - Fall (LLO)
Table 137	No Name Lake Outlet - Spring (NNO)
Table 138	No Name Lake Outlet - Summer (NNO)
Table 139	No Name Lake Outlet - Fall (NNO)

Appendix I
List of Tables

	Receiving Environment - Rivers -5 in 30 & Monthly Water Quality Monitoring
Table 140	Quinsam River Upstream of 7 South Mining Operation - Spring (QRDS1)
Table 141	Quinsam River Upstream of 7 South Mining Operation - Summer (QRDS1)
Table 142	Quinsam River Upstream of 7 South Mining Operation - Fall (QRDS1)
Table 143	Lower Wetland Outlet at the Confluence of the Quinsam River- Spring (LWO)
Table 144	Lower Wetland Outlet at the Confluence of the Quinsam River- Summer (LWO)
Table 145	Lower Wetland Outlet at the Confluence of the Quinsam River- Fall (LWO)
Table 146	Quinsam River Downstream of 7 South Mine Operation - Spring (7SQR)
Table 147	Quinsam River Downstream of 7 South Mine Operation - Summer (7SQR)
Table 148	Quinsam River Downstream of 7 South Mine Operation - Fall (7SQR)
Table 149	7-South Quinsam River - Winter (7SQR)
Table 150	Iron River Upstream of Mining Operations -Spring (IR1)
Table 151	Iron River Upstream of Mining Operations - Summer (IR1)
Table 152	Iron River Upstream of Mining Operations - Fall (IR1)
Table 153	Iron River Upstream of Mining Operations -Winter (IR1)
Table 154	Iron River Upstream of Proposed 7SA5 & Upstream of Reclaimed 242 Mine - Spring (IR6)
Table 155	Iron River Upstream of Proposed 7SA5 & Upstream of Reclaimed 242 Mine - Summer (IR6)
Table 156	Iron River Upstream of Proposed 7SA5 & Upstream of Reclaimed 242 Mine -Fall (IR6)
Table 157	Iron River Upstream of Proposed 7SA5 & Upstream of Reclaimed 242 Mine - Winter (IR6)
Table 158	Iron River Downstream of Proposed 7SA5 & Reclaimed 242 Mine - Spring (IR8)
Table 159	Iron River Downstream of Proposed 7SA5 & Reclaimed 242 Mine - Summer (IR8)
Table 160	Iron River Downstream of Proposed 7SA5 & Reclaimed 242 Mine - Fall (IR8)
Table 161	Iron River Downstream of Proposed 7SA5 & Reclaimed 242 Mine - Winter (IR8)
Table 162	Quinsam River Downstream of the Confluence with Iron River - Spring (IRQR)
Table 163	Quinsam River Downstream of the Confluence with Iron River - Summer (IRQR)
Table 164	Quinsam River Downstream of the Confluence with Iron River - Fall (IRQR)
Table 165	Quinsam River Downstream of the Confluence with Iron River -Winter (IRQR)
	Nutrient Sampling
Table 166	Nutrient Sampling for Select Rivers Sites
	Water Quality Results For Sediment & Benthic Monitoring Program
Table 167	Sediment Study Water Quality - Gooseneck Lake (GNL)
Table 168	Sediment Study Water Quality - Gooseneck Lake PAH
Table 169	Sediment Study Water Quality - Gooseneck Lake Depth Profiling
Table 170	Sediment Study Water Quality - No Name Lake (NNL)
Table 171	Sediment Study Water Quality - No Name Lake PAH
Table 172	Sediment Study Water Quality - No Name Lake Depth Profiling
Table 173	Sediment Study Water Quality - Long Lake (LL)
Table 174	Sediment Study Water Quality - Long Lake PAH
Table 175	Sediment Study Water Quality - Long Lake Depth Profiling
Table 176	Sediment Study Water Quality - Middle Quinsam Lake (MQL)
Table 177	Sediment Study Water Quality - Middle Quinsam Lake PAH
Table 178	Sediment Study Water Quality - Middle Quinsam Lake Depth Profiling
Table 179	Sediment Study Water Quality - Lower Quinsam Lake (LQL)
Table 180	Sediment Study Water Quality - Lower Quinsam Lake PAH
Table 181	Sediment Study Water Quality - Lower Quinsam Lake Depth Profiling
Table 182	Sediment Study Water Quality - Lower Wetland (LW)
Table 183	Sediment Study Water Quality - Lower Wetland PAH
Table 184	Sediment Study Water Quality - Quinsam River (QR)
Table 185	Sediment Study Water Quality -Quinsam River PAH
	Physical Parameters of Sediment Chemistry For Sediment & Benthic Monitoring Program
Table 186	Physical Parameters of Sediment Chemistry Analysis in Gooseneck Lake
Table 187	Physical Parameters of Sediment Chemistry Analysis in No Name Lake
Table 188	Physical Parameters of Sediment Chemistry Analysis in Long Lake
Table 189	Physical Parameters of Sediment Chemistry Analysis in Middle Quinsam Lake

Appendix I
List of Tables

Table 190	Physical Parameters of Sediment Chemistry Analysis in Lower Quinsam Lake
Table 191	Physical Parameters of Sediment Chemistry Analysis in Lower Wetland
Table 192	Physical Parameters of Sediment Chemistry Analysis on Quinsam River
	Summary of Sediment Metal Exceedances
Table 193	List of Standards For Sediment Quality Comparison
Table 194	Summary of Sediment Metal Exceedances - PEL , ISQG & (SQO for Long Lake)
Table 195	Summary of Sediment Metal Exceedances - PEL , ISQG & (SQO for comparison only)
Table 196	Summary of Sediment Metal Exceedances - PEL , ISQG & (SQO for comparison only)
Table 197	Summary of Sediment Metal Exceedances - PEL , ISQG & (SQO for comparison only)
Table 198	Summary of Sediment Metal Exceedances - PEL , ISQG & (SQO for comparison only)
Table 199	Summary of Sediment Metal Exceedances - PEL , ISQG & (SQO for comparison only)
Table 200	Sediment Metals Exceedances - SQO
Table 201	Sediment Metals Exceedances - SQO
Table 202	Sediment Metals Exceedances - PEL
Table 203	Sediment Metals Exceedances - PEL
	Summary of Sediment PAH Exceedances
Table 204	PAH Exceedances - ISQG &PEL
Table 205	PAH Exceedances - ISQG &PEL
Table 206	PAH Exceedances - BCASQG
Table 207	PAH Exceedances - ISQG 1% TOC Adjusted
	Results of Sediment Chemistry Analysis - Metals (ICPMS)
Table 208	Results of Sediment Chemistry Analysis in Gooseneck Lake - Metals (ICPMS)
Table 209	Results of Sediment Chemistry Analysis in No Name Lake Inlet - Metals (ICPMS)
Table 210	Results of Sediment Chemistry Analysis in No Name Lake Deep - Metals (ICPMS)
Table 211	Results of Sediment Chemistry Analysis in No Name Lake Near Seep - Metals (ICPMS)
Table 212	Results of Sediment Chemistry Analysis in No Name Lake Outlet - Metals (ICPMS)
Table 213	Results of Sediment Chemistry Analysis in Long Lake Inlet - Metals (ICPMS)
Table 214	Results of Sediment Chemistry Analysis in Long Lake Deep - Metals (ICPMS)
Table 215	Results of Sediment Chemistry Analysis in Long Lake Near Seep - Metals (ICPMS)
Table 216	Results of Sediment Chemistry Analysis in Long Lake Outlet - Metals (ICPMS)
Table 217	Results of Sediment Chemistry Analysis in Middle Quinsam Lake Inlet - Metals (ICPMS)
Table 218	Results of Sediment Chemistry Analysis in Middle Quinsam Lake Deep - Metals (ICPMS)
Table 219	Results of Sediment Chemistry Analysis in Middle Quinsam Lake Near Seep - Metals (ICPMS)
Table 220	Results of Sediment Chemistry Analysis in Middle Quinsam Lake Outlet - Metals (ICPMS)
Table 221	Results of Sediment Chemistry Analysis in Lower Quinsam Lake Inlet - Metals (ICPMS)
Table 222	Results of Sediment Chemistry Analysis in Lower Quinsam Lake Deep Site 1 - Metals (ICPMS)
Table 223	Results of Sediment Chemistry Analysis in Lower Quinsam Lake Deep Site 2 - Metals (ICPMS)
Table 224	Results of Sediment Chemistry Analysis in Lower Quinsam Lake Outlet - Metals (ICPMS)
Table 225	Results of Sediment Chemistry Analysis in Lower Wetland Inlet - Metals (ICPMS)
Table 226	Results of Sediment Chemistry Analysis in Lower Wetland Middle - Metals (ICPMS)
Table 227	Results of Sediment Chemistry Analysis in Lower Wetland Outlet - Metals (ICPMS)
Table 228	Results of Sediment Chemistry Analysis on Quinsam River at Argonaut Bridge (Upstream of Mine Influence) - Metals (ICPMS)
Table 229	Results of Sediment Chemistry Analysis on Quinsam River (Downstream of North Mining Operation) - Metals (ICPMS)
Table 230	Results of Sediment Chemistry Analysis on Quinsam River (Downstream of 7-South Mining Operation) - Metals (ICPMS)
	Results of Sediment Chemistry Analysis - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 231	Results of Sediment Chemistry Analysis on Gooseneck Lake -Polycyclic Aromatic Hydrocarbons (GCMS)
Table 232	Results of Sediment Chemistry Analysis on No Name Lake Inlet - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 233	Results of Sediment Chemistry Analysis on No Name Lake Deep - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 234	Results of Sediment Chemistry Analysis on No Name Lake Near Seep - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 235	Results of Sediment Chemistry Analysis on No Name Lake Outlet - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 236	Results of Sediment Chemistry Analysis on Long Lake Inlet - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 237	Results of Sediment Chemistry Analysis on Long Lake Deep - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 238	Results of Sediment Chemistry Analysis on Long Lake Near Seep - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 239	Results of Sediment Chemistry Analysis on Long Lake Outlet - Polycyclic Aromatic Hydrocarbons (GCMS)

Appendix I
List of Tables

Table 240	Results of Sediment Chemistry Analysis on Middle Quinsam Lake Inlet - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 241	Results of Sediment Chemistry Analysis on Middle Quinsam Lake Deep - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 242	Results of Sediment Chemistry Analysis on Middle Quinsam Lake Near Seep - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 243	Results of Sediment Chemistry Analysis on Middle Quinsam Lake Outlet - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 244	Results of Sediment Chemistry Analysis on Lower Quinsam Lake Inlet - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 245	Results of Sediment Chemistry Analysis on Lower Quinsam Lake Deep Site 1- Polycyclic Aromatic Hydrocarbons (GCMS)
Table 246	Results of Sediment Chemistry Analysis on Lower Quinsam Lake Deep Site 2 - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 247	Results of Sediment Chemistry Analysis on Lower Quinsam Lake Outlet - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 248	Results of Sediment Chemistry Analysis on Lower Wetland Inlet - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 249	Results of Sediment Chemistry Analysis on Lower Wetland Middle - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 250	Results of Sediment Chemistry Analysis on Lower Wetland Outlet - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 251	Results of Sediment Chemistry Analysis on Quinsam River at Argonaut Bridge - Polycyclic Aromatic Hydrocarbons (GCMS)
Table 252	Results of Sediment Chemistry Analysis on Quinsam River Downstream of North Mining Operation -Polycyclic Aromatic Hydrocarbons (GCMS)
Table 253	Results of Sediment Chemistry Analysis on Quinsam River Downstream of 7-South Mining Operations - Polycyclic Aromatic Hydrocarbons (GCMS)
	Quality Control Quality Assurance For Sediment Quality
Table 254	Relative Percent Difference (RPD) Sediment Values Greater Than 20%

Table 1
2016-2017 Annual Report

Description of Effluent, In-Mine Releases & Receiving Environment Monitoring Sites			
EMS ID #	**Monitoring Sites**	**Abbreviation (Station Code)**	***Type of Water (MW, FW or GW)**
	North Coal Mining Operation		
E207409	Settling Pond #4 Decant	WD	**Discharge (MW)**
E207411	Culvert, at Middle Quinsam Lake Road	WC	MW & FW
E283433	2-North Portal Sump (Adit Sump)	2NPS	MW
E207412	2-North Pit Sump CCR Cover	WP	PAG-CCR Water Cover - MW
E292126	South Dyke Sump	SDS	MW
	South Coal Mine		
E218582	Settling Pond #1 Decant	SPD	**Discharge (MW)**
E217014	Culvert, Downstream End at Access Road	SPC	MW & FW
E217015	South Pit Main Sump Water	3S	PAG-CCR Water Cover (MW & FW)
E292127	2-South Pit In Pit Water Cover (2-South Standpipe)	2S	PAG-CCR Water Cover (MW & FW)
E292128	1977 Bulk Sample Pit	3S77	MW & FW
E292129	Culvert Downstream of 4 South Access Road	4S-Lo	**MW & FW**
	7-South Mining Operation		
E292069	7-South Surface Decant	7SSD	**Discharge (MW & FW)**
E292110	7-South Adit Sump	7SPS	MW
	Seep Monitoring Sites		
E292131	Long Lake Seeps	LLS & LLSM	MW
	Small seep near the plant (PDS) & groundwater surface near road entering MQL (PDSR)	PDS & PDSR	GW & MW
	Receiving Environment Monitoring Sites - Initial Zone of Dilution (IDZ)		
Initial Dilution Zone (IDZ) Monitoring Sites			
E292130	Long Lake Entrance (South end water entering Long Lake)	LLE	IDZ
E292109	Road Crossing Bridge on Stream 1 above the Lower Wetland (Downstream of 7SSD).The site name is Stream 1, 7S.	7S	IDZ
	Receiving Water (Streams & Lakes Monitoring Sites) 5 in 30 Monitoring Locations		
North Coal Mining Operation			
E0126402	Quinsam River at Argonaut Road	WA	FW
E206618	Middle Quinsam Lake Centre	MQL (1, 4, 9 & 1m from Bottom)	FW
E0900504	Outflow from Middle Quinsam Lake	WB	FW
South Coal Mine			
E217018	No Name Lake	NNL (1, 4, 9 & 1m from Bottom)	FW
E217017	No Name Lake Outlet	NNO	FW
E206619	Long Lake at Centre	LLM (1, 4, 9 & 1m from Bottom)	FW
E219412	Long Lake Outlet	LLO	FW
7-South Mining Operation (Areas 1 to 4)			
E286930	Quinsam River Upstream of 7-South Mining Operation	QRDS1	FW
E292113	Quinsam River Downstream of 7-South Mining Operation	7SQR	FW
E292112	Lower Wetland Outlet at the confluence of the Quinsam River	LWO	FW
E292118	Lower Quinsam Lake Centre	LQL (1, 4, 9 & 1m from Bottom)	FW
7-South (Proposed) Area 5 Mining Operation			
E297230	Iron River upstream of mining operations	IR1	FW
E297231	Iron River upstream of 7SA5	IR6	FW
E297232	Iron River downstream of 7SA5 and 242 inputs	IR8	FW
E299256	Quinsam River downstream of confluence with Iron River	IRQR	FW
E292118	Lower Quinsam Lake Centre	LQL (1, 4, 9 & 1m from Bottom)	FW
Block 242 Mining Operation (Reclaimed / Not Monitored)			
E225798	Iron River upstream of the 242 influence	Not Monitored	FW
E225808	Iron River downstream of the 242 influence	Not Monitored	FW
N/A	Old portal sump used for collection of water from underground	Reclaimed	FW / GW
Middle Point Barge Loading Facility PE: 17181			
E17181	Middle Point	MP	Surface runoff
Long Lake Seep Passive Treatment System			
N/A	Groundwater well (2-South Mine Pool) Influent to the treatment system	QU11-11 (INF-EFF)	MW
N/A	Bio Cell Reactor	BCR-EFF	MW
N/A	Sulphide Polishing Cell	SPC-EFF	MW
N/A	Aeration Lagoon	AL-EFF	MW
N/A	Settling Pond Effluent	SP-EFF	**Discharge MW**
Authorization to Bypass the Works			
N/A	Sampling location 35 m downstream of discharge from the treatment system (SP-EFF) and Settling Pond #1. Discharge is compared to SPD permit limits.	BDS	**Discharge MW**
*** MW= Mine Water, FW= Freshwater, GW =Groundwater IDZ = Intial Dilution Zone**			

Table 2
2016-2017 Annual Report

SUMMARY OF PERMIT LIMIT EXCEEDANCES & PERMIT NON-COMPLIANCES (April 1st, 2016 through March 31st, 2017)

EMS ID	Site Name	Permit Limit Exceedance (P) or Non-Compliance (PNC)	Parameter	Result (mg/L)	Requirement	Date	Non-Compliance Reason	Ratio of events
Authorization to bypass the works	**Bio cell Downstream (BDS)**	**P**	**P-D**	0.0608	0.03	Apr. 4th	Spill report number is **DGI 160152**.	Permit limit was exceeded on (1/12) monthly sampling events.
E218582	**Settling Pond #1 (SPD)**	**PNC**	**TSS**	Missing Daily Composite TSS	Daily Composite	Nov. 9th	Sample was collected but spilled in transit to the lab.	Missing (2/138) required daily composite TSS samples.
						Feb. 22nd	Sampler error, composite sample was working but samples were not collected.	
E207409	**Settling Pond #4 (WD)**	**P**	**TSS**	Results Ranging From (29.0 to 58.5)	25 mg/L	Oct. 23 & Nov. 4th to 13th & Jan 22nd & 30th	TSS was elevated due to extreme storm events & dewatering 2-North Mine, spill & non-compliance reports were submitted **(DGI 162161, DGI 162328 & DGI 162403 & DGI 163158 & 163326).**	Permit limit was exceeded on 13 events.
		PNC	**TSS**	Missing Daily Composite TSS	Daily Composite	Apr. 2nd-3rd	Equipment error, distributer arm malfunctioned on composite sampler. Non-compliance report submitted April 18th, 2016.	Missing (4/308) required daily composite TSS samples.
						Feb. 21st & 22nd	Sampler error, composite sample was working but samples were not collected.	
		Used to calculate fees	**Annual Average Authorized Rate of Discharge**	Annual Average Rate of Discharge was 0.1079 m^3/s	Authorized Annual Average Rate of Discharge 0.08 m^3/s	April 1, 2016 through March 31, 2017	Extreme storm events lead to excessive dewatering on surface and in 2-North Mine. There is no environmental risk associate with this clause. It is for permit fee calculation purposes only.	Average authorized rate of discharge was exceeded by 878,959 m^3 or 34.8%.
		PNC	**Continuous Discharge**	Missing 29 days of Continuous Flow.	Continuous Flow	May 30th - Jun. 6th & Oct. 31st through Nov. 20th.	Flow meter malfunctioned erasing continuous flow data. The instrument reset itself to factory settings during download. Field observations & spot measurements were recorded from the flow meter during Q3. New flow meter was purchased & non-compliance reports were submitted June 27th & December 1st, 2016, respectively.	Missing continuous discharge data for (29/365) days required.
E292069	**7-South Settling Pond Decant (7SSD)**	**P**	**TSS**	27.3 & 35.0	25 mg/L	Oct. 7 & Oct. 16th	2 events, spill & non-compliance reports were submitted **(DGI 162073)**	Permit limit was exceeded on 2 events.
		PNC		Missing Daily Composite TSS	Daily Composite	Oct. 14th & Oct 15th	Equipment malfunction of composite sampler. New sampler purchased. Non-compliance report was submitted.	Missing (3/21) daily composite TSS samples required.
		PNC				Jan. 17, 2017	Pipe cracked due to freezing conditions. Discharged 25.1625 m3, (0.29 L/s) for approximately 24 hours.	
E207412	**WP**	**PNC**	**TSS**	Missing Parameter (TSS)	Required monthly	Mar. 29, 2017	Missing (1/12)TSS samples required monthly. Sampler error when filling out chain of custody.	(1/12) TSS samples
Q4 - MISSED SAMPLES DUE TO DANGEROUS SAMPLING CONDITIONS								
E207412	**WP**	N/A	All required parameters	No Results	Required monthly	Feb. 2017	Snow and ice made it dangerous for sample collection and access.	Missing (1/12) required monthly samples.
E292113	**7SQR**							
E297230	**IR1**							
E297231	**IR6**							
E297232	**IR8**							
E299256	**IRQR**							

Table 3
2016-2017 Annual Report

SUMMARY OF WATER QUALITY GUIDELINE OBSERVATIONS AT RECEIVING MONITORING LOCATIONS

EMS ID & Site Name	Site Code & Depth	Parameter	Units	Guideline Limit	Result	Date	Guideline	Sampling Events Exceeding Guideline
E217018 - No Name Lake (NNL)	NNL 7-11 metres	pH-F	pH	6.5	6.16 to 6.47	Apr. 14th, 28th & May 11th	Min	(13/55) Depths profiled during spring
	NNL 7-11 metres				5.79 - 6.49	Summer 5 in 30	Min	(15/58) Depths profiled during summer
	NNL 1-12 metres				5.35 - 6.49	Oct. 27th, Nov. 3rd & 9th	Min	(31/63) Depths profiled during fall
	NNL 1 metre	Al-D	mg/L	0.05	0.0519	Fall 5 in 30	A	Average fall 5 in 30 was exceeded at 1 metre, 4 metre and 9 metre depths
	NNL 4 metre				0.0526			
	NNL 9 metre				0.0511			
E217017 - No Name Lake Outlet (NNO)	NNO	Al-D	mg/L	0.05	0.0521	Fall 5 in 30	A	Fall 5 in 30
E206619- Long Lake Middle (LLM)	LLM 1-20.6 metres	pH-F	pH	6.5	5.83 - 6.44	Oct. 27th, Nov. 3rd & 9th	Min	(68/102) Depths profiled during fall
	LLM 9 metre	SO4-D	mg/L	128	133	Spring 5 in 30	A	Spring 5 in 30 at 9 metres
	LLM 1 metre from bottom (LLMB)				134	Spring 5 in 30	A	Spring 5 in 30 at 1 metre from bottom
					131	Fall 5 in 30	A	Fall 5 in 30 at 1 metre from bottom
	LLMB	Mn-T	mg/L	0.8	0.998 & 1.02	Oct. 27th & Nov. 3rd	M	(2/5) Fall Sampling Events
E206618- Middle Quinsam Lake (MQL)	MQL 13-13.5 metres	Hypolimnetic DO	mg/L	3 mg/L minimum June through August	0.73 & 2.73	Sept. 1st	Min	(2/13.5) depths profiled on Sept. 1st were below 3mg/L. Guideline is from Jun-Aug.
E292130 - Long Lake Entry (LLE) -Last wetland South Water Management flows into prior to entering Long Lake. Considered an initial dilution zone (IDZ)	LLE	SO4-D*	mg/L	128	Results ranged from 103 to 480	April through March, 2017	A	Sulphate exceeded Ave-WQG guideline of 128 mg/L (50/52) weeks using a rolling average and background hardness of 30 mg/L. Water hardness is 218 mg/L & 63 mg/L at LLE & LLM, respectively. Sulphate guideline for water hardness of soft to moderately hard water (31 mg/L -75 mg/L) is 218 mg/L. If this was applied at LLE the ratio of sulphate exceeding guideline would be (23/52) weeks.
		Fe-D	mg/L	0.35	0.595 & 0.358	Jan. 2nd & Mar. 7th, 2017	M	(2/12) Monthly sampling events. High flow conditions prevent settling of iron in the wetland. High flows cause the mixing of turbid iron-rich bottom waters of the wetland into surface water discharged at LLE.
		P-T	mg/L	0.005	0.0106	Monthly May through Sept.	A	VIO -Calculated average monthly samples from May through Sept. Monitoring is continuing (May - Sept. 2017).
				0.01	0.0113 & 0.0182	Aug. 2nd & Sept. 6th	M	(2/5) Monthly samples from May through Sept (VIO)
E286930 - Quinsam River Upstream of 7-South Mining Operation (QRDS1)	QRDS1	Zn-T	mg/L	0.0075	0.0225	Spring 5 in 30	A	Spring 5 in 30 (max. result of 0.0927 mg/L increased average. All other Zn-T results were below detection limits.
				0.033	0.0927	Apr. 12th	M	(1/5) Samples collected during spring. Maximum result may be an outlier.
E292112 - Lower Wetland Outlet at the Confluence of Quinsam River (LWO)	LWO	Al-D	mg/L	0.05	0.1446	Spring 5 in 30	A	Spring 5 in 30
				0.1	0.126, 0.103, 0.153, 0.184 & 0.157	Spring 5 in 30	M	(5/5) Spring Sampling Events
				0.05	0.0799	Summer 5 in 30	A	Summer 5 in 30
				0.1	0.128 & 0.102	Oct. 12 & Oct. 31	M	(2/5) Fall Sampling Events
				0.05	0.0767	Fall 5 in 30	A	Fall 5 in 30
		Cu-T	mg/L	0.002	0.00255	Spring 5 in 30	A	Spring 5 in 30
					0.00233	Summer 5 in 30	A	Summer 5 in 30
		Fe-D	mg/L	0.35	0.494, 0.444, 1.15, 1.640 & 1.25	Spring 5 in 30	M	(5/5) Spring Sampling Events
					0.462, 0.489, 0.536, 0.657 & 0.615	Summer 5 in 30	M	(5/5) Summer Sampling Events
		Fe-T	mg/L	1.00	1.88, 2.91 & 2.06	Apr 27th, May 3rd & 10th	M	(3/5) Spring Sampling Events
					1.110 & 1.100	Summer 5 in 30	M	(2/5) Summer Sampling Events
		TSS	mg/L	5.00	5.6	Summer 5 in 30	A	Summer 5 in 30
E292113 - Quinsam River Downstream of 7-South Mining Operation (7SQR)	7SQR	As-T	mg/L	0.005	0.00558	Aug.11	M	(1/5) Summer Sampling Events
		P-T	mg/L	0.01	0.0117	Aug.11	M	VIO- (1/4) Monthly samples from Jun - Sep
E297230 - Quinsam River Upstream of Mining Operations (IR1)	IR1	Al-D	mg/L	0.05	0.0670	Spring 5 in 30	A	Spring 5 in 30
				0.05	0.0765	Fall 5 in 30	A	Fall 5 in 30
				0.1	0.105	Oct.26	M	(1/5) Fall Sampling Events
E297231 - Iron River Upstream of 7SA5 (IR6)	IR6	Al-D	mg/L	0.05	0.0721	Spring 5 in 30	A	Spring 5 in 30
				0.05	0.109	Fall 5 in 30	A	Fall 5 in 30
				0.1	0.114, 0.147 & 0.113	Oct.18th, 26th & Nov. 10th	M	(3/5) Fall Sampling Events
E297232 - Iron River Downstream of 7SA5 & 242 Inputs (IR8)	IR8	Al-D	mg/L	0.05	0.0725	Spring 5 in 30	A	Spring 5 in 30
				0.05	0.0982	Fall 5 in 30	A	Fall 5 in 30
				0.1	0.133 & 0.101	Oct. 26th & Nov. 10th	M	(2/5) Fall Sampling Events
		As-T	mg/L	0.005	0.00556, 0.00599, 0.00803 & 0.00886	Summer 5 in 30	M	(4/5) Summer Sampling Events
E299256 - Quinsam River Downstream of the Confluence with the Iron River (IRQR)	IRQR	Al-D	mg/L	0.05	0.0587	Fall 5 in 30	A	Fall 5 in 30
E292118 - Lower Quinsam Lake (LQL)	LQL 15-16.4 metres	pH-F	pH	6.5	6.28 - 6.38	Aug. 31st	Min	(3/16.4) depths profiled on Aug. 31st
	LQL 12-16.4 metres	Hypolimnetic DO	mg/L	3 mg/L minimum June through August	0.00 - 2.81	Summer 5 in 30	Min	(22/81) depths profiled
	LQL 1 metre	Al-D	mg/L	0.05	0.0631	Fall 5 in 30	A	Fall 5 in 30
	LQL 4 metre				0.0625	Fall 5 in 30	A	Fall 5 in 30
	LQL 9 metre				0.0631	Fall 5 in 30	A	Fall 5 in 30
	LQL 1 metre from bottom (LQLB)	Al-D	mg/L	0.05	0.0641	Fall 5 in 30	A	Fall 5 in 30
		Fe-D	mg/L	0.35	0.498, 0.380 & 0.382	Aug. 3rd, 9th & 17th	M	(3/5) Summer Sampling Events
		Fe-T	mg/L	1.00	1.22, 1.15, 1.65 & 1.37	Aug. 3rd, 17th, 25th & 31st	M	(4/5) Summer Sampling Events

For all Middle Quinsam Lake Sub-basin results background hardness of 30 mg/L was used to calculate those parameters that are hardness dependent.

For Iron River results IR1 average hardness was used to calculate hardness dependent parameters. 5 in 30 average hardness concentrations = 24 mg/L for Spring, 73 mg/L Summer and 30 mg/L for Fall.

***SO4 at LLE was calculated using a rolling average.**

Table 4
2016-2017 Annual Report

EMS ID		E207409												
Site Description		Settling Pond #4		Permitted Decant for the North Mining Operation										
Site Name		WD												
Date		4-Apr-16	2-May-16	1-Jun-16	5-Jul-16	2-Aug-16	6-Sep-16	11-Oct-16	1-Nov-16	5-Dec-16	2-Jan-17	1-Feb-17	7-Mar-17	Permit Limit
Parameter	Unit													North
SO4-D	mg/L	647	968	1000	629	818	945	518	676	579	668	464	549	-
TSS	mg/L	<4.0	9.7	5.0	<4.0	<4.0	<4.0	<4.0	13.5	5.8	<4.0	-	-	25
Alk-T	mg/L	368	387	329	366	375	376	331	337	376	413	387	398	-
Acidity 8.3	mg/L	<0.50	2.72	<0.50	<0.50	<0.50	3.18	<0.50	5.60	4.20	<0.50	2.28	1.70	-
Al-T	mg/L	0.0268	-	0.0045	-	0.0058	-	0.0450	-	0.0872	-	0.0141	-	-
As-T	mg/L	0.00357	-	0.00106	-	0.00093	-	0.00133	-	0.00361	-	0.00248	-	-
Ba-T	mg/L	0.0371	-	0.0205	-	0.0213	-	0.0162	-	0.0217	-	0.0157	-	-
B-T	mg/L	0.980	-	0.981	-	1.20	-	0.686	-	0.885	-	0.799	-	-
Cd-T	mg/L	0.000013	-	<0.000010	-	<0.000010	-	<0.000010	-	0.000038	-	<0.000010	-	-
Ca-T	mg/L	144	-	224	-	167	-	96.8	-	132	-	101	-	-
Cr-T	mg/L	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	-
Co-T	mg/L	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	0.0131	-	<0.00050	-	-
Cu-T	mg/L	0.00332	-	0.00069	-	0.00081	-	0.00119	-	0.00305	-	0.00055	-	-
Hard-T	mg/L	419	-	664	-	496	-	292	-	389	-	304	-	-
Fe-T	mg/L	1.18	-	0.420	-	0.246	-	0.215	-	1.33	-	0.285	-	-
Pb-T	mg/L	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	-
Mg-T	mg/L	14.4	-	25.6	-	19.4	-	12.2	-	14.5	-	12.8	-	-
Mn-T	mg/L	0.162	-	0.0924	-	0.0090	-	0.0893	-	0.366	-	0.137	-	-
Hg-T	mg/L	<0.0000020	-	<0.0000020	-	<0.0000020	-	<0.0000020	-	<0.0000020	-	<0.0000020	-	-
Mo-T	mg/L	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	-
Ni-T	mg/L	<0.0010	-	0.0011	-	<0.0010	-	0.0017	-	0.0267	-	0.0013	-	-
K-T	mg/L	4.67	-	4.99	-	5.29	-	2.43	-	3.25	-	2.68	-	-
S-T	mg/L	255	-	366	-	334	-	179	-	208	-	172	-	-
Se-T	mg/L	<0.00010	-	<0.00010	-	<0.00010	-	0.00011	-	0.00013	-	<0.00010	-	-
Si-T	mg/L	3.56	-	2.19	-	3.04	-	3.15	-	3.39	-	3.13	-	-
Ag-T	mg/L	<0.000020	-	<0.000020	-	<0.000020	-	<0.000020	-	<0.000020	-	<0.000020	-	-
Na-T	mg/L	379	-	382	-	418	-	237	-	287	-	261	-	-
Sr-T	mg/L	1.44	-	1.98	-	1.57	-	0.887	-	1.17	-	0.878	-	-
Zn-T	mg/L	0.0402	-	<0.0050	-	<0.0050	-	<0.0050	-	0.0122	-	<0.0050	-	-
Al-D	mg/L	0.0074	-	0.0123	-	<0.0030	-	0.0215	-	0.0194	-	0.0081	-	0.5
As-D	mg/L	0.00160	-	0.00054	-	0.00083	-	0.00086	-	0.00151	-	0.00181	-	-
Ba-D	mg/L	0.0306	-	0.0179	-	0.0212	-	0.0165	-	0.0211	-	0.0155	-	-
B-D	mg/L	0.946	-	0.911	-	1.24	-	0.731	-	0.905	-	0.747	-	-
Be-D	mg/L	<0.00010	-	<0.00010	-	<0.00010	-	<0.00010	-	<0.00010	-	<0.00010	-	-
Cd-D	mg/L	0.0000090	-	<0.0000050	-	<0.0000050	-	<0.0000050	-	0.0000330	-	0.0000050	-	-
Ca-D	mg/L	123	-	201	-	174	-	97.0	-	131	-	99.4	-	-
Cr-D	mg/L	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	-
Co-D	mg/L	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	0.0126	-	<0.00050	-	-
Cu-D	mg/L	0.00045	-	0.00050	-	0.00062	-	0.00070	-	0.00095	-	0.00043	-	0.02
Hard-D	mg/L	355	-	608	-	515	-	293	-	386	-	300	-	-
Fe-D	mg/L	0.0152	-	0.0125	-	0.0180	-	0.0107	-	0.0094	-	0.0143	-	0.3
Pb-D	mg/L	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	0.05
Mg-D	mg/L	11.8	-	25.4	-	20.0	-	12.4	-	14.4	-	12.6	-	-
Mn-D	mg/L	0.141	-	0.0312	-	<0.0010	-	0.0494	-	0.362	-	0.131	-	-
Hg-D	mg/L	<0.0000020	-	<0.0000020	-	<0.0000020	-	<0.0000020	-	<0.0000020	-	<0.0000020	-	-
Mo-D	mg/L	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	-
Ni-D	mg/L	<0.0010	-	<0.0010	-	<0.0010	-	0.0015	-	0.0263	-	0.0013	-	-
K-D	mg/L	4.01	-	4.98	-	5.11	-	2.45	-	3.21	-	2.55	-	-
S-D	mg/L	246	-	360	-	329	-	178	-	213	-	174	-	-
Se-D	mg/L	<0.00010	-	<0.00010	-	<0.00010	-	<0.00010	-	0.00021	-	<0.00010	-	-
Si-D	mg/L	3.20	-	2.27	-	2.99	-	3.15	-	3.10	-	2.87	-	-
Na-D	mg/L	321	-	351	-	412	-	238	-	285	-	262	-	-
Sr-D	mg/L	1.17	-	1.95	-	1.61	-	0.874	-	1.14	-	0.887	-	-
Zn-D	mg/L	<0.0050	-	<0.0050	-	<0.0050	-	<0.0050	-	0.0085	-	<0.0050	-	0.1
O&G	mg/L	<5.0	-	<5.0	-	<5.0	-	<5.0	-	<5.0	-	<5.0	-	10

Table 5
2016-2017 Annual Report

EMS ID		E207412											
Site Description		2-North Pit Sump (WP) CCR Water Cover											
Site Name		WP											
Date		4-Apr-16	2-May-16	1-Jun-16	7-Jul-16	2-Aug-16	6-Sep-16	11-Oct-16	1-Nov-16	5-Dec-16	24-Jan-17	1-Feb-17	30/Mar/2017
Parameter	Unit												
SO4-D	mg/L	588	523	642	559	663	767	722	759	783	738		326
TSS	mg/L	<4.0	39.0	<4.0	<4.0	14.3	5.0	<4.0	17.8	<4.0	45		PNC
Alk-T	mg/L	204	256	336	364	321	353	303	271	241	311		315
Acidity 8.3	mg/L	<0.50	2.46	<0.50	<0.50	<0.50	1.84	<0.50	3.68	2.63	4.97		<0.50
Al-T	mg/L	0.0293	0.0726	0.0074	0.0086	0.0242	0.0479	0.0565	0.1010	0.0433	0.5800		0.0239
As-T	mg/L	0.00031	0.00072	0.0009	0.00338	0.00141	0.00188	0.00104	0.00026	0.00029	0.00377		0.00249
Ba-T	mg/L	0.021	0.021	0.026	0.025	0.023	0.025	0.019	0.018	0.016	0.029		0.0180
B-T	mg/L	0.728	0.684	0.905	1.000	1.120	1.130	0.909	0.850	0.654	0.930		0.674
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000011	<0.000010	0.000156	0.00014	0.000046		0.000012
Ca-T	mg/L	195	121	137	106	119	142	132	156	191	239		85.6
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0021		<0.0010
Co-T	mg/L	0.001120	<0.00050	<0.00050	<0.00050	<0.00050	0.000730	0.00091	0.063900	0.065500	0.00236		0.00247
Cu-T	mg/L	<0.00050	0.00133	0.0006	0.00095	0.00095	0.00166	0.00094	0.00779	0.00123	0.01		0.00212
Hard-T	mg/L	600	377	417	324	366	422	395	484	585	740		261
Fe-T	mg/L	0.05	0.13	0.04	0.69	0.17	0.62	0.28	1.34	0.24	1.78		0.166
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00021		<0.00020
Mg-T	mg/L	27.3	18.1	18.2	14.3	16.9	16.4	16.0	22.8	26.1	34.8		11.4
Mn-T	mg/L	0.074	0.015	0.060	0.057	0.013	0.160	0.074	0.505	0.696	0.306		0.0825
Hg-T	mg/L	<0.0000020	0.00000	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020		<0.0000020
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010
Ni-T	mg/L	0.003	0.002	<0.0010	<0.0010	<0.0010	0.002	0.002	0.099	0.112	0.006		0.0106
K-T	mg/L	2.7	2.5	3.6	3.7	4.5	5.2	3.7	3.3	2.6	3.8		2.34
S-T	mg/L	229	184	236	211	270	303	249	264	258	314		133
Se-T	mg/L	0.00014	<0.00010	<0.00010	<0.00010	<0.00010	0.00021	0.00011	0.00029	0.00032	0.00025		0.00010
Si-T	mg/L	2.78	1.99	2.29	2.70	3.04	3.40	2.87	2.77	2.71	5.03		2.69
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	Pond was frozen. Ice cover on pond posed a significant safety risk. No sample could be collected.	<0.000020
Na-T	mg/L	168	176	287	326	359	360	307	258	194	290		208
Sr-T	mg/L	1.19	0.954	1.3	1.14	1.19	1.4	1.27	1.26	1.26	1.65		0.597
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.058700	0.045100	0.0084		0.0061
Al-D	mg/L	0.0162	0.0047	0.0138	0.0061	<0.0030	0.0071	0.0316	0.0186	0.0112	0.0069		0.0089
As-D	mg/L	0.0002	0.00065	0.00077	0.0022	0.0013	0.00106	0.00104	<0.00010	0.00019	0.00065		0.00201
Ba-D	mg/L	0.0206	0.0243	0.0227	0.0245	0.0238	0.0238	0.0171	0.0173	0.0172	0.0194		0.0178
B-D	mg/L	0.71	0.801	0.826	1.01	1.0500	1.04	0.895	0.762	0.74	0.699		0.719
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		<0.00010
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	0.0000	<0.0000050	0.0001400	0.0002	<0.0000050		<0.0000050
Ca-D	mg/L	172	136	125	105	128	142	105	160	205	168		77.5
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010
Co-D	mg/L	0.00102	<0.00050	<0.00050	<0.00050	<0.00050	0.00065	0.00061	0.06360	0.06730	0.00065		0.00113
Cu-D	mg/L	0.00031	0.00058	0.00039	0.00047	0.00073	0.00096	0.00038	0.0018	0.00263	0.00064		0.00249
Hard-D	mg/L	525	417	383	322	385	420	325	494	626	525		242
Fe-D	mg/L	<0.0050	<0.0050	0.00900	0.22900	0.04720	0.01200	<0.0050	<0.0050	<0.0050	<0.0050		0.0082
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00024	<0.00020		<0.00020
Mg-D	mg/L	23.2	19.1	17.2	14.5	15.9	16	15.0	22.9	27.4	25.8		11.8
Mn-D	mg/L	0.068	0.0087	0.0118	0.0350	0.0093	0.158	0.0312	0.505	0.749	0.144		0.0230
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020		<0.0000020
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010
Ni-D	mg/L	0.0032	0.0013	<0.0010	<0.0010	<0.0010	0.0019	0.0017	0.0977	0.117	0.0027		0.0111
K-D	mg/L	2.4900000	2.7	3.3900000	3.9400000	4.2600000	4.1500000	3.4800000	3.0700000	2.5800000	3.03		2.44
S-D	mg/L	241.0000	206.0000	223.0000	244.0000	264.0000	273.0000	242.0000	251.0000	271.0000	246		130
Se-D	mg/L	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00029	0.00034	0.00014		<0.00010
Si-D	mg/L	2.66	2.26	2.27	2.64	3.01	3.17	2.62	2.65	2.92	2.97		2.73
Na-D	mg/L	145	189	273	302	334	347	293	243	201	214		224
Sr-D	mg/L	1.18000	1.13	1.24000	1.10000	1.21000	1.33000	1.16000	1.21	1.350	1.29		0.621
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0475	0.0455	0.0074		<0.0050

Table 6
2016-2017 Annual Report

EMS ID		E283433											
Site Description		2-North Portal Sump Effluent											
Site Name		2NPS											
Date		4-Apr-16	2-May-16	1-Jun-16	7-Jul-16	2-Aug-16	6-Sep-16	11-Oct-16	1-Nov-16	5-Dec-16	2-Jan-17	1-Feb-17	7-Mar-17
Parameter	Unit												
SO4-D	mg/L	1100	1150	1070	1040	1140	747	609	1290	1250	1100	1140	1010
Alk-T	mg/L	271	323	322	320	326	226	150	283	317	302	288	281
Acidity 8.3	mg/L	7.0	12.0	1.7	5.5	4.1	8.1	<0.50	10.8	12.4	7.4	9.46	9.79
Al-T	mg/L	0.0481	0.0063	0.0069	0.0163	0.0133	0.158	0.0478	0.0779	0.0474	0.0126	0.0156	0.0269
As-T	mg/L	0.0003	0.0002	0.0002	0.0004	0.0003	0.0008	0.0002	0.0002	0.0003	0.0010	0.00093	0.00072
Ba-T	mg/L	0.0198	0.0113	0.012	0.0153	0.0163	0.0218	0.0192	0.0195	0.0133	0.0119	0.0114	0.0123
B-T	mg/L	0.875	0.882	0.884	0.944	0.985	0.773	0.466	0.874	0.764	0.879	0.810	0.894
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000027	0.000023	0.000048	<0.000010	<0.000010	<0.000010	0.000012
Ca-T	mg/L	367	298	344	319	338	230	196	380	356	256	272	293
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-T	mg/L	0.00149	0.00068	0.00067	0.0007	0.0006	0.00218	0.00254	0.00761	0.00199	0.0016	0.00171	0.00202
Cu-T	mg/L	0.00076	<0.00050	<0.00050	0.00072	<0.00050	0.00207	0.00095	0.00191	0.00055	<0.00050	0.00076	0.00050
Hard-T	mg/L	1070	878	1010	936	997	669	567	1120	1040	776	810	865
Fe-T	mg/L	0.111	0.088	0.102	0.116	0.058	0.323	0.012	0.207	0.1	0.262	0.293	0.288
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00027	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-T	mg/L	38.1	32.8	35.8	34	37.2	23.2	18.7	41.5	36.9	33.4	31.9	32.3
Mn-T	mg/L	0.192	0.106	0.115	0.127	0.0985	0.277	0.143	0.452	0.25	0.471	0.432	0.415
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ni-T	mg/L	0.004	0.0024	0.0024	0.0032	0.0031	0.0044	0.0066	0.0183	0.0046	0.0037	0.0034	0.0035
K-T	mg/L	4.97	4.37	4.19	4.16	4.8	3.69	2.5	4.64	4.28	3.87	3.43	3.99
S-T	mg/L	443	408	387	384	455	267	212	454	417	391	393	376
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00021	0.00029	0.00011	<0.00010	<0.00010	<0.00010	<0.00010
Si-T	mg/L	4.08	3.53	3.45	3.69	3.88	3.03	2.34	3.62	3.51	2.88	3.06	3.32
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Na-T	mg/L	273	239	245	255	268	163	108	241	235	247	229	217
Sr-T	mg/L	2.65	2.33	2.29	2.16	2.19	1.45	1.47	2.55	2.42	2.13	1.90	1.94
Zn-T	mg/L	0.0129	<0.0050	<0.0050	<0.0050	<0.0050	0.0157	<0.0050	0.0544	<0.0050	<0.0050	<0.0050	<0.0050
Al-D	mg/L	0.0151	0.0081	0.0033	0.0072	0.0149	0.0148	0.0333	0.031	0.0254	0.0089	0.0104	0.0130
As-D	mg/L	0.0001	0.0003	0.0002	0.0002	0.0003	0.0006	0.0002	<0.00010	0.0003	0.0006	0.00069	0.00047
Ba-D	mg/L	0.016	0.012	0.012	0.015	0.016	0.021	0.019	0.019	0.015	0.011	0.0117	0.0130
B-D	mg/L	0.895	1.05	0.838	0.947	1.05	0.714	0.524	0.819	0.947	0.885	0.765	0.820
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cd-D	mg/L	0.000015	<0.0000050	<0.0000050	0.000008	0.0000108	0.0000140	0.000017	0.0000570	0.0000240	0.000013	0.0000100	0.0000089
Ca-D	mg/L	315	353	330	296	341	230	179	371	377	250	273	284
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	mg/L	0.00122	0.00068	0.0006	0.00057	0.00057	0.00212	0.00258	0.00756	0.00216	0.00141	0.00167	0.00222
Cu-D	mg/L	0.00047	<0.00020	<0.00020	<0.00020	0.00028	0.00059	0.00071	0.001	0.00045	0.00035	0.00038	0.00044
Hard-D	mg/L	922	1030	972	888	1000	670	521	1090	1100	746	812	846
Fe-D	mg/L	0.0077	0.0221	0.0074	0.0105	0.013	<0.0050	<0.0050	<0.0050	<0.0050	0.0173	0.0060	0.0074
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-D	mg/L	32.9	36.2	36.1	36	36.5	23.4	17.7	38.9	39.2	29.5	31.8	32.9
Mn-D	mg/L	0.166	0.112	0.0995	0.116	0.103	0.297	0.139	0.443	0.278	0.427	0.435	0.448
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ni-D	mg/L	0.0033	0.0027	0.0023	0.0026	0.0033	0.0044	0.0068	0.0182	0.0052	0.0032	0.0034	0.0040
K-D	mg/L	4.41	4.42	4.26	4.38	4.48	3.19	2.3	4.24	4.38	3.55	3.57	3.96
S-D	mg/L	419	417	387	426	406	267	207	419	444	344	358	362
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00014	0.00031	0.00014	0.00010	<0.00010	<0.00010	<0.00010
Si-D	mg/L	3.88	3.70	3.59	3.37	3.74	2.86	2.31	3.45	3.81	2.90	2.97	3.05
Na-D	mg/L	229	242	242	244	255	168	106	228	250	218	236	217
Sr-D	mg/L	2.15	2.40	2.31	2.09	2.14	1.43	1.09	2.46	2.76	1.92	2.04	2.13
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0090	<0.0050	0.0505	<0.0050	<0.0050	<0.0050	<0.0050

Table 7
2015-2016 Annual Report

EMS ID		E207411											
Site Description		Culvert at Middle Quinsam Lake Road											
Site Name		WC											
Date		4-Apr-16	2-May-16	1-Jun-16	7-Jul-16	2-Aug-16	6-Sep-16	11-Oct-16	1-Nov-16	5-Dec-16	2-Jan-17	1-Feb-17	7-Mar-17
Parameter	Unit												
SO4-D	mg/L	558	910	1080	589	1010	834	482	612	538	636	529	514
Alk-T	mg/L	348	-	282	-	-	-	-	-	-	-	-	-
Acidity 8.3	mg/L	<0.50	-	<0.50	-	-	-	-	-	-	-	-	-
Al-T	mg/L	0.009	-	0.0063	-	0.0074	-	0.0191	-	0.0358	-	0.0136	-
As-T	mg/L	0.0011	-	0.0008	-	0.0010	-	0.0006	-	0.0009	-	0.0007	-
Ba-T	mg/L	0.0268	-	0.0315	-	0.0301	-	0.0123	-	0.0171	-	0.0124	-
B-T	mg/L	0.959	-	1.05	-	1.24	-	0.69	-	0.761	-	0.679	-
Cd-T	mg/L	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	0.000027	-	<0.000010	-
Ca-T	mg/L	127	-	175	-	163	-	96.8	-	114	-	97.3	-
Cr-T	mg/L	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
Co-T	mg/L	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	0.00517	-	<0.00050	-
Cu-T	mg/L	0.00068	-	<0.00050	-	<0.00050	-	<0.00050	-	0.00151	-	0.00056	-
Hard-T	mg/L	370	-	524	-	496	-	290	-	338	-	291	-
Fe-T	mg/L	0.185	-	0.105	-	0.109	-	0.039	-	0.309	-	0.132	-
Pb-T	mg/L	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-
Mg-T	mg/L	12.8	-	21.1	-	21.8	-	11.8	-	12.6	-	11.7	-
Mn-T	mg/L	0.0075	-	0.0213	-	0.0188	-	0.0075	-	0.158	-	0.0417	-
Hg-T	mg/L	<0.0000020	-	<0.0000020	-	<0.0000020	-	<0.0000020	-	<0.0000020	-	<0.0000020	-
Mo-T	mg/L	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
Ni-T	mg/L	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	0.0170	-	0.0020	-
K-T	mg/L	3.99	-	5.42	-	6.34	-	2.51	-	2.92	-	2.67	-
S-T	mg/L	217	-	380	-	421	-	175	-	185	-	180	-
Se-T	mg/L	<0.00010	-	<0.00010	-	<0.00010	-	<0.00010	-	<0.00010	-	<0.00010	-
Si-T	mg/L	3.05	-	3.57	-	6.39	-	3.21	-	2.8	-	3.13	-
Ag-T	mg/L	<0.000020	-	<0.000020	-	<0.000020	-	<0.000020	-	<0.000020	-	<0.000020	-
Na-T	mg/L	325	-	423	-	490	-	247	-	249	-	237	-
Sr-T	mg/L	1.13	-	1.88	-	1.74	-	0.889	-	0.965	-	0.894	-
Zn-T	mg/L	<0.0050	-	<0.0050	-	<0.0050	-	<0.0050	-	0.0077	-	<0.0050	-
Al-D	mg/L	0.0079	-	0.0058	-	0.0037	-	0.0156	-	0.0179	-	0.0117	-
As-D	mg/L	0.0008	-	0.0008	-	0.0010	-	0.0006	-	0.0007	-	0.0006	-
Ba-D	mg/L	0.0272	-	0.03	-	0.0289	-	0.0122	-	0.0177	-	0.0130	-
B-D	mg/L	0.96	-	0.991	-	1.24	-	0.681	-	0.869	-	0.742	-
Be-D	mg/L	<0.00010	-	<0.00010	-	<0.00010	-	<0.00010	-	<0.00010	-	<0.00010	-
Cd-D	mg/L	<0.0000050	-	0.0000070	-	<0.0000050	-	<0.0000050	-	0.0000270	-	0.0000060	-
Ca-D	mg/L	108	-	153	-	164.0	-	89.3	-	122	-	93.1	-
Cr-D	mg/L	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
Co-D	mg/L	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	0.00528	-	<0.00050	-
Cu-D	mg/L	0.00026	-	0.00028	-	<0.00020	-	0.00035	-	0.00065	-	0.0005	-
Hard-D	mg/L	316	-	467	-	493	-	269	-	361	-	284	-
Fe-D	mg/L	0.0132	-	0.0506	-	0.0393	-	0.0102	-	0.0168	-	0.0102	-
Pb-D	mg/L	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-
Mg-D	mg/L	11.3	-	20.5	-	20.2	-	11.2	-	13.6	-	12.5	-
Mn-D	mg/L	0.0062	-	0.0031	-	0.0166	-	0.0058	-	0.168	-	0.0373	-
Hg-D	mg/L	<0.0000020	-	<0.0000020	-	<0.0000020	-	<0.0000020	-	<0.0000020	-	<0.0000020	-
Mo-D	mg/L	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
Ni-D	mg/L	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	0.0189	-	0.0018	-
K-D	mg/L	3.81	-	5.30	-	5.73	-	2.4	-	2.9	-	2.69	-
S-D	mg/L	223	-	362	-	378	-	170	-	194	-	173	-
Se-D	mg/L	<0.00010	-	<0.00010	-	<0.00010	-	<0.00010	-	0.00012	-	<0.00010	-
Si-D	mg/L	2.87	-	3.53	-	6.36	-	3.23	-	3.22	-	2.89	-
Na-D	mg/L	287	-	407	-	438	-	231	-	262	-	258	-
Sr-D	mg/L	1.12	-	1.83	-	1.7	-	0.812	-	1.04	-	0.915	-
Zn-D	mg/L	<0.0050	-	<0.0050	-	<0.0050	-	<0.0050	-	0.0056	-	<0.0050	-

Table 8
2016-2017 Annual Report

EMS ID		E292126			
Site Description		South Dyke Sump - Collects seepage from tailings dam			
Site Name		SDS			
Date		4-Apr-16	7-Jul-16	11-Oct-16	24-Jan-17
Parameter	Unit		NF		
SO4-D	mg/L	1600		1380	394
Alk-T	mg/L	283		250	82.6
Acidity 8.3	mg/L	4.99		2.94	1.02
Al-T	mg/L	0.0326		0.0196	0.224
As-T	mg/L	0.00029		0.00028	0.00025
Ba-T	mg/L	0.0181		0.0318	0.0154
B-T	mg/L	0.892		0.774	0.207
Cd-T	mg/L	<0.000010		0.000048	0.000043
Ca-T	mg/L	511		464	138
Cr-T	mg/L	<0.0010		<0.0010	<0.0010
Co-T	mg/L	0.00498		0.00219	0.00247
Cu-T	mg/L	0.00133		0.00172	0.00300
Hard-T	mg/L	1530		1380	410
Fe-T	mg/L	0.056		<0.010	0.244
Pb-T	mg/L	<0.00020		<0.00020	<0.00020
Mg-T	mg/L	61		53.8	16.0
Mn-T	mg/L	0.627		0.147	0.200
Hg-T	mg/L	<0.0000020		<0.0000020	<0.0000020
Mo-T	mg/L	<0.0010		<0.0010	<0.0010
Ni-T	mg/L	0.0156		0.0123	0.0091
K-T	mg/L	5.32		4.44	2.52
S-T	mg/L	560		474	138
Se-T	mg/L	0.00025		0.00124	0.00072
Si-T	mg/L	4.55		4.33	2.55
Ag-T	mg/L	<0.000020		<0.000020	<0.000020
Na-T	mg/L	277		151	40.1
Sr-T	mg/L	2.95	SDS was dry from May through Oct	2.82	0.710
Zn-T	mg/L	<0.0050		0.0075	0.0100
Al-D	mg/L	0.0286		0.0155	0.0272
As-D	mg/L	0.00015		0.00013	0.00013
Ba-D	mg/L	0.0162		0.0285	0.0151
B-D	mg/L	0.918		0.772	0.177
Be-D	mg/L	<0.00010		<0.00010	<0.00010
Cd-D	mg/L	0.000005		<0.0000050	0.0000410
Ca-D	mg/L	430		435	134
Cr-D	mg/L	<0.0010		<0.0010	<0.0010
Co-D	mg/L	0.00439		0.00189	0.00217
Cu-D	mg/L	0.00112		0.00136	0.00144
Hard-D	mg/L	1300		1300	402
Fe-D	mg/L	0.0065		<0.0050	0.0075
Pb-D	mg/L	<0.00020		<0.00020	<0.00020
Mg-D	mg/L	55.1		52.8	16.2
Mn-D	mg/L	0.59		0.115	0.192
Hg-D	mg/L	<0.0000020		0.0000021	<0.0000020
Mo-D	mg/L	<0.0010		<0.0010	<0.0010
Ni-D	mg/L	0.0140		0.0116	0.0086
K-D	mg/L	5.14		4.33	2.45
S-D	mg/L	593		463	141
Se-D	mg/L	<0.00010		0.00113	0.00069
Si-D	mg/L	4.26		4.24	2.02
Na-D	mg/L	245		145	38.5
Sr-D	mg/L	2.83		2.62	0.705
Zn-D	mg/L	<0.0050		<0.0050	0.0079

Table 9
2016-2017 Annual Report

Site Description		Seep Near Plant								
Site Name		PDS								
Date		4-Apr-16	2-May-16	June-Sept	11-Oct-16	1-Nov-16	5-Dec-16	2-Jan-17	1-Feb-17	7-Mar-17
Parameter	Unit			NF						
SO4-D	mg/L	1140	1240		1120	1060	1050	1100	1090	998
Alk-T	mg/L	293	351		337	330	331	357	325	300
Acidity 8.3	mg/L	11.8	22.4		4.06	14.0	17.2	13.7	18.7	13.7
Al-T	mg/L	0.0032	<0.0030		0.0104	0.0069	0.0064	0.029	0.0046	0.0139
As-T	mg/L	0.00015	<0.00010		<0.00010	<0.00010	<0.00010	0.00028	<0.00010	0.00011
Ba-T	mg/L	0.0188	0.0202		0.0151	0.0152	0.0147	0.017	0.0136	0.0152
B-T	mg/L	0.645	0.700		0.632	0.58	0.501	0.613	0.548	0.554
Cd-T	mg/L	<0.000010	<0.000010		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Ca-T	mg/L	504	410		427	389	366	412	414	396
Cr-T	mg/L	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-T	mg/L	<0.00050	<0.00050		<0.00050	<0.00050	0.00073	0.00057	<0.00050	<0.00020
Cu-T	mg/L	<0.00050	<0.00050		<0.00050	<0.00050	<0.00050	0.00069	<0.00050	0.00065
Hard-T	mg/L	1550	1280		1310	1210	1150	1290	1260	1230
Fe-T	mg/L	0.143	0.097		0.138	0.24	0.664	2.36	0.507	0.219
Pb-T	mg/L	<0.00020	<0.00020		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-T	mg/L	69.8	62.9		59.1	57.7	56.6	63.7	54.8	58.2
Mn-T	mg/L	0.251	0.295		0.223	0.436	0.607	0.471	0.407	0.187
Hg-T	mg/L	<0.0000020	<0.0000020		<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Mo-T	mg/L	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ni-T	mg/L	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
K-T	mg/L	3.33	3.55		2.93	3.1	2.87	3.09	2.63	3.12
S-T	mg/L	422	438		375	351	347	391	344	371
Se-T	mg/L	<0.00010	<0.00010		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Si-T	mg/L	5.00	4.81		4.75	4.63	3.70	4.76	4.61	4.62
Ag-T	mg/L	<0.000020	<0.000020		<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Na-T	mg/L	87.4	90.3	PDS was dry from Jun. through Sept.	77.3	71.5	67.7	72.6	64.4	63.2
Sr-T	mg/L	2.88	3.18		2.86	2.62	2.35	2.62	2.37	2.40
Zn-T	mg/L	<0.0050	<0.0050		<0.0050	<0.0050	<0.0050	<0.0050	0.0056	<0.0050
Al-D	mg/L	0.0056	0.0045		0.0092	0.0034	0.0054	0.0045	0.0052	0.0064
As-D	mg/L	<0.00010	0.00013		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Ba-D	mg/L	0.0174	0.0192		0.0146	0.0147	0.0156	0.0149	0.0132	0.0161
B-D	mg/L	0.632	0.838		0.580	0.536	0.590	0.623	0.582	0.548
Be-D	mg/L	<0.00010	<0.00010		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cd-D	mg/L	<0.0000050	<0.0000050		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Ca-D	mg/L	412	480		403	391	414	413	323	402
Cr-D	mg/L	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	mg/L	<0.00050	<0.00050		<0.00050	<0.00050	0.00082	<0.00050	<0.00050	<0.00020
Cu-D	mg/L	<0.00020	<0.00020		0.00028	0.00024	0.00028	0.00053	0.00025	0.00022
Hard-D	mg/L	1290	1470		1250	1210	1290	1290	1040	1240
Fe-D	mg/L	0.0092	0.0203		<0.0050	<0.0050	0.0112	<0.0050	0.0103	<0.0050
Pb-D	mg/L	<0.00020	<0.00020		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-D	mg/L	62.6	65.2		58.9	57.4	61.8	63.9	57.0	58.1
Mn-D	mg/L	0.237	0.301		0.212	0.419	0.678	0.164	0.409	0.195
Hg-D	mg/L	<0.0000020	<0.0000020		<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Mo-D	mg/L	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0038
Ni-D	mg/L	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
K-D	mg/L	3.52	3.38		2.81	2.99	2.95	3.07	2.78	3.03
S-D	mg/L	437	436		371	338	371	391	341	352
Se-D	mg/L	<0.00010	<0.00010		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Si-D	mg/L	4.53	5.08		4.58	4.33	4.43	4.51	3.52	4.28
Na-D	mg/L	80.6	86.3		78.4	71.9	71.8	72.8	67.2	64.6
Sr-D	mg/L	2.80	3.13		2.61	2.63	2.69	2.78	2.42	2.62
Zn-D	mg/L	<0.0050	<0.0050		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Table 10
2016-2017 Annual Report

Site Description		Groundwater / Surface Water from 2N Area at Road											
Site Name		PDSR											
Date		4-Apr-16	2-May-16	1-Jun-16	7-Jul-16	2-Aug-16	2-Sep-16	11-Oct-16	1-Nov-16	5-Dec-16	2-Jan-17	1-Feb-17	7-Mar-17
Parameter	Unit					NF							
SO4-D	mg/L	681	759	1010	884			333	347	401	612	494	467
Alk-T	mg/L	159	194	243	243			117	130	137	170	147	147
Acidity 8.3	mg/L	2.19	7.42	<0.50	2.93			<0.50	1.30	1.90	2.11	2.51	1.86
Al-T	mg/L	0.0089	0.0064	0.0067	0.014			0.0117	1.71	0.0445	0.0097	0.0102	0.02
As-T	mg/L	0.00032	<0.00010	0.00014	0.00018			<0.00010	0.00076	<0.00010	<0.00010	<0.00010	<0.00010
Ba-T	mg/L	0.026	0.0311	0.0412	0.0393			0.0158	0.0232	0.0161	0.0223	0.0148	0.016
B-T	mg/L	0.285	0.375	0.423	0.393			0.195	0.189	0.154	0.182	0.169	0.204
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010			<0.000010	0.000017	<0.000010	<0.000010	<0.000010	<0.000010
Ca-T	mg/L	267	250	361	313			129	126	148	216	154	185
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010			<0.0010	0.0022	<0.0010	<0.0010	<0.0010	<0.0010
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050			<0.00050	0.00125	<0.00050	<0.00050	<0.00050	<0.00020
Cu-T	mg/L	<0.00050	<0.00050	<0.00050	0.00064			0.00085	0.00600	<0.00050	<0.00050	<0.00050	0.00054
Hard-T	mg/L	830	794	1150	989			411	409	471	706	502	589
Fe-T	mg/L	<0.010	<0.010	<0.010	0.016			0.011	2.46	0.034	0.012	<0.010	<0.010
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020			<0.00020	0.00036	<0.00020	<0.00020	<0.00020	<0.00020
Mg-T	mg/L	39.5	41.2	59.9	50.7			21.7	22.6	24.5	40.7	28.5	30.6
Mn-T	mg/L	<0.0010	<0.0010	<0.0010	0.002			0.0026	0.0632	0.0033	0.002	0.0024	0.0015
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020			<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010			<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010			<0.0010	0.0017	<0.0010	<0.0010	<0.0010	<0.0010
K-T	mg/L	2.28	2.41	2.51	2.68			1.57	1.65	1.34	1.58	1.34	1.55
S-T	mg/L	240	284	353	340			127	123	136	240	168	180
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010			<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Si-T	mg/L	3.82	3.80	3.9	4.74			4.13	6.5	3.4	3.44	3.09	3.7
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020			<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Na-T	mg/L	58.7	66.3	81.8	87			41.2	42.5	40.7	57.3	44	44.1
Sr-T	mg/L	1.5	1.76	2.22	1.94	PDSR was dry from Aug. through Sept.		0.953	0.849	0.835	1.32	0.94	1.02
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050			<0.0050	0.0055	<0.0050	<0.0050	<0.0050	<0.0050
Al-D	mg/L	0.0113	0.01	0.0051	0.0094			0.0132	0.014	0.0114	0.0084	0.0086	0.006
As-D	mg/L	0.00022	0.00017	0.00011	0.0001			<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Ba-D	mg/L	0.0257	0.0309	0.0407	0.0384			0.0152	0.0173	0.017	0.0199	0.0152	0.0168
B-D	mg/L	0.307	0.409	0.419	0.446			0.210	0.198	0.188	0.18	0.16	0.19
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010			<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	0.000011			<0.0000050	<0.0000050	0.0000050	0.0000060	<0.0000050	<0.0000050
Ca-D	mg/L	235	291	372	310			114	135	154	210	159	175
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010			<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050			<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020
Cu-D	mg/L	0.0003	0.00027	0.0005	0.00057			0.00038	0.00103	0.00039	0.00064	0.00059	0.00029
Hard-D	mg/L	744	905	1170	987			367	423	492	684	515	551
Fe-D	mg/L	<0.0050	<0.0050	<0.0050	0.0053			0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020			<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-D	mg/L	37.9	43.2	59.3	51.7			19.8	20.9	26.3	38.6	28.6	27.7
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010			0.0022	<0.0010	0.0024	0.0017	0.0025	0.0012
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020			<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010			<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010			<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
K-D	mg/L	2.38	2.36	2.59	2.75			1.41	1.51	1.38	1.57	1.25	1.47
S-D	mg/L	241	285	356	339			121	123	147	228	156	163
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010			<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Si-D	mg/L	4.07	4.06	4.16	4.79			3.67	3.59	3.97	3.4	3.20	3.11
Na-D	mg/L	54.8	64	84.8	79.2			38.6	39.5	43.3	55.4	42.1	42.3
Sr-D	mg/L	1.45	1.79	2.42	1.99			0.733	0.869	0.946	1.24	0.966	1.08
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050			<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Table 11
2016-2017 Annual Report

EMS ID		E218582												
Site Description		Settling Pond # 1 - Permitted Decant for South Mining Operation												Permit
Site Name		SPD	(SPD was not discharging from May 7th through June 22nd and July 26th through September 10th)											Limit-South
Date		4-Apr-16	5-May-16	2-Jun-16	7-Jul-16	2-Aug-16	6-Sep-16	11-Oct-16	1-Nov-16	5-Dec-16	2-Jan-17	1-Feb-17	7-Mar-17	
Parameter	Unit													
SO4-D	mg/L	391	440	444	441	484	274	135	314	190	58.2	207	32.8	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	-	<4.0	10.5	<4.0	-	6.0	<4.0	**25**
Alk-T	mg/L	-	-	75.9	91.3	92.8	280	38.2	148	121	39.7	111	22.5	-
Acidity 8.3	mg/L	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	2.63	1.59	1.24	1.92	1.84	-
Al-T	mg/L	0.0193	0.0063	0.0054	0.01	0.00	0.0815	0.254	0.102	0.104	0.0384	0.0565	0.0388	-
As-T	mg/L	0.0004	0.0005	0.0006	0.0011	0.0008	0.0034	0.0006	0.0008	0.0011	0.00097	0.00073	0.00030	-
Ba-T	mg/L	0.0127	0.0143	0.0159	0.0213	0.0179	0.0243	0.0085	0.0151	0.0096	0.0137	0.0095	0.0030	-
B-T	mg/L	0.35700	0.324	0.333	0.327	0.302	0.834	0.081	0.415	0.29800	0.158	0.286	<0.050	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-
Ca-T	mg/L	130	156.000	145	169	138	114	61.5	99.7	49.8	110	58.2	12.0	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Co-T	mg/L	0.00122	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0	0.00239	0.00589	0.00187	0.00040	-
Cu-T	mg/L	0.0011	0.0010	0.0010	0.0010	0.0010	0.0006	0.0016	0.0021	0.0032	0.00079	0.00191	<0.00050	-
Hard-T	mg/L	389.0	482.0	451.0	520.0	437.0	344.0	182.0	302.0	152.0	339.0	184.0	37.4	-
Fe-T	mg/L	0.20	0.17	0.20	0.31	0.15	0.29	0.56	2.15	1.89	2.85	1.70	0.25	-
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-
Mg-T	mg/L	15.7	22.1	21.9	23.9	22.3	14.2	6.79	12.8	6.72	15.6	9.30	1.81	-
Mn-T	mg/L	0.0605	0.0185	0.0167	0.03	0.0059	0.0691	0.0609	0.179	0.10	0.544	0.0905	0.0529	-
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	0.00000	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Ni-T	mg/L	0.0066	0.0017	0.0013	0.0016	0.001	<0.0010	0.001	0.0067	0.0049	0.0032	0.0033	<0.0010	-
K-T	mg/L	2.46	2.09	1.85	1.90	1.63	3.41	0.78	2.51	1.80	1.22	1.56	0.27	-
S-T	mg/L	169.0	176.0	163.0	174.0	160.0	103.0	43.0	122.0	66.6	109.0	75.4	9.5	-
Se-T	mg/L	0.00011	<0.00010	<0.00010	<0.00010	0.00011	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-
Si-T	mg/L	2.7	1.1	0.3	0.9	1.8	6.1	4.6	3.3	3.0	3.7	2.7	2.5	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-
Na-T	mg/L	73.2	53.0	56.3	51.0	47.7	113.0	8.9	92.7	73.8	26.6	58.1	5.3	-
Sr-T	mg/L	0.90	1.02	1.00	1.16	0.96	1.60	0.28	0.72	0.39	0.64	0.45	0.07	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-
Al-D	mg/L	0.0108	<0.0030	0.0141	0.0054	0.0053	0.0079	0.0768	0.0104	0.0171	0.0037	0.0113	0.0260	**0.5**
As-D	mg/L	0.0003	0.0005	0.0006	0.0007	0.0009	0.0027	0.0004	0.0003	0.0004	0.0004	0.0002	0.0003	-
Ba-D	mg/L	0.0122	0.0146	0.0160	0.0196	0.0186	0.0231	0.0076	0.0137	0.0088	0.0140	0.0096	0.0033	-
B-D	mg/L	0.357	0.299	0.301	0.319	0.323	0.709	0.078	0.396	0.314	0.175	0.268	<0.050	-
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-
Cd-D	mg/L	0.0000	<0.0000050	0.000015	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	0.0000050	<0.0000050	<0.0000050	-
Ca-D	mg/L	136	151	148	158	160	115	45.2	96.3	49.2	105	68.1	13.0	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Co-D	mg/L	0.00063	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0022900	0.00223	0.00594	0.00179	0.00041	-
Cu-D	mg/L	0.00104	0.00071	0.00087	0.00081	0.00067	0.00031	0.00078	0.00079	0.00153	0.00055	0.00059	0.00049	**0.02**
Hard-D	mg/L	413	459	462	492	493	344	138	291	151	324	208	41	-
Fe-D	mg/L	0.010	0.031	0.072	0.129	0.138	0.029	0.135	0.034	0.124	0.034	0.115	0.125	**0.5**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	**0.05**
Mg-D	mg/L	17.90	20.00	22.40	23.60	23.00	14.00	6.03	12.30	6.80	14.80	9.34	1.92	-
Mn-D	mg/L	0.0402	<0.0010	<0.0010	<0.0010	0.0057	0.0544	0.0437	0.151	0.0971	0.560	0.0921	0.0552	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Ni-D	mg/L	0.0073	0.0015	0.0013	0.0013	0.0011	<0.0010	<0.0010	0.006	0.0044	0.0031	0.0031	<0.0010	-
K-D	mg/L	2.55	1.95	1.89	1.97	1.82	2.87	0.64	2.25	1.79	1.21	1.59	0.27	-
S-D	mg/L	167	165	165	182	176	104	43	112	67	105	78	10	-
Se-D	mg/L	0.0002	<0.00010	<0.00010	<0.00010	0.00014	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-
Si-D	mg/L	2.51	1.06	0.32	0.86	1.85	6.01	3.91	2.96	3.12	3.46	2.83	2.72	-
Na-D	mg/L	87.4	47.6	54.5	50.9	47.2	111	7.8	87.6	74.8	27.3	56.4	5.51	-
Sr-D	mg/L	0.93	1.14	1.09	1.05	0.96	1.77	0.28	0.69	0.39	0.69	0.50	0.07	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-
O&G	mg/L	<5.0	-	<5.0	-	<5.0	-	<5.0	-	<5.0	-	-	<5.0	-

Metals analyses were obtained monthly instead of bi-monthly as results were applied to the loading assessment.

Table 12
2016-2017 Annual Report

Site Description		Long Lake Seep Passive Treatment System (LLSTS) Settling Pond Effluent											
Site Name		SPEFF	(SPD was not discharging from May 7th through June 22nd and July 26th through Sepember 10th)										
Date		4-Apr-16	5-May-16	2-Jun-16	7-Jul-16	2-Aug-16	6-Sep-16	11-Oct-16	1-Nov-16	5-Dec-16	2-Jan-17	1-Feb-17	7-Mar-17
Parameter	Unit												
SO4-D	mg/L	323	291	297	295	329	270	256	248	263	302	348	327
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	5.0	<4.0	<4.0	<4.0	<4.0	<4.0
Alk-T	mg/L	234	258	274	273	286	309	274	299	277	333	322	299
Acidity 8.3	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.82	0.54
N-NH3	mg/L	<0.0050	0.0191	0.019	0.025	0.0076	<0.0050	0.0087	0.0100	<0.0050	<0.0050	0.029	0.0390
NO2+NO3	mg/L	<0.20	<0.20	<2.0	<0.20	<0.20	<0.20	<0.20	<2.0	<2.0	<2.0	<2.0	<0.20
Al-T	mg/L	0.0045	<0.0030	0.0063	0.0048	0.0053	0.0075	0.012	0.0127	0.0140	0.0311	0.009	0.0167
As-T	mg/L	0.00142	0.00245	0.00316	0.00565	0.00683	0.00546	0.00349	0.00215	0.0016	0.00345	0.00159	0.00117
Ba-T	mg/L	0.0276	0.0218	0.0223	0.0265	0.0236	0.0271	0.0243	0.0236	0.0194	0.0335	0.0228	0.0223
B-T	mg/L	0.623	0.802	0.876	0.684	0.921	0.848	0.615	0.491	0.433	0.494	0.505	0.527
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Ca-T	mg/L	130	131	134	123	118	126	117	140	136	182	153	176
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020
Cu-T	mg/L	0.00052	0.00063	0.00069	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00944	0.00081	<0.00050
Hard-T	mg/L	367	374	395	364	364	373	348	399	379	509	432	487
Fe-T	mg/L	0.045	0.038	0.078	0.062	0.049	0.075	0.12	0.039	0.05	0.741	0.044	0.046
P-T	mg/L	0.011	0.016	0.0194	0.0177	0.0189	0.0242	0.0117	0.0075	0.0094	0.0262	0.0194	0.0188
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-T	mg/L	10.4	11.5	14.5	13.7	16.8	14.6	13.8	11.7	9.91	13.3	11.9	11.9
Mn-T	mg/L	0.0045	0.0192	0.0208	0.0218	0.0179	0.0214	0.0163	0.0059	0.0055	0.128	0.0037	0.0111
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010
K-T	mg/L	1.74	2.03	2.1	2.39	3.29	3.6	3.02	2.55	2.23	2.52	2.5	3.06
S-T	mg/L	131	122	117	110	124	106	111	99.7	97.2	111	125	135
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00016	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Si-T	mg/L	3.17	4.99	4.7	5.31	6.14	6.54	4.63	4.38	3.49	4.86	3.61	3.67
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Na-T	mg/L	101	109	130	118	139	116	108	87.5	79.3	96.8	87.4	87.8
Sr-T	mg/L	1.44	1.53	1.67	1.81	1.78	1.70	1.63	1.62	1.23	1.6	1.45	1.49
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Al-D	mg/L	0.0057	<0.0030	0.0042	0.0038	0.0102	0.0073	0.0116	0.0102	0.0111	0.0069	0.0088	0.0031
As-D	mg/L	0.00119	0.00224	0.00316	0.0048	0.00717	0.00474	0.00316	0.00202	0.00159	0.00295	0.00164	0.00107
Ba-D	mg/L	0.0266	0.0214	0.023	0.023	0.0217	0.0252	0.0243	0.0224	0.0197	0.036	0.0225	0.0242
B-D	mg/L	0.719	0.684	0.772	0.758	0.839	0.784	0.584	0.472	0.458	0.469	0.476	0.516
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000220	<0.0000050	<0.0000050
Ca-D	mg/L	138	123	122	116	111	118	108	137	142	169	148	161
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020
Cu-D	mg/L	0.00051	0.00052	0.00052	0.00025	0.00025	<0.00020	0.00036	0.00031	0.00030	<0.00020	0.00043	<0.00020
Hard-D	mg/L	387	352	360	349	341	354	321	388	395	480	419	451
Fe-D	mg/L	0.0216	0.018	0.0358	0.015	0.0299	0.0233	0.055	0.013	0.025	0.21	0.0227	0.0108
P-D	mg/L	0.0118	0.0141	0.0185	0.0113	0.013	0.0223	0.0136	0.0088	0.0055	0.0246	0.0154	0.0184
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-D	mg/L	10.4	11.0	13.5	14.6	15.7	14.7	12.6	11.3	9.72	14.3	12.4	11.7
Mn-D	mg/L	0.0021	0.0057	0.0023	<0.0010	<0.0010	<0.0010	0.0132	0.0039	0.0044	0.104	0.002	0.0075
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
K-D	mg/L	1.78	1.95	2.12	2.54	3.04	2.93	2.78	2.3	2.15	2.50	2.33	2.77
S-D	mg/L	133	115	115	123	123	98.2	96.2	93	96.5	114	113	117
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Si-D	mg/L	3.31	4.93	5.16	5.09	5.67	6.31	3.96	4.07	3.66	4.37	3.35	2.98
Na-D	mg/L	99.6	102	116	118	124	121	105	82.9	77	105	92.9	88.9
Sr-D	mg/L	1.37	1.65	1.62	1.64	1.64	1.58	1.55	1.48	1.24	1.66	1.54	1.70
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Table 13
2016-2017 Annual Report

Site Description		LLSTS and Settling Pond #1 Combined Discharge (Biocell Downstream)												
Site Name		BDS	(SPD was not discharging from May 7th through June 22nd and July 26th through Sepember 10th)											Permit
Date		4-Apr-16	5-May-16	2-Jun-16	7-Jul-16	2-Aug-16	6-Sep-16	11-Oct-16	1-Nov-16	5-Dec-16	2-Jan-17	1-Feb-17	7-Mar-17	Limit-South
Parameter	Unit													
SO4-D	mg/L	388	291	302	386	328	407	196	328	292	249	389	173	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	7.0	5.3	6.8	<4.0	<4.0	<4.0	**25**
Alk-T	mg/L	129	246	269	167	262	84.5	68.1	169	198	149	145	126	-
Acidity 8.3	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.26	1.72	0.76	2.98	0.76	-
N-NH3	mg/L	0.0098	0.0192	0.0075	0.057	0.011	0.015	0.0071	0.074	0.11	0.021	0.028	0.051	**1**
NO2+NO3	mg/L	<0.20	<0.20	<2.0	<0.20	<0.20	<0.20	<0.20	<2.0	<2.0	<2.0	<2.0	<2.0	-
Al-T	mg/L	0.0187	0.0044	0.0039	0.0067	0.0046	0.0065	0.135	0.0642	0.0735	0.0473	0.0378	0.0377	-
As-T	mg/L	0.00046	0.00175	0.00206	0.00204	0.00354	0.00074	0.00052	0.00077	0.00126	0.00075	0.00043	0.00070	-
Ba-T	mg/L	0.0147	0.0212	0.0241	0.0245	0.0241	0.0192	0.0106	0.0165	0.0142	0.0137	0.0125	0.0103	-
B-T	mg/L	0.388	0.741	0.655	0.491	0.881	0.328	0.143	0.452	0.464	0.234	0.261	0.214	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000017	<0.000010	<0.000010	<0.000010	-
Ca-T	mg/L	134	131	118	153	114	145	76.5	107	89.6	115	147	68.5	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Co-T	mg/L	0.00108	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00269	0.00319	0.00235	0.00095	0.00047	-
Cu-T	mg/L	0.0011	0.00117	0.00076	0.00099	<0.00050	<0.00050	0.00106	0.00173	0.00354	0.00076	0.00114	0.00056	-
Hard-T	mg/L	403	377	348	465	351	456	233	321	268	347	442	197	-
Fe-T	mg/L	0.193	0.212	0.221	0.255	0.152	0.153	0.248	1.720	2.000	0.707	0.868	0.333	-
P-T	mg/L	0.0653	0.0063	0.0074	0.0081	0.0074	0.0112	0.0122	0.006	0.0058	0.0063	0.0088	0.0123	-
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-
Mg-T	mg/L	16.5	12.3	12.8	20.1	16.3	23.1	10.3	13.1	10.7	14.4	18.2	6.20	-
Mn-T	mg/L	0.0599	0.068	0.0593	0.0413	0.0688	0.012	0.0392	0.149	0.12	0.302	0.0766	0.0568	-
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	0.0000023	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Ni-T	mg/L	0.0055	0.0011	<0.0010	0.0013	<0.0010	<0.0010	<0.0010	0.0063	0.0066	0.0022	0.0024	<0.0010	-
K-T	mg/L	2.46	1.86	1.83	2.18	3.02	1.53	1.11	2.63	2.78	1.59	1.67	1.26	-
S-T	mg/L	166	126	112	150	129	151	74.3	125	109	105	137	53.1	-
Se-T	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	-
Si-T	mg/L	2.6	4.26	4.74	2.76	5.59	1.79	3.1	3.35	2.92	3.78	3.03	2.47	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-
Na-T	mg/L	76.7	102	110	79.2	132	47.1	17.5	96.0	111.0	43.3	40.7	34.9	-
Sr-T	mg/L	0.965	1.33	1.47	1.47	1.61	0.91	0.485	0.829	0.72	0.811	0.881	0.607	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0057	<0.0050	<0.0050	
Al-D	mg/L	0.012	0.0036	0.0055	0.0049	0.0052	0.0032	0.0546	0.0121	0.0104	0.0124	0.0140	0.0168	**0.5**
As-D	mg/L	0.00038	0.00121	0.00154	0.00141	0.00303	0.00066	0.00048	0.00038	0.00041	0.00049	0.00026	0.00050	-
Ba-D	mg/L	0.0141	0.022	0.0229	0.0219	0.0224	0.019	0.0114	0.0147	0.0132	0.0139	0.0122	0.0111	-
B-D	mg/L	0.368	0.619	0.732	0.501	0.819	0.295	0.166	0.443	0.486	0.234	0.265	0.222	-
Cd-D	mg/L	0.0000058	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000050	<0.0000050	0.0000090	<0.0000050	0.0000050	<0.0000050	-
Ca-D	mg/L	140	124	120	134	106	147	80	103	87.3	107	138	74.2	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Co-D	mg/L	0.00071	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00223	0.00288	0.00226	0.00092	0.00047	-
Cu-D	mg/L	0.00104	0.00076	0.00067	0.0007	0.00031	0.00039	0.00072	0.00088	0.00115	0.00078	0.00064	0.00039	**0.02**
Hard-D	mg/L	424	359	355	414	328	454	246	310	262	326	420	215	-
Fe-D	mg/L	0.0106	0.0393	0.0379	0.0958	0.0291	0.1090	0.0997	0.0282	0.0339	0.0978	0.0301	0.0544	**0.5**
P-D	mg/L	**0.0608**	0.0076	0.0107	0.0042	0.0041	0.0078	0.011	0.0027	0.0024	0.0059	0.0073	0.0082	**0.03**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	**0.05**
Mg-D	mg/L	17.8	12.2	13.5	19.2	15.4	20.9	11.2	13.1	10.7	13.9	18.3	7.11	-
Mn-D	mg/L	0.038	0.058	0.042	0.002	0.069	0.006	0.040	0.136	0.121	0.289	0.074	0.061	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Ni-D	mg/L	0.006	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0056	0.006	0.0020	0.0025	<0.0010	-
K-D	mg/L	2.46	1.80	1.96	2.26	2.87	1.55	1.16	2.40	2.75	1.49	1.79	1.33	-
S-D	mg/L	160	118	115	145	121	151	74.9	117	106	101	135	58.4	-
Se-D	mg/L	0.00024	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00015	<0.00010	-
Si-D	mg/L	2.45	4.09	4.76	2.59	5.41	1.74	3.14	2.98	2.86	3.54	2.56	2.78	-
Na-D	mg/L	78.7	95.3	112	77.8	125	44.2	19.3	94.4	111	43.9	42.3	38.0	-
Sr-D	mg/L	0.975	1.47	1.51	1.27	1.46	0.984	0.55	0.82	0.714	0.897	0.897	0.665	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	**0.2**

Table 14
2016-2017 Annual Report

EMS ID		E292127											
Site Description		2 South Pit in Pit Water Cover (CCR Water Cover)											
Site Name		2S											
Date		4-Apr-16	2-May-16	2-Jun-16	7-Jul-16	2-Aug-16	6-Sep-16	11-Oct-16	1-Nov-16	5-Dec-16	2-Jan-17	1-Feb-17	7-Mar-17
Parameter	Unit												
SO4-D	mg/L	136	168	459	618	679	768	444	198	161	160	112	84.4
Alk-T	mg/L	47.5	55.1	122	138	128	104	66.9	41.1	57.5	76.6	38.1	30.8
Acidity 8.3	mg/L	<0.50	1.06	<0.50	<0.50	2.38	2.52	<0.50	<0.50	0.78	<0.50	<0.50	<0.50
Al-T	mg/L	0.149	0.126	0.0334	0.0943	0.0087	0.0903	0.212	0.322	0.0860	0.0093	0.0963	0.183
As-T	mg/L	0.00024	0.00032	0.00062	0.00064	0.00016	0.00043	0.00034	0.00029	0.00042	0.00067	<0.00010	0.00010
Ba-T	mg/L	0.0178	0.0128	0.0233	0.0287	0.0527	0.0286	0.0190	0.0142	0.0146	0.0159	0.0074	0.0076
B-T	mg/L	0.053	0.067	0.308	0.407	0.446	0.501	0.228	0.083	0.079	0.079	<0.050	<0.050
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000015	<0.000010	0.000015	0.000012	<0.000010	<0.000010	<0.000010	<0.000010
Ca-T	mg/L	63.2	74.5	183	222	271	281	162	81.7	69.8	66.3	41.9	38.4
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00086	0.00066	<0.00050	<0.00050	<0.00050	<0.00020
Cu-T	mg/L	0.00116	0.00167	0.00093	0.00158	0.00067	0.00159	0.00183	0.00204	0.00202	<0.00050	0.00097	0.00102
Hard-T	mg/L	187	222	552	674	807	856	497	249	210	206	128	116
Fe-T	mg/L	0.120	0.175	0.347	0.332	0.012	0.126	0.156	0.266	0.090	0.013	0.126	0.183
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-T	mg/L	7.08	8.70	22.8	29.2	31.7	37.5	22.5	11.0	8.69	9.73	5.60	4.86
Mn-T	mg/L	0.0023	0.0411	0.0440	0.0161	0.0042	0.0219	0.0702	0.0715	0.0081	0.0096	0.0030	0.0030
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	0.0000033	<0.0000020	0.0000020	<0.0000020	<0.0000020	<0.0000020
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	0.0015	0.0022	0.0019	<0.0010	<0.0010	<0.0010	<0.0010
K-T	mg/L	0.538	0.646	1.87	2.43	2.79	3.61	1.83	0.900	0.736	0.762	0.390	0.377
S-T	mg/L	42.5	60.7	171	227	275	301	167	74.4	52.1	53.1	34.0	29.7
Se-T	mg/L	0.00020	<0.00010	<0.00010	0.00014	0.00011	0.00025	0.00014	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Si-T	mg/L	3.29	2.87	1.59	1.43	3.10	0.76	2.50	3.38	1.94	1.34	2.24	2.34
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Na-T	mg/L	2.14	5.45	36.1	58.1	48.3	49.5	25.0	8.29	4.42	4.08	2.32	1.52
Sr-T	mg/L	0.234	0.321	1.16	1.54	1.39	1.72	0.969	0.414	0.364	0.407	0.206	0.152
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0170	<0.0050	<0.0050	<0.0050	<0.0050
Al-D	mg/L	0.0108	0.0186	0.0361	0.0199	0.0061	0.0420	0.0508	0.0323	0.0043	0.0031	0.0103	0.0075
As-D	mg/L	0.00011	0.00029	0.00061	0.00047	0.00020	0.00040	0.00022	0.00017	0.00041	0.00064	<0.00010	<0.00010
Ba-D	mg/L	0.0173	0.0125	0.0240	0.0283	0.0588	0.0277	0.0183	0.0136	0.0151	0.0149	0.0073	0.0072
B-D	mg/L	<0.050	0.085	0.297	0.382	0.472	0.465	0.229	0.080	0.082	0.081	<0.050	<0.050
Cd-D	mg/L	0.0000060	<0.0000050	<0.0000050	<0.0000050	0.0000155	0.0000070	<0.0000050	0.0000090	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Ca-D	mg/L	59.6	76.9	184	224	316	283	154	78.8	71.9	64.7	41.7	35.4
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00063	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020
Cu-D	mg/L	0.00082	0.00083	0.00080	0.00061	0.00080	0.00088	0.00114	0.00142	0.00065	0.00026	0.00078	0.00065
Hard-D	mg/L	179	231	557	682	929	860	467	240	217	199	129	108
Fe-D	mg/L	<0.0050	<0.0050	0.208	0.114	0.0063	0.0059	0.0090	0.0160	<0.0050	<0.0050	0.0258	0.0093
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00058
Mg-D	mg/L	7.31	9.48	23.5	30.0	34.0	37.6	20.0	10.6	9.09	9.18	5.92	4.76
Mn-D	mg/L	0.0012	0.0355	0.0386	0.0010	0.0050	0.0117	0.0594	0.0595	0.0056	0.0071	0.0020	0.0015
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	0.0017	0.0015	<0.0010	<0.0010	<0.0010	<0.0010
K-D	mg/L	0.534	0.701	1.83	2.47	3.02	2.95	1.63	0.822	0.767	0.754	0.409	0.340
S-D	mg/L	45.9	60.7	173	260	283	283	152	71.4	55.0	48.8	35.9	25.9
Se-D	mg/L	0.00014	0.00013	0.00011	0.00012	0.00011	0.00015	0.00014	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Si-D	mg/L	3.00	2.74	1.56	1.42	3.35	0.66	2.21	2.67	1.81	1.31	2.11	1.76
Na-D	mg/L	2.45	5.91	35.2	55.8	50.3	49.0	22.7	8.19	4.63	3.92	2.55	1.49
Sr-D	mg/L	0.255	0.347	1.21	1.53	1.51	1.70	0.902	0.390	0.378	0.394	0.201	0.157
Zn-D	mg/L	0.0115	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Table 15
2016-2017 Annual Report

EMS ID		E217015											
Site Description		3 South Pit Main Water Sump (CCR Water Cover)											
Site Name		3S											
Date		4-Apr-16	2-May-16	2-Jun-16	7-Jul-16	2-Aug-16	6-Sep-16	11-Oct-16	1-Nov-16	5-Dec-16	2-Jan-17	1-Feb-17	7-Mar-17
Parameter	Unit												
SO4-D	mg/L	606	693	734	779	798	821	718	826	725	722	762	670
Alk-T	mg/L	121	138	123	155	169	151	159	161	172	208	193	178
Acidity 8.3	mg/L	<0.50	1.72	<0.50	0.65	0.75	2.98	<0.50	2.55	2.91	2.47	4.87	2.66
Al-T	mg/L	0.0709	0.0715	0.0764	0.124	0.0297	0.100	0.0369	0.0420	0.0466	0.0042	0.0556	-
As-T	mg/L	0.00015	0.00020	0.00024	0.00048	0.00039	0.00023	0.00021	0.00027	0.00025	0.00021	0.00016	-
Ba-T	mg/L	0.0133	0.0133	0.0138	0.0307	0.0264	0.0231	0.0210	0.0203	0.0158	0.0145	0.0153	-
B-T	mg/L	0.279	0.397	0.437	0.462	0.503	0.503	0.399	0.311	0.298	0.402	0.261	-
Cd-T	mg/L	0.000021	<0.000010	<0.000010	<0.000010	<0.000010	0.000011	<0.000010	0.000010	<0.000010	<0.000010	<0.000010	-
Ca-T	mg/L	288	240	289	301	322	316	280	317	294	304	262	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-
Cu-T	mg/L	0.00083	0.00074	0.00079	0.00140	0.00086	0.00133	0.00076	0.00055	0.00219	<0.00050	0.00080	-
Hard-T	mg/L	853	727	890	914	983	950	841	950	883	932	792	-
Fe-T	mg/L	0.040	0.055	0.107	0.161	0.073	0.134	0.040	0.052	0.072	0.057	0.193	-
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-
Mg-T	mg/L	32.5	31.3	40.9	39.4	43.3	39.3	34.7	38.7	35.8	41.7	33.4	-
Mn-T	mg/L	0.0086	0.0075	0.0062	0.106	0.0275	0.0242	0.0629	0.0686	0.0612	0.0425	0.180	-
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020		<0.0000020	<0.0000020	0.0000033	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Ni-T	mg/L	0.0014	<0.0010	<0.0010	0.0013	0.0011	0.0013	0.0012	0.0020	0.0015	<0.0010	0.0013	-
K-T	mg/L	2.07	2.42	2.98	3.50	3.85	4.08	2.59	2.54	2.20	3.01	2.16	-
S-T	mg/L	222	257	280	306	319	346	250	283	257	292	245	-
Se-T	mg/L	0.00117	0.00018	0.00012	0.00016	0.00017	0.00040	0.00029	0.00020	0.00029	0.00019	0.00016	-
Si-T	mg/L	1.96	1.47	0.89	1.39	1.43	1.46	2.29	2.36	2.34	2.68	2.37	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-
Na-T	mg/L	24.5	34.1	46.2	49.4	53.1	51.3	32.0	27.1	23.9	36.8	26.4	-
Sr-T	mg/L	1.46	1.58	1.74	1.87	1.89	1.92	1.71	1.73	1.67	1.93	1.57	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0085	-
Al-D	mg/L	0.0648	0.0626	0.0807	0.0200	0.0112	0.0141	0.0165	0.0101	0.0102	0.0051	0.0074	-
As-D	mg/L	<0.00010	0.00025	0.00024	0.00035	0.00035	0.00021	0.00029	0.00018	0.00017	0.00027	0.00024	-
Ba-D	mg/L	0.0120	0.0133	0.0134	0.0279	0.0265	0.0228	0.0198	0.0197	0.0161	0.0140	0.0153	-
B-D	mg/L	0.258	0.395	0.398	0.455	0.475	0.499	0.363	0.302	0.313	0.413	0.286	-
Cd-D	mg/L	0.0000160	<0.0000050	<0.0000050	0.0000052	0.0000070	0.0000060	<0.0000050	0.0000050	0.0000080	<0.0000050	0.0000080	-
Ca-D	mg/L	254	269	266	295	326	322	271	307	306	295	241	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-
Cu-D	mg/L	0.00067	0.00036	0.00057	0.00083	0.00071	0.00062	0.00047	0.00042	0.00044	0.00055	0.00041	-
Hard-D	mg/L	761	811	822	898	985	970	813	920	916	896	742	-
Fe-D	mg/L	0.0056	0.0074	0.0364	0.0079	0.0064	<0.0050	0.0058	<0.0050	<0.0050	0.0070	0.0084	-
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-
Mg-D	mg/L	30.9	33.7	38.0	39.0	41.5	40.5	32.7	37.4	37.0	38.7	34.1	-
Mn-D	mg/L	0.0043	<0.0010	<0.0010	0.0868	0.0217	0.0202	0.0524	0.0643	0.0608	0.0396	0.178	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020		<0.0000020	<0.0000020	0.0000027	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Ni-D	mg/L	0.0014	<0.0010	<0.0010	0.0012	0.0011	0.0011	0.0012	0.0020	0.0014	<0.0010	0.0012	-
K-D	mg/L	2.09	2.48	2.86	3.41	3.77	3.31	2.50	2.39	2.21	2.84	2.23	-
S-D	mg/L	264	250	259	305	322	302	249	273	261	278	242	-
Se-D	mg/L	0.00018	0.00023	0.00015	0.00015	0.00020	0.00020	0.00031	0.00023	0.00020	0.00019	0.00018	-
Si-D	mg/L	2.04	1.42	0.98	1.26	1.38	1.36	2.30	2.19	2.53	2.88	2.08	-
Na-D	mg/L	24.2	33.5	45.1	49.7	50.0	50.1	31.3	26.3	24.1	35.4	27.6	-
Sr-D	mg/L	1.41	1.63	1.76	1.76	1.84	1.82	1.57	1.72	1.74	1.83	1.58	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0076	-

Table 16
2016-2017 Annual Report

EMS ID		E292128			
Site Description		3 South 77 Adit Pit- Exploration pit from 1977			
Site Name		3S77			
Date		4-Apr-16	2-Aug-16	11-Oct-16	2-Jan-17
Parameter	Unit				
SO4-D	mg/L	332	322	277	290
Alk-T	mg/L	129	193	136	141
Acidity 8.3	mg/L	1.64	<0.50	<0.50	1.46
Al-T	mg/L	<0.0030	0.0118	0.0106	0.0292
As-T	mg/L	0.00074	0.00152	0.00064	0.00104
Ba-T	mg/L	0.0331	0.0404	0.0293	0.0262
B-T	mg/L	0.347	0.584	0.375	0.267
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010
Ca-T	mg/L	109	138	96.5	95.4
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050
Cu-T	mg/L	<0.00050	0.00059	0.00064	0.00092
Hard-T	mg/L	328	416	292	290
Fe-T	mg/L	0.017	0.057	0.033	0.462
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020
Mg-T	mg/L	13.5	17.3	12.5	12.5
Mn-T	mg/L	0.0051	0.0233	0.0041	0.0346
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010
K-T	mg/L	1.83	2.28	1.55	1.50
S-T	mg/L	146	150	106	104
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010
Si-T	mg/L	3.01	4.31	3.38	2.88
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020
Na-T	mg/L	83.2	90.3	60.3	65.9
Sr-T	mg/L	0.865	0.955	0.734	0.738
Zn-T	mg/L	<0.0050	0.0764	<0.0050	<0.0050
Al-D	mg/L	0.0048	<0.0030	0.0048	0.0036
As-D	mg/L	0.00064	0.00150	0.00069	0.00053
Ba-D	mg/L	0.0309	0.0397	0.0283	0.0245
B-D	mg/L	0.354	0.542	0.355	0.258
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Ca-D	mg/L	115	140	99.7	90.4
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050
Cu-D	mg/L	0.00032	0.00043	0.00053	0.00043
Hard-D	mg/L	346	418	298	277
Fe-D	mg/L	0.0054	0.0102	<0.0050	0.0231
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020
Mg-D	mg/L	14.1	16.7	12.0	12.5
Mn-D	mg/L	0.0047	0.0247	0.0022	0.0133
Hg-D	mg/L	<0.0000020	<0.0000020	0.0000063	<0.0000020
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010
K-D	mg/L	1.82	2.15	1.53	1.48
S-D	mg/L	148	141	100	104
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010
Si-D	mg/L	3.03	4.07	3.04	2.75
Na-D	mg/L	82.3	85.4	56.9	66.2
Sr-D	mg/L	0.843	0.937	0.769	0.737
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050

Table 17
2016-2017 Annual Report

EMS ID		E292129											
Site Description		4 South Lower- Culvert Dowstream of Acess Road											
Site Name		4S-LO											
Date		4-Apr-16	5-May-16	2-Jun-16	7-Jul-16	2-Aug-16	6-Sep-16	11-Oct-16	1-Nov-16	5-Dec-16	2-Jan-17	1-Feb-17	7-Mar-17
Parameter	Unit												
SO4-D	mg/L	186	209	203	227	218	255	196	159	136	165	155	145
Alk-T	mg/L	47.8	60.9	69.3	78.4	87.5	86.0	63.6	59.2	53.8	58.6	53.1	51.2
Acidity 8.3	mg/L	1.51	1.63	<0.50	1.24	<0.50	1.93	<0.50	3.13	1.90	2.07	2.26	2.29
Al-T	mg/L	0.0089	0.0080	0.0177	0.0147	0.0114	0.0191	0.0260	0.0240	0.0407	0.146	0.0175	0.0206
As-T	mg/L	0.00017	0.00019	0.00026	0.00036	0.00030	0.00033	0.00021	0.00024	0.00021	0.00031	0.0002	0.00017
Ba-T	mg/L	0.0196	0.0243	0.0252	0.0270	0.0319	0.0260	0.0182	0.0161	0.0136	0.0163	0.0121	0.0126
B-T	mg/L	0.124	0.132	0.143	0.147	0.177	0.177	0.128	0.115	0.095	0.1	0.083	0.089
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	<0.000010	<0.000010
Ca-T	mg/L	72.2	76.7	76.0	88.0	90.2	87.7	71.8	57.8	52.1	56.1	46.9	50
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-T	mg/L	0.00211	0.00157	0.00164	0.00215	0.00256	0.00160	0.00172	0.00300	0.00316	0.00337	0.00234	0.00231
Cu-T	mg/L	<0.00050	<0.00050	<0.00050	0.00058	<0.00050	<0.00050	<0.00050	<0.00050	0.00063	0.00082	<0.00050	<0.00050
Hard-T	mg/L	217	234	232	270	277	268	217	176	155	172	144	151
Fe-T	mg/L	2.44	2.80	1.89	2.35	2.27	2.05	0.675	2.36	3.63	5.03	2.41	2.43
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-T	mg/L	9.01	10.2	10.2	12.2	12.6	11.9	9.07	7.64	6.10	7.87	6.47	6.35
Mn-T	mg/L	1.65	1.38	1.43	1.54	1.83	1.16	0.455	1.22	1.43	1.84	1.16	1.26
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	0.0010	0.0014	0.0018	0.0016	0.0012	0.0012
K-T	mg/L	0.740	0.834	0.881	1.06	1.45	1.14	0.816	0.697	0.545	0.631	0.531	0.599
S-T	mg/L	63.9	86.3	84.2	93.7	113	95.8	76.2	55.3	45.2	59.7	50.7	52.9
Se-T	mg/L	0.00070	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Si-T	mg/L	3.74	3.66	3.32	4.03	4.13	4.24	3.99	3.59	3.81	3.83	3.33	3.6
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Na-T	mg/L	25.3	34.9	35.8	43.7	44.5	46.3	31.7	23.1	17.2	23	19.1	17.5
Sr-T	mg/L	0.294	0.380	0.401	0.452	0.457	0.452	0.389	0.279	0.224	0.255	0.22	0.212
Zn-T	mg/L	0.0137	0.0167	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0075	<0.0050	<0.0050
Al-D	mg/L	0.0058	<0.0030	0.0131	0.0059	0.0037	0.0042	0.0154	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
As-D	mg/L	<0.00010	<0.00010	0.00015	0.00014	0.00024	0.00021	0.00018	0.00012	0.00012	<0.00010	<0.00010	<0.00010
Ba-D	mg/L	0.0181	0.0232	0.0256	0.0252	0.0318	0.0251	0.0173	0.0158	0.0139	0.0151	0.0118	0.0121
B-D	mg/L	0.111	0.125	0.147	0.154	0.177	0.162	0.123	0.114	0.103	0.093	0.093	0.087
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000050	<0.0000050	<0.0000050	0.0000060	<0.0000050	<0.0000050	0.0000050	0.0000050	<0.0000050
Ca-D	mg/L	65.0	74.6	81.3	83.2	99.4	91.3	68.2	58.7	53.0	54.3	49.5	50.2
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	mg/L	0.00199	0.00146	0.00153	0.00180	0.00258	0.00146	0.00166	0.00280	0.00331	0.00305	0.00224	0.00223
Cu-D	mg/L	<0.00020	0.00020	<0.00020	<0.00020	0.00035	0.00026	0.00029	0.00023	0.00024	0.00021	0.00025	<0.00020
Hard-D	mg/L	196	224	247	255	297	276	206	176	159	166	151	151
Fe-D	mg/L	0.0172	0.0290	0.0405	0.0337	0.0375	0.0340	0.261	0.286	0.0764	0.0126	0.126	0.008
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-D	mg/L	8.21	9.22	10.7	11.4	11.9	11.5	8.68	7.18	6.54	7.44	6.69	6.16
Mn-D	mg/L	1.65	1.39	1.43	1.45	1.80	1.19	0.444	1.25	1.53	1.81	1.14	1.24
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	0.0013	0.0017	0.0013	0.0011	0.0012
K-D	mg/L	0.748	0.846	0.932	1.04	1.44	1.19	0.785	0.686	0.576	0.642	0.534	0.535
S-D	mg/L	65.8	81.8	84.2	102	98.9	98.5	75.3	54.0	48.5	58	50.7	45.8
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Si-D	mg/L	3.49	3.59	3.41	3.89	4.28	4.33	3.61	3.55	3.91	3.46	3.4	3.2
Na-D	mg/L	24.4	30.7	37.3	38.4	41.4	44.1	31.2	21.7	18.2	21.7	20.3	17
Sr-D	mg/L	0.302	0.387	0.424	0.436	0.442	0.472	0.357	0.264	0.242	0.268	0.233	0.221
Zn-D	mg/L	<0.0050	0.0120	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Table 18
2016-2017 Annual Report

EMS ID		E217014												
Site Description		South Pit Culvert- Culvert, downstream of Settling Pond #1 discharge												
Site Name		SPC												
Date		4-Apr-16	5-May-16	29-Jun-16	7-Jul-16	Aug	20-Sep-16	6-Oct-16	11-Oct-16	1-Nov-16	5-Dec-16	2-Jan-17	1-Feb-17	7-Mar-17
Parameter	Unit													
SO4-D	mg/L	227	180	174	245		290	171	83.3	171	149	145	164	78.1
Alk-T	mg/L	90.0	71.4	96.3	128		108	55.4	31.7	79.5	81.7	67.7	70.8	48.5
Acidity 8.3	mg/L	<0.50	<0.50	<0.50	<0.50		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.64	<0.50
Al-T	mg/L	0.0328	0.0489	-	0.0333		-	-	0.115	0.0705	0.0519	-	0.0401	-
As-T	mg/L	0.00035	0.00051	-	0.00102		-	-	0.00046	0.00033	0.00030	-	0.00024	-
Ba-T	mg/L	0.0175	0.0158	-	0.0267		-	-	0.0066	0.0102	0.0086	-	0.0089	-
B-T	mg/L	0.268	0.191	-	0.260		-	-	0.054	0.191	0.192	-	0.122	-
Cd-T	mg/L	<0.000010	0.000012	-	<0.000010		-	-	<0.000010	<0.000010	<0.000010	-	<0.000010	-
Ca-T	mg/L	77.4	58.5	-	96.6		-	-	27.6	47.7	44.6	-	58.0	-
Cr-T	mg/L	<0.0010	<0.0010	-	<0.0010		-	-	<0.0010	<0.0010	<0.0010	-	<0.0010	-
Co-T	mg/L	<0.00050	<0.00050	-	<0.00050		-	-	<0.00050	<0.00050	<0.00050	-	<0.00050	-
Cu-T	mg/L	<0.00050	0.00088	-	0.00065		-	-	0.00075	0.00052	0.00083	-	<0.00050	-
Hard-T	mg/L	234	186	-	296		-	-	85.7	147	135	-	177	-
Fe-T	mg/L	0.092	0.160	-	0.122		-	-	0.199	0.151	0.206	-	0.081	-
Pb-T	mg/L	<0.00020	<0.00020	-	<0.00020		-	-	0.00033	<0.00020	<0.00020	-	<0.00020	-
Mg-T	mg/L	10.0	9.7	-	13.4		-	-	4.1	6.7	5.7	-	7.69	-
Mn-T	mg/L	0.0033	0.0061	-	0.0018		-	-	0.0037	0.0035	0.0041	-	0.0061	-
Hg-T	mg/L	<0.0000020	0.0000026	-	0.0000020		-	-	0.0000044	<0.0000020	<0.0000020	-	<0.0000020	-
Mo-T	mg/L	<0.0010	<0.0010	-	<0.0010		-	-	<0.0010	<0.0010	<0.0010	-	<0.0010	-
Ni-T	mg/L	0.0011	0.0015	-	0.0012		-	-	<0.0010	<0.0010	<0.0010	-	<0.0010	-
K-T	mg/L	1.56	1.12	-	1.27		-	-	0.471	1.13	1.14	-	0.839	-
S-T	mg/L	99.8	70.1	-	104		-	-	25.5	53.8	49.8	-	51.4	-
Se-T	mg/L	<0.00010	<0.00010	-	<0.00010		-	-	<0.00010	<0.00010	<0.00010	-	<0.00010	-
Si-T	mg/L	2.40	2.13	-	5.66		-	-	3.59	3.24	3.39	-	3.45	-
Ag-T	mg/L	<0.000020	<0.000020	-	<0.000020		-	-	<0.000020	<0.000020	<0.000020	-	<0.000020	-
Na-T	mg/L	58.2	40.8	-	62.6	NF	-	-	8.52	43.7	46.1	-	22.6	-
Sr-T	mg/L	0.571	0.435	-	0.720		-	-	0.190	0.358	0.336	-	0.388	-
Zn-T	mg/L	<0.0050	<0.0050	-	<0.0050		-	-	<0.0050	<0.0050	<0.0050	-	<0.0050	-
Al-D	mg/L	0.0349	0.0251	-	0.0305		-	-	0.0970	0.0550	0.0413	-	0.0374	-
As-D	mg/L	0.00031	0.00037	-	0.00085		-	-	0.00032	0.00030	0.00024	-	0.00021	-
Ba-D	mg/L	0.0174	0.0148	-	0.0259		-	-	0.0067	0.0101	0.0087	-	0.0092	-
B-D	mg/L	0.280	0.180	-	0.295		-	-	0.065	0.179	0.200	-	0.137	-
Cd-D	mg/L	<0.0000050	<0.0000050	-	0.00001		-	-	<0.0000050	<0.0000050	<0.0000050	-	<0.0000050	-
Ca-D	mg/L	80.5000000	60.4000000	-	94.7000000		-	-	27.9000000	47.6000000	46.2000000	-	54.4	-
Cr-D	mg/L	<0.0010	<0.0010	-	<0.0010		-	-	<0.0010	<0.0010	<0.0010	-	<0.0010	-
Co-D	mg/L	<0.00050	<0.00050	-	<0.00050		-	-	<0.00050	<0.00050	<0.00050	-	<0.00050	-
Cu-D	mg/L	0.00058	0.00053	-	0.00028		-	-	0.00058	0.00052	0.00049	-	0.00037	-
Hard-D	mg/L	247	186	-	291		-	-	85.8	145	140	-	168	-
Fe-D	mg/L	0.0396	0.0640	-	0.0871		-	-	0.131	0.0863	0.0729	-	0.0484	-
Pb-D	mg/L	<0.00020	<0.00020	-	<0.00020		-	-	<0.00020	<0.00020	<0.00020	-	<0.00020	-
Mg-D	mg/L	11.10000	8.49000	-	13.30000		-	-	3.93000	6.31000	5.93000	-	7.81	-
Mn-D	mg/L	0.0038	<0.0010	-	0.0017		-	-	0.0019	0.0025	0.0030	-	0.0042	-
Hg-D	mg/L	<0.0000020	0.0000022	-	<0.0000020		-	-	0.0000044	<0.0000020	<0.0000020	-	<0.0000020	-
Mo-D	mg/L	<0.0010	<0.0010	-	<0.0010		-	-	<0.0010	<0.0010	<0.0010	-	<0.0010	-
Ni-D	mg/L	0.0013	0.0012	-	<0.0010		-	-	<0.0010	<0.0010	<0.0010	-	<0.0010	-
K-D	mg/L	1.55	0.993	-	1.25		-	-	0.454	1.12	1.15	-	0.853	-
S-D	mg/L	89.5	69.1	-	105		-	-	24.5	52.0	51.8	-	55.6	-
Se-D	mg/L	<0.00010	<0.00010	-	<0.00010		-	-	<0.00010	<0.00010	<0.00010	-	<0.00010	-
Si-D	mg/L	2.26000	2.32000	-	5.64000		-	-	3.75000	3.25000	3.54000	-	3.25	-
Na-D	mg/L	65.00	38.40	-	59.80		-	-	8.03	42.20	47.00	-	23.9	-
Sr-D	mg/L	0.612	0.487	-	0.669		-	-	0.190	0.343	0.341	-	0.393	-
Zn-D	mg/L	<0.0050	<0.0050	-	<0.0050		-	-	<0.0050	<0.0050	<0.0050	-	<0.0050	-

Table 19
2016-2017 Annual Report

EMS ID		E292130														
Site Description		Long Lake Entrance- Last wetland prior to entering Long Lake near the outlet - IDZ														
Site Name		LLE												May- Sept. Average	VIO-Ave	WQG-Max
Date		4-Apr-16	5-May-16	2-Jun-16	7-Jul-16	2-Aug-16	6-Sep-16	11-Oct-16	1-Nov-16	5-Dec-16	2-Jan-17	1-Feb-17	7-Mar-17			
Parameter	Unit															
SO4-D	mg/L	187	207	502	221	324	224	108	166	147	144	132	82.1	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	-	-	25
Alk-T	mg/L	60.4	69.5	85.5	93.3	106	96.4	38.1	77.7	76.7	60.2	54.5	44.0	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	1.40	<0.50	1.09	2.19	<0.50	<0.50	0.62	1.24	1.41	1.03	-	-	-
N-NH3	mg/L	<0.0050	0.0274	0.014	0.023	<0.0050	0.0093	0.0064	<0.0050	0.016	0.056	0.024	0.016	-	-	-
NO2+NO3	mg/L	0.020	<0.020	<0.020	0.036	<0.020	0.065	<0.020	<0.020	0.061	0.105	0.071	0.066	-	-	-
Al-T	mg/L	0.0502	0.0154	0.0071	0.0237	0.0137	0.106	0.192	0.0940	0.146	0.0965	0.0700	0.0730	-	-	-
As-T	mg/L	0.00065	0.00055	0.00070	0.00076	0.00095	0.00082	0.00144	0.00088	0.00121	0.00092	0.00066	0.00086	-	-	0.005
Ba-T	mg/L	0.0176	0.0275	0.0332	0.0333	0.0403	0.0308	0.0121	0.0135	0.0118	0.0137	0.0087	0.0103	-	-	-
B-T	mg/L	0.203	0.184	0.263	0.189	0.265	0.243	0.070	0.182	0.172	0.092	0.074	0.093	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	55.0	73.3	152	83.2	135	97.3	34.3	49.4	45.6	44.2	32.8	31.1	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020	-	-	0.11
Cu-T	mg/L	0.00053	<0.00050	<0.00050	0.00077	0.00051	0.00104	0.00075	0.00057	0.00131	0.00071	0.00072	<0.00050	-	-	0.0051
Hard-T	mg/L	167	228	487	258	430	300	107	152	137	135	103	95.8	-	-	-
Fe-T	mg/L	0.278	0.297	0.193	0.306	0.308	0.332	0.309	0.220	0.352	0.812	0.233	0.530	-	-	1
P-T	mg/L	0.0063	0.0066	0.0097	0.0072	0.0113	0.0182	0.0088	0.0043	0.0052	0.0062	0.0070	0.0040	0.0106	0.005*	0.01*
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	0.005
Mg-T	mg/L	7.27	11.0	25.8	12.2	22.3	13.8	5.21	7.06	5.61	6.12	5.02	4.42	-	-	-
Mn-T	mg/L	0.0786	0.0613	0.0236	0.0433	0.0504	0.0343	0.0381	0.0341	0.0534	0.107	0.0371	0.0644	-	-	0.8
Hg-T	mg/L	0.0000024	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	0.0000023	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	1.10	1.00	0.807	1.09	1.32	1.69	0.592	1.12	1.02	0.677	0.560	0.638	-	-	-
S-T	mg/L	70.4	84.8	174	86.8	150	96.6	33.2	54.2	45.2	42.3	30.6	29.7	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Si-T	mg/L	2.59	2.16	2.60	3.73	4.51	5.23	3.70	3.26	3.61	3.65	2.36	3.39	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	0.0001
Na-T	mg/L	38.0	38.6	47.1	46.4	47.6	37.9	11.8	42.1	40.3	19.0	15.1	16.1	-	-	-
Sr-T	mg/L	0.382	0.497	0.973	0.522	0.775	0.564	0.234	0.352	0.307	0.287	0.223	0.193	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	0.03
Al-D	mg/L	0.0278	0.0062	0.0137	0.0077	<0.0030	0.0062	0.0676	0.0444	0.0390	0.0336	0.0374	0.0307	-	-	0.1
As-D	mg/L	0.00049	0.00052	0.00073	0.00055	0.00082	0.00075	0.00119	0.00074	0.00096	0.00076	0.00069	0.00060	-	-	-
Ba-D	mg/L	0.0168	0.0272	0.0338	0.0312	0.0392	0.0283	0.0121	0.0136	0.0116	0.0151	0.0109	0.0104	-	-	-
B-D	mg/L	0.205	0.170	0.281	0.201	0.253	0.202	0.082	0.177	0.179	0.114	0.106	0.089	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	-	-	0.000288
Ca-D	mg/L	57.4	69.4	163	78.7	131	88.6	36.7	49.3	43.7	46.2	48.6	28.9	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020	-	-	-
Cu-D	mg/L	0.00045	0.00045	0.00038	0.00029	0.00053	0.00058	0.00060	0.00049	0.00063	0.00038	0.00050	0.00034	-	-	-
Hard-D	mg/L	173	213	524	243	412	275	113	150	134	145	147	89.9	-	-	-
Fe-D	mg/L	0.155	0.101	0.0493	0.0917	0.0957	0.0633	0.194	0.117	0.156	0.595	0.182	0.358	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	7.15	9.71	28.2	11.3	20.7	13.1	5.18	6.48	5.95	7.19	6.27	4.27	-	-	-
Mn-D	mg/L	0.0798	0.0525	0.0024	0.0133	0.0610	0.0259	0.0331	0.0314	0.0561	0.119	0.0477	0.0656	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	1.04	0.991	0.889	1.03	1.30	1.37	0.572	1.10	1.07	0.757	0.701	0.593	-	-	-
S-D	mg/L	63.9	79.9	183	89.4	140	85.8	33.5	52.6	48.7	48.8	42.4	27.7	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Si-D	mg/L	2.65	2.20	2.69	3.52	4.43	4.92	3.61	3.31	3.66	3.69	3.31	2.93	-	-	-
Na-D	mg/L	35.9	35.2	49.3	42.2	44.0	35.9	11.1	40.1	42.6	22.8	18.1	16.2	-	-	-
Sr-D	mg/L	0.378	0.492	1.08	0.527	0.747	0.574	0.239	0.343	0.323	0.335	0.300	0.203	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

*** Vancouver Island Objective for P-T in streams applicable from May through September. Average based on monthly samples from May through Sept. This is applied for observation only as LLE is not a stream.**

Table 20
2016-2017 Annual Report

EMS ID.		E292131												
Site Description		Seep into Long Lake												
Site Name		LLS												WQG-Max
Date		4-Apr-16	2-May-16	2-Jun-16	7-Jul-16	2-Aug-16	6-Sep-16	11-Oct-16	1-Nov-16	5-Dec-16	3-Jan-17	1-Feb-17	7-Mar-17	
Parameter	Unit													
SO4-D	mg/L	571	656	375	400	333	339	470	537	566	550	641	573	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	5.3	7.0	<4.0	<4.0	9.0	<4.0	25
Alk-T	mg/L	229	256	201	231	214	217	232	229	243	253	245	251	-
Acidity 8.3	mg/L	7.59	10.1	<0.50	7.02	1.95	1.37	5.07	3.07	9.41	5.45	5.51	3.50	-
Al-T	mg/L	<0.0030	<0.0030	0.0033	0.0054	0.0047	0.0057	0.0150	0.0206	0.0066	<0.0030	0.0161	0.0147	-
As-T	mg/L	0.00409	0.00544	0.00077	0.00193	0.00125	0.00101	0.00216	0.00583	0.00286	0.00500	0.00939	0.00535	0.005
Ba-T	mg/L	0.0196	0.0192	0.0187	0.0181	0.0199	0.0208	0.0190	0.0212	0.0195	0.0227	0.0190	0.0201	-
B-T	mg/L	0.658	0.714	0.425	0.498	0.470	0.437	0.575	0.568	0.536	0.684	0.640	0.716	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-
Ca-T	mg/L	263	212	150	159	156	152	187	197	204	215	209	220	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Co-T	mg/L	0.00072	0.00111	<0.00050	0.00062	<0.00050	<0.00050	0.00108	<0.00050	<0.00050	0.00053	0.00058	0.00039	0.11
Cu-T	mg/L	<0.00050	<0.00050	<0.00050	0.00053	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0051
Hard-T	mg/L	744	609	431	461	452	437	533	564	584	623	604	630	-
Fe-T	mg/L	0.88	1.51	0.35	0.94	0.54	0.30	0.26	2.10	0.59	1.13	3.60	1.71	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.005
Mg-T	mg/L	20.9	19.2	13.8	15.3	15.4	13.8	16.1	17.4	18.3	20.9	19.9	19.4	-
Mn-T	mg/L	0.356	0.439	0.164	0.237	0.159	0.167	0.299	0.302	0.238	0.369	0.409	0.313	0.8
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	0.0000025	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Ni-T	mg/L	0.0016	0.0025	0.0013	0.0014	0.0013	0.0011	0.0028	0.0016	0.0012	0.0017	0.0015	0.0012	0.025
K-T	mg/L	2.68	2.63	2.13	2.20	2.40	2.03	2.13	2.35	2.39	2.53	2.27	2.55	-
S-T	mg/L	213	234	134	148	148	131	167	184	197	228	219	215	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-
Si-T	mg/L	3.52	3.31	2.53	2.75	2.78	2.63	3.02	3.09	2.75	3.22	3.00	3.29	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.0001
Na-T	mg/L	120	115	78.1	92.0	89.5	80.4	89.7	96.3	103	112	103	105	-
Sr-T	mg/L	1.94	2.08	1.32	1.51	1.30	1.26	1.64	1.79	1.83	2.11	1.92	1.91	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0064	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.03
Al-D	mg/L	0.0042	0.0043	0.0128	0.0051	<0.0030	0.0118	0.0088	<0.0030	0.0057	0.0112	0.0046	0.0065	0.1
As-D	mg/L	0.00274	0.00237	0.00055	0.00090	0.00063	0.00087	0.00140	0.00161	0.00223	0.00292	0.00183	0.00237	-
Ba-D	mg/L	0.0192	0.0185	0.0185	0.0191	0.0198	0.0197	0.0185	0.0198	0.0208	0.0196	0.0181	0.0215	-
B-D	mg/L	0.644	0.821	0.401	0.578	0.438	0.411	0.543	0.504	0.639	0.666	0.615	0.651	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000490	0.0000060	<0.0000050	<0.0000050	0.0001878
Ca-D	mg/L	216	240	153	166	157	149	181	197	220	198	210	228	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Co-D	mg/L	0.00062	0.00109	<0.00050	0.00059	<0.00050	<0.00050	0.00106	<0.00050	<0.00050	0.00052	0.00053	0.00041	-
Cu-D	mg/L	<0.00020	<0.00020	0.00035	<0.00020	0.00024	0.00051	<0.00020	0.00028	0.00039	0.00046	<0.00020	<0.00020	-
Hard-D	mg/L	622	682	441	482	451	427	515	560	628	576	607	647	-
Fe-D	mg/L	<0.0050	<0.0050	0.0056	<0.0050	0.0216	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0220	<0.0050	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-
Mg-D	mg/L	19.8	20.2	14.2	16.0	13.9	13.3	15.1	16.4	19.2	20.0	20.1	19.2	-
Mn-D	mg/L	0.351	0.443	0.158	0.242	0.152	0.160	0.290	0.288	0.263	0.361	0.392	0.328	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Ni-D	mg/L	0.0016	0.0025	0.0013	0.0013	0.0013	0.0011	0.0025	0.0013	0.0014	0.0016	0.0013	0.0012	-
K-D	mg/L	2.65	2.66	2.15	2.35	2.16	1.98	2.13	2.19	2.40	2.45	2.29	2.52	-
S-D	mg/L	236	247	134	165	139	122	169	177	204	213	223	204	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-
Si-D	mg/L	3.33	3.23	2.61	2.87	2.68	2.65	2.92	2.76	3.24	2.98	2.72	3.08	-
Na-D	mg/L	114	113	78.0	95.7	78.9	75.7	90.4	90.2	107	109	109	106	-
Sr-D	mg/L	1.91	2.10	1.34	1.44	1.29	1.25	1.52	1.83	2.05	1.91	1.97	2.05	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-

WQG are displayed for comparison purposes only. Thererfore exceedances are not highlighted in the table.

Table 21
2016-2017 Annual Report

Site Description		Middle Seep into Long Lake									
Site Name		LLSM									WQG-Max
Date		4-Apr-16	2-May-16	Jun-Sept	11-Oct-16	1-Nov-16	5-Dec-16	3-Jan-17	1-Feb-17	7-Mar-17	
Parameter				NF							
SO4-D	mg/L	510	456		320	460	519	506	477	519	-
TSS	mg/L	<4.0	<4.0		<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	25
Alk-T	mg/L	210	222		163	211	226	235	206	230	-
Acidity 8.3	mg/L	4.33	7.45		<0.50	3.89	5.32	4.24	5.28	7.19	-
Al-T	mg/L	0.0041	<0.0030		0.107	0.0567	0.0167	0.0038	0.0232	0.0162	-
As-T	mg/L	0.00131	0.00157		0.00111	0.00194	0.00121	0.00282	0.00214	0.00239	0.005
Ba-T	mg/L	0.0192	0.0186		0.0180	0.0210	0.0185	0.0216	0.0176	0.0203	-
B-T	mg/L	0.631	0.563		0.356	0.481	0.511	0.614	0.496	0.653	-
Cd-T	mg/L	<0.000010	<0.000010		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-
Ca-T	mg/L	231	167		131	182	193	204	157	201	-
Cr-T	mg/L	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Co-T	mg/L	0.00064	0.00079		0.00110	0.00054	<0.00050	0.00080	0.00088	0.00045	0.11
Cu-T	mg/L	<0.00050	<0.00050		0.00154	0.00082	<0.00050	<0.00050	<0.00050	<0.00050	0.0051
Hard-T	mg/L	653	479		377	524	546	589	456	578	-
Fe-T	mg/L	0.353	0.435		0.593	0.713	0.288	0.758	0.741	0.611	1
Pb-T	mg/L	<0.00020	<0.00020		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.005
Mg-T	mg/L	18.6	15.1		12.4	16.6	15.9	19.3	15.7	18.5	-
Mn-T	mg/L	0.157	0.218		0.112	0.144	0.0842	0.281	0.235	0.198	0.8
Hg-T	mg/L	<0.0000020	<0.0000020		<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	0.0001
Mo-T	mg/L	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Ni-T	mg/L	0.0021	0.0017		0.0035	0.0021	0.0016	0.0020	0.0022	0.0016	0.025
K-T	mg/L	2.39	2.27		1.95	2.30	2.22	2.47	1.98	2.43	-
S-T	mg/L	183	176		122	172	172	203	163	197	-
Se-T	mg/L	<0.00010	<0.00010		0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-
Si-T	mg/L	3.21	2.86		2.80	2.87	2.67	3.06	2.69	3.06	-
Ag-T	mg/L	<0.000020	<0.000020	Seep was dry from June through Sept. 2016	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.0001
Na-T	mg/L	109	90.5		67.6	87.4	93.7	105	78.6	97.3	-
Sr-T	mg/L	1.76	1.61		1.08	1.88	1.66	1.85	1.51	1.72	-
Zn-T	mg/L	<0.0050	<0.0050		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.03
Al-D	mg/L	0.0053	0.0040		0.0613	0.0248	0.0132	0.0050	0.0148	0.0084	0.1
As-D	mg/L	0.00108	0.00112		0.00048	0.00108	0.00105	0.00172	0.00147	0.00178	-
Ba-D	mg/L	0.0185	0.0182		0.0177	0.0195	0.0199	0.0190	0.0173	0.0209	-
B-D	mg/L	0.634	0.637		0.360	0.460	0.586	0.593	0.467	0.586	-
Cd-D	mg/L	<0.0000050	<0.0000050		<0.0000050	0.0000080	0.0000170	<0.0000050	0.0000050	<0.0000050	0.0001878
Ca-D	mg/L	196	185		117	175	200	176	155	194	-
Cr-D	mg/L	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Co-D	mg/L	0.00061	0.00079		0.00096	0.00052	<0.00050	0.00071	0.00090	0.00048	-
Cu-D	mg/L	0.00024	<0.00020		0.00081	0.00053	0.00046	0.00050	0.00040	0.00022	-
Hard-D	mg/L	560	530		340	502	569	514	453	558	-
Fe-D	mg/L	0.0075	0.0144		<0.0050	<0.0050	<0.0050	<0.0050	0.0119	<0.0050	0.35
Pb-D	mg/L	<0.00020	<0.00020		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-
Mg-D	mg/L	17.1	16.3		11.5	15.5	17.0	18.2	16.2	17.6	-
Mn-D	mg/L	0.155	0.224		0.101	0.136	0.0902	0.252	0.238	0.203	-
Hg-D	mg/L	<0.0000020	<0.0000020		<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-
Mo-D	mg/L	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Ni-D	mg/L	0.0022	0.0018		0.0032	0.0020	0.0021	0.0018	0.0022	0.0016	-
K-D	mg/L	2.45	2.36		1.81	2.06	2.25	2.13	2.04	2.34	-
S-D	mg/L	215	176		119	160	182	180	159	185	-
Se-D	mg/L	<0.00010	<0.00010		<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	-
Si-D	mg/L	3.16	2.86		2.94	2.60	3.00	2.67	2.58	2.92	-
Na-D	mg/L	105	90.9		62.6	82.3	99.6	95.2	83.1	94.4	-
Sr-D	mg/L	1.73	1.64		1.06	1.63	1.88	1.71	1.44	1.84	-
Zn-D	mg/L	<0.0050	<0.0050		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-

WQG are displayed for comparison purposes only. Therefore exceedances are not highlighted in the table.

Table 22
2016-2017 Annual Report

EMS ID		E292069																	
Site Description		Settling Pond at 7S - Permitted discharge location for the 7-South Mining Operation																	
Site Name		7SSD																	Permit Limits
Date		4-Apr-16	1-Jun-16	7-Jul-16	2-Aug-16	6-Sep-16	7-Oct-16	11-Oct-16	17-Oct-16	24-Oct-16	1-Nov-16	24-Nov-16	28-Nov-16	5-Dec-16	3-Jan-17	18-Jan-17	1-Feb-17	7-Mar-17	7SSD
Paramet	Unit																		
SO4-D	mg/L	14.2	31.0	20.2	20.2	19.7	16.3	21.2	18.1	15.7	13.6	8.22	11.2	10.0	13.7	16.0	9.86	9.83	500
TSS	mg/L	5.3	<4.0	10.3	5.0	<4.0	27.3	<4.0	9.3	<4.0	<4.0	4.8	<4.0	<4.0	<4.0	9.0	<4.0	<4.0	25
Alk-T	mg/L	74.9	201	171	178	145	60.5	219	63.3	174	168	114	184	159	153	50.7	142	154	-
Acidity 8	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.84	<0.50	0.91	<0.50	-
Al-T	mg/L	0.219	0.0808	0.0705	0.0262	0.0228	1.03	0.0443	0.498	0.0676	0.0596	0.194	0.0535	0.0513	0.0589	0.311	0.0242	0.0228	-
As-T	mg/L	0.00100	0.00422	0.00532	0.0112	0.00629	0.00250	0.00271	0.00124	0.00196	0.00120	0.00089	0.0007	0.00083	0.00065	0.00067	0.00063	0.00070	-
Ba-T	mg/L	0.0066	0.0119	0.0093	0.0082	0.0062	0.0132	0.0110	0.0085	0.0096	0.0079	0.0062	0.0086	0.0076	0.0084	0.0064	0.0056	0.0068	-
B-T	mg/L	<0.050	0.051	<0.050	0.060	0.058	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000019	<0.000010	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	<0.000010	<0.000010	-
Ca-T	mg/L	26.6	59.0	42.4	47.4	38.7	28.6	63.7	24.9	50.6	46.3	29.1	50.3	43.8	41.6	18.5	35.9	43.7	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00200	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020	-
Cu-T	mg/L	0.00105	0.00381	0.00286	0.00176	0.00132	0.00511	0.00069	0.00253	0.00123	0.00077	0.00093	0.00074	0.00079	0.00101	0.00149	0.00055	0.00068	-
Hard-T	mg/L	87.6	230	168	189	151	82.9	227	78.8	181	166	108	181	158	144	63.5	128	155	-
Fe-T	mg/L	0.183	0.306	0.139	0.090	0.057	1.37	0.093	0.619	0.115	0.064	0.191	0.088	0.088	0.293	0.385	0.063	0.065	-
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-
Mg-T	mg/L	5.16	20.1	15.1	17.2	13.2	2.81	16.6	4.07	13.3	12.1	8.48	13.5	11.9	9.83	4.21	9.28	11.1	-
Mn-T	mg/L	0.0100	0.0784	0.0578	0.0496	0.0424	0.138	0.0319	0.0382	0.0362	0.0490	0.0264	0.124	0.0540	0.479	0.0569	0.0839	0.0619	-
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	2.2E-06	<0.0000020	2.9E-06	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-
Mo-T	mg/L	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
K-T	mg/L	0.483	2.00	1.24	1.32	1.16	0.563	0.632	0.597	0.556	0.455	0.370	0.393	0.357	0.368	0.389	0.305	0.383	-
S-T	mg/L	4.7	6.0	8.7	7.7	3.4	5.5	7.0	6.0	5.6	4.1	<3.0	3.6	<3.0	4.0	5.4	3.4	3.7	-
Se-T	mg/L	<0.00010	0.00011	<0.00010	<0.00010	0.00018	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-
Si-T	mg/L	2.96	1.00	5.36	8.47	7.56	5.40	7.11	4.35	4.94	4.36	3.80	5.52	4.73	5.75	2.86	3.67	4.45	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-
Na-T	mg/L	2.87	13.7	10.5	10.5	8.03	1.61	8.16	2.07	6.89	6.18	4.23	6.68	6.06	7.43	1.92	4.67	5.43	-
Sr-T	mg/L	0.0936	0.245	0.197	0.201	0.162	0.0781	0.247	0.0802	0.190	0.171	0.121	0.189	0.171	0.148	0.0697	0.133	0.153	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-
Al-D	mg/L	0.0135	0.0215	0.0082	0.0050	<0.0030	0.0298	0.0054	0.0293	<0.0030	<0.0030	0.0046	<0.0030	<0.0030	0.0038	0.0212	0.0033	<0.0030	0.1
As-D	mg/L	0.00073	0.00337	0.00482	0.0100	0.00569	0.00040	0.00230	0.00074	0.00181	0.00108	0.00071	0.0006	0.00070	0.00029	0.00033	0.00055	0.00063	-
Ba-D	mg/L	0.0053	0.0128	0.0087	0.0073	0.0058	0.0086	0.0100	0.0073	0.0088	0.0077	0.0053	0.0083	0.0074	0.0074	0.0045	0.0062	0.0067	-
B-D	mg/L	<0.050	0.052	<0.050	<0.050	<0.050	<0.050	<0.050	0.053	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000090	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000080	0.0000080	0.0000050	<0.0000050	0.000045
Ca-D	mg/L	26.8	55.1	41.9	46.4	37.9	26.8	60.6	23.0	48.9	43.9	28.0	48.6	45.1	37.6	19.6	38.0	42.1	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020	-
Cu-D	mg/L	0.00071	0.00347	0.00181	0.00152	0.00103	0.00144	0.00069	0.00114	0.00060	0.00054	0.00059	0.00052	0.00064	0.00063	0.00066	0.00043	0.00061	0.014
DOC	mg/L	<0.50	<0.50	3.71	<0.50	<0.50	<0.50	3.26	<0.50	<0.50	<0.50	<0.50	0.90	<0.50	2.25	0.90	1.20	2.04	-
Hard-D	mg/L	88.3	217	167	184	149	76.8	214	73.6	178	155	104	176	161	134	67.4	139	150	-
Fe-D	mg/L	0.0091	0.0850	0.0247	0.0139	0.0058	0.0401	0.0073	0.0369	<0.0050	<0.0050	0.0051	<0.0050	<0.0050	0.0178	0.0380	0.0058	0.0050	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-
Mg-D	mg/L	5.18	19.2	15.2	16.5	13.2	2.40	15.2	3.91	13.5	11.0	8.28	13.3	11.9	9.63	4.52	10.7	10.9	-
Mn-D	mg/L	<0.0010	0.0065	0.0035	0.0021	<0.0010	0.0514	0.0153	0.0319	0.0062	0.0239	0.0031	0.117	0.0455	0.423	0.0482	0.0757	0.0447	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-
Mo-D	mg/L	<0.0010	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
K-D	mg/L	0.429	1.92	1.09	1.20	0.934	0.435	0.587	0.475	0.553	0.446	0.368	0.403	0.358	0.360	0.349	0.296	0.347	-
S-D	mg/L	4.6	10.2	7.4	6.0	6.0	5.1	7.1	6.7	5.8	4.0	<3.0	3.8	3.4	3.8	5.3	3.0	3.0	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.016
Si-D	mg/L	2.31	0.79	5.12	7.90	7.25	4.10	6.38	3.64	5.10	4.29	2.92	5.39	4.74	5.17	2.88	3.95	3.80	-
Na-D	mg/L	2.89	12.0	9.31	10.0	7.78	1.49	7.69	2.14	6.87	5.87	4.19	6.75	6.05	7.34	2.05	5.28	5.27	-
Sr-D	mg/L	0.0861	0.252	0.196	0.189	0.158	0.0794	0.229	0.0829	0.209	0.168	0.115	0.196	0.171	0.145	0.0716	0.148	0.153	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-

Table 23
2016-2017 Annual Report

EMS ID		E292109														
Site Description		Stream 1 - Downstream of the 7SSD discharge, prior to entering the Lower Wetland Outlet (IDZ)														
Site Name		7S														
Date		4-Apr-16	2-May-16	5-Oct-16	11-Oct-16	17-Oct-16	24-Oct-16	1-Nov-16	24-Nov-16	28-Nov-16	5-Dec-16	2-Jan-17	18-Jan-17	1-Feb-17	7-Mar-17	WQG-Max
Parameter	Unit															
SO4-D	mg/L	2.92	3.66	3.65	4.37	3.87	3.40	2.85	1.26	2.25	3.07	2.92	2.26	2.36	3.04	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	8.0	<4.0	<4.0	<4.0	25
Alk-T	mg/L	14.9	26.8	21.6	16.4	14.2	16.4	14.8	12.4	13.5	14.4	13.2	10.3	13.9	12.1	-
Acidity 8.3	mg/L	<0.50	1.99	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.57	<0.50	-
Al-T	mg/L	0.0193	0.0163	0.0899	0.0392	0.0622	0.0333	0.0355	0.0957	0.0529	0.0364	0.0251	0.130	0.0275	0.0218	-
As-T	mg/L	<0.00010	<0.00010	0.00018	0.00013	0.00013	0.00011	0.00010	0.00014	0.00012	0.00011	<0.00010	0.00012	<0.00010	<0.00010	0.005
Ba-T	mg/L	0.0016	0.0023	0.0026	0.0016	0.0017	0.0017	0.0016	0.0016	0.0014	0.0014	0.0012	0.0016	0.0011	0.0011	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-
Ca-T	mg/L	5.29	7.10	7.05	5.00	4.82	5.21	4.61	3.51	3.91	4.01	4.18	4.13	3.76	4.11	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020	0.11
Cu-T	mg/L	<0.00050	<0.00050	0.00112	<0.00050	<0.00050	<0.00050	<0.00050	0.00060	0.00059	0.00050	<0.00050	0.00067	<0.00050	<0.00050	0.0051
Hard-T	mg/L	18.1	24.3	24.0	17.2	16.7	18.0	16.3	12.1	13.6	14.0	14.7	13.7	13.6	14.1	-
Fe-T	mg/L	<0.010	<0.010	0.040	0.018	0.015	<0.010	<0.010	0.039	0.014	<0.010	<0.010	0.075	<0.010	<0.010	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.005
Mg-T	mg/L	1.18	1.59	1.57	1.16	1.13	1.21	1.15	0.816	0.941	0.975	1.02	0.824	1.03	0.922	-
Mn-T	mg/L	<0.0010	<0.0010	0.0014	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	0.8
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	2.2E-06	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.025
K-T	mg/L	0.129	0.176	0.185	0.115	0.161	0.126	0.116	0.114	0.112	0.102	0.092	0.114	0.090	0.095	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-
Si-T	mg/L	4.64	5.04	4.66	5.03	4.65	4.61	4.31	4.04	4.06	4.30	3.84	3.77	3.59	4.28	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.0001
Na-T	mg/L	1.65	2.08	1.98	1.55	1.65	1.70	1.62	1.32	1.45	1.50	1.52	1.26	1.52	1.35	-
Sr-T	mg/L	0.0202	0.0267	0.0265	0.0216	0.0173	0.0205	0.0188	0.0149	0.0159	0.0166	0.0160	0.0151	0.0160	0.0143	-
Zn-T	mg/L	<0.0050	<0.0050	0.0064	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.03
Al-D	mg/L	0.0205	0.0177	0.0675	0.0349	0.0493	0.0258	0.0318	0.0661	0.0381	0.0335	0.0222	0.0776	0.0241	0.0232	0.1
As-D	mg/L	<0.00010	<0.00010	0.00015	<0.00010	0.00023	0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	0.00016	<0.00010	<0.00010	-
Ba-D	mg/L	0.0015	0.0022	0.0024	0.0016	0.0018	0.0020	0.0016	0.0015	0.0013	0.0014	0.0012	0.0014	0.0010	0.0012	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-
Cd-D	mg/L	<0.0000050	<0.0000050	0.0000100	<0.0000050	<0.0000050	0.0000060	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000188
Ca-D	mg/L	5.32	7.40	6.57	4.87	3.99	5.22	4.54	3.91	3.84	3.93	3.87	3.59	3.73	3.97	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020	-
Cu-D	mg/L	<0.00020	<0.00020	0.00062	0.00057	0.00047	0.00037	0.00040	0.00062	0.00041	0.00036	0.00043	0.00050	0.00027	0.00030	-
DOC	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	<0.50	1.79	-	1.06	<0.50	-
Hard-D	mg/L	18.0	25.1	22.4	16.7	14.2	17.8	15.6	13.1	13.2	13.8	13.8	12.5	13.3	13.6	-
Fe-D	mg/L	<0.0050	<0.0050	0.0197	0.0051	0.0118	0.0053	<0.0050	0.0313	0.0067	<0.0050	0.0051	0.0365	<0.0050	<0.0050	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-
Mg-D	mg/L	1.15	1.61	1.44	1.11	1.02	1.15	1.04	0.811	0.875	0.975	0.993	0.869	0.978	0.893	-
Mn-D	mg/L	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	2.6E-06	4.6E-06	<0.0000020	2.3E-06	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
K-D	mg/L	0.127	0.159	0.129	0.110	0.134	0.128	0.113	0.122	0.106	0.100	0.090	0.103	0.082	0.083	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-
Si-D	mg/L	4.61	5.30	5.03	4.60	3.96	4.67	4.45	4.31	4.08	4.50	3.73	3.40	3.62	3.69	-
Na-D	mg/L	1.59	1.93	1.56	1.47	1.48	1.63	1.53	1.34	1.34	1.47	1.50	1.34	1.53	1.28	-
Sr-D	mg/L	0.0193	0.0281	0.0278	0.0194	0.0190	0.0224	0.0190	0.0142	0.016	0.0171	0.0158	0.0157	0.0156	0.0159	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-

Table 24
2016-2017 Annual Report

EMS ID	E292109							
Site Description:	Stream 1 (7S) - Average Water Quality Compared to (5 in 30) Average Water Quality Guidelines							
Site Name		7S						
Date		5-Oct-16	11-Oct-16	17-Oct-16	24-Oct-16	1-Nov-16	Average	WQG- Average
Parameter	Unit							
Hard-T	mg/L	24.00	17.20	16.70	18.00	16.30	18.4	NA
SO4-D	mg/L	3.65	4.37	3.87	3.4	2.85	3.6	128
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	5
Cu-T	mg/L	0.00112	<0.00050	<0.00050	<0.00050	<0.00050	0.000624	0.0020
Mn-T	mg/L	0.0014	<0.0010	<0.0010	<0.0010	<0.0010	0.00108	0.7
Al-D	mg/L	0.0675	0.0349	0.0493	0.0258	0.0318	0.0419	0.05
Cd-D	mg/L	0.0000100	<0.0000050	<0.0000050	0.000006	<0.0000050	0.0000062	0.000088

Table 25
2016-2017 Annual Report

Daily Total Suspended Solid Results

EMS ID E207409

Site Description Settling Pond #4 (WD)

TSS Permit Limit: 25.0 mg/L

Date	April	May	June	July	August	September	October	November	December	January	February	March
1	<4.0	<4.0	5.00	-	<4.0	<4.0	<4.0	13.50	<4.0	5.0	<4.0	<4.0
2	**PNC**	9.70	6.00	-	-	<4.0	<4.0	24.30	5.80	<4.0	<4.0	<4.0
3	**PNC**	<4.0	6.00	-	-	<4.0	<4.0	11.80	<4.0	<4.0	<4.0	<4.0
4	<4.0	4.00	5.30	-	-	<4.0	<4.0	**32.80**	<4.0	5.3	<4.0	<4.0
5	<4.0	5.70	<4.0	<4.0	-	<4.0	<4.0	**35.00**	5.80	6.5	<4.0	<4.0
6	<4.0	6.30	<4.0	<4.0	-	<4.0	<4.0	**29.00**	<4.0	11.3	<4.0	<4.0
7	4.00	6.00	<4.0	<4.0	-	<4.0	4.50	**32.80**	6.50	6.5	<4.0	4.3
8	<4.0	7.30	<4.0	<4.0	<4.0	4.00	<4.0	**39.00**	5.30	6.3	<4.0	<4.0
9	<4.0	4.00	-	<4.0	-	<4.0	<4.0	**36.80**	5.00	8.5	<4.0	<4.0
10	4.30	4.30	-	<4.0	-	<4.0	<4.0	**32.80**	5.30	<4.0	<4.0	<4.0
11	4.30	4.50	-	<4.0	-	<4.0	<4.0	**33.50**	5.50	<5.3	<4.0	<4.0
12	4.00	-	-	<4.0	-	<4.0	<4.0	**32.00**	4.00	5.8	<4.0	<4.0
13	4.00	-	<4.0	<4.0	<4.0	<4.0	<4.0	**31.00**	<4.0	5.8	<4.0	<4.0
14	<4.0	-	-	4.30	<4.0	<4.0	<4.0	16.00	<4.0	5.0	4.3	<4.0
15	4.30	-	-	<4.0	4.50	4.30	<4.0	15.50	5.50	4.5	4.3	<4.0
16	4.30	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	15.00	7.80	4.3	<4.0	<4.0
17	4.50	4.00	<4.0	<4.0	<4.0	4.00	<4.0	<4.0	4.50	<4.0	<4.0	<4.0
18	5.30	4.80	<4.0	<4.0	8.50	<4.0	<4.0	6.00	5.00	5.5	<4.0	<4.0
19	6.50	4.30	<4.0	<4.0	<4.0	4.00	<4.0	7.50	4.80	<4.0	<4.0	<4.0
20	4.50	<4.0	-	<4.0	<4.0	<4.0	<4.0	8.00	4.00	4.0	<4.0	<4.0
21	5.80	<4.0	-	<4.0	<4.0	<4.0	<4.0	10.30	5.00	18.5	**PNC**	<4.0
22	5.00	4.00	-	<4.0	-	<4.0	16.80	12.50	4.80	**51.5**	**PNC**	<4.0
23	4.30	5.30	-	<4.0	-	4.50	**27.30**	12.30	<4.0	<4.0	<4.0	<4.0
24	6.00	4.00	-	<4.0	-	<4.0	20.50	9.00	5.00	4.5	<4.0	<4.0
25	8.30	4.80	-	4.30	10.30	<4.0	21.00	8.30	4.00	8.3	<4.0	<4.0
26	9.50	<4.0	-	4.50	10.30	<4.0	14.00	10.00	<4.0	<4.0	<4.0	4.0
27	7.80	-	<4.0	-	5.50	<4.0	18.50	7.80	4.00	<4.0	4.3	<4.0
28	<4.0	-	<4.0	-	4.00	<4.0	19.00	4.00	4.00	<4.0	<4.0	<4.0
29	5.00	-	<4.0	-	<4.0	<4.0	21.50	5.00	5.30	<4.0	-	<4.0
30	<4.0	5.80	-	-	<4.0	<4.0	15.80	<4.0	4.00	**58.5**	-	<4.0
31	-	<4.0	-	-	<4.0	-	21.30	-	4.30	11.0	-	<4.0

Notes: TSS composite sample is required: monthly - no decant flow, weekly when max daily flow < 0.054m^3/s & daily when max daily flow > 0.054m^3/s

Values highlighted in **bold red** indicate a permit limit exceedance

PNC (Permit Non-Compliance) indicates a required TSS sample was not collected

A dash (-) indicates that a sample was not required

Table 26
2016-2017 Annual Report

Total Suspended Solid Results

EMS ID E218582

Site Description Settling Pond #1 (SPD)

TSS Permit Limit: 25.0 mg/L

Date	TSS mg/L	Date	TSS mg/L	Date	TSS mg/L	Date	TSS mg/L	Date	TSS mg/L	Date	TSS mg/L	Date	TSS mg/L
3-Apr-16	<4.0	5-Oct-16	<4.0	1-Nov-16	10.5	1-Dec-16	6	1-Jan-17	<4.0	1-Feb-17	6.0	1-Mar-17	<4.0
4-Apr-16	<4.0	6-Oct-16	<4.0	2-Nov-16	13.0	2-Dec-16	6.5	2-Jan-17	<4.0	2-Feb-17	7.3	2-Mar-17	<4.0
8-Apr-16	<4.0	7-Oct-16	5.0	3-Nov-16	5.3	3-Dec-16	9.5	3-Jan-17	<4.0	3-Feb-17	<4.0	3-Mar-17	<4.0
9-Apr-16	<4.0	8-Oct-16	<4.0	4-Nov-16	4.8	4-Dec-16	11.5	5-Jan-17	5.0	4-Feb-17	<4.0	4-Mar-17	<4.0
13-Apr-16	<4.0	9-Oct-16	<4.0	5-Nov-16	7.8	5-Dec-16	<4.0	6-Jan-17	5.0	5-Feb-17	4.0	5-Mar-17	<4.0
14-Apr-16	<4.0	10-Oct-16	<4.0	6-Nov-16	8.0	6-Dec-16	6.8	7-Jan-17	4.8	6-Feb-17	<4.0	6-Mar-17	<4.0
20-Apr-16	5.0	11-Oct-16	<4.0	7-Nov-16	7.8	7-Dec-16	6.5	8-Jan-17	<4.0	7-Feb-17	<4.0	7-Mar-17	<4.0
21-Apr-16	<4.0	12-Oct-16	<4.0	8-Nov-16	7.0	8-Dec-16	4.8	9-Jan-17	5.8	8-Feb-17	<4.0	8-Mar-17	<4.0
28-Apr-16	<4.0	13-Oct-16	<4.0	9-Nov-16	**PNC**	9-Dec-16	5.5	10-Jan-17	5.8	9-Feb-17	4.0	9-Mar-17	<4.0
4-May-16	<4.0	14-Oct-16	9.3	10-Nov-16	7.0	12-Dec-16	<4.0	16-Jan-17	8.0	10-Feb-17	<4.0	10-Mar-17	<4.0
8-May-16	<4.0	15-Oct-16	8.3	11-Nov-16	7.8	15-Dec-16	<4.0	17-Jan-17	<4.0	11-Feb-17	<4.0	11-Mar-17	<4.0
16-May-16	<4.0	16-Oct-16	8.8	12-Nov-16	12.0	16-Dec-16	<4.0	18-Jan-17	<4.0	12-Feb-17	<4.0	12-Mar-17	<4.0
2-Jun-16	<4.0	17-Oct-16	8.5	13-Nov-16	12.3	17-Dec-16	<4.0	19-Jan-17	5.0	13-Feb-17	<4.0	13-Mar-17	<4.0
27-Jun-16	<4.0	18-Oct-16	10.3	14-Nov-16	6.3	18-Dec-16	<4.0	20-Jan-17	4.8	14-Feb-17	6.3	14-Mar-17	<4.0
5-Jul-16	<4.0	19-Oct-16	9.0	15-Nov-16	7.8	20-Dec-16	<4.0	21-Jan-17	5.0	15-Feb-17	<4.0	15-Mar-17	<4.0
6-Jul-16	<4.0	20-Oct-16	7.8	16-Nov-16	9.3	22-Dec-16	<4.0	22-Jan-17	<4.0	16-Feb-17	<4.0	16-Mar-17	<4.0
11-Jul-16	<4.0	21-Oct-16	11.5	17-Nov-16	7.5	23-Dec-16	<4.0	23-Jan-17	<4.0	17-Feb-17	<4.0	17-Mar-17	<4.0
18-Jul-16	<4.0	22-Oct-16	<8.0	18-Nov-16	7.0	24-Dec-16	<4.0	24-Jan-17	5.0	18-Feb-17	6.3	18-Mar-17	<4.0
25-Jul-16	<4.0	23-Oct-16	10.5	19-Nov-16	7.5	25-Dec-16	<4.0	25-Jan-17	5.5	19-Feb-17	<4.0	19-Mar-17	<4.0
1-Aug-16	<4.0	24-Oct-16	8.5	20-Nov-16	6.3	26-Dec-16	<4.0	26-Jan-17	<4.0	20-Feb-17	5.5	20-Mar-17	<4.0
6-Sep-16	<4.0	25-Oct-16	15	21-Nov-16	9.3	27-Dec-16	<4.0	27-Jan-17	5.8	21-Feb-17	<4.0	21-Mar-17	<4.0
12-Sep-16	<4.0	26-Oct-16	11.0	22-Nov-16	<11	28-Dec-16	<4.0	28-Jan-17	5.8	22-Feb-17	**PNC**	22-Mar-17	<4.0
13-Sep-16	<4.0	27-Oct-16	9.0	23-Nov-16	9.5	29-Dec-16	<4.0	29-Jan-17	6.5	23-Feb-17	5.3	23-Mar-17	<4.0
19-Sep-16	<4.0	28-Oct-16	11.0	24-Nov-16	5.8	30-Dec-16	<4.0	30-Jan-17	4.5	24-Feb-17	4.0	24-Mar-17	5.3
20-Sep-16	<4.0	29-Oct-16	14.0	25-Nov-16	9.0	31-Dec-16	<4.0	31-Jan-17	<4.0	25-Feb-17	<4.0	25-Mar-17	7.0
26-Sep-16	<4.0	30-Oct-16	15.5	26-Nov-16	9.3	-	-	-	-	26-Feb-17	6.0	26-Mar-17	5.5
-	-	31-Oct-16	12.8	27-Nov-16	15.5	-	-	-	-	27-Feb-17	<4.0	27-Mar-17	5.8
-	-	-	-	28-Nov-16	12.3	-	-	-	-	28-Feb-17	<4.0	28-Mar-17	7.5
-	-	-	-	29-Nov-16	8.8	-	-	-	-	-	-	29-Mar-17	<4.0
-	-	-	-	30-Nov-16	11.3	-	-	-	-	-	-	30-Mar-17	5.0
-	-	-	-			-	-	-	-	-	-	31-Mar-17	4.5

Notes: TSS composite sample is required: monthly - no decant flow, weekly when max daily flow < 0.046m^3/s & daily when max daily flow > 0.046m^3/s

Values highlighted in **bold red** indicate a permit limit exceedance

PNC (Permit Non-Compliance) indicates a required TSS sample was not collected.

A dash (-) indicates that a sample was not required

Table 27
2016-2017 Annual Report

Total Suspended Solid Results

EMS ID E292069

Site Description 7 South Surface Decant (7SSD)

TSS Permit Limit: 25.0 mg/L

Date	TSS mg/L	Date	TSS mg/L
4-Apr-16	5.3	3-Jan-17	<4.0
4-May-16	Insufficient water for sample	17-Jan-17	**PNC**
1-Jun-16	<4.0	18-Jan-17	9
7-Jul-16	10.3	1-Feb-17	<4.0
2-Aug-16	5.0	7-Mar-17	<4.0
6-Sep-16	<4.0		
7-Oct-16	**27.3**		
11-Oct-16	<4.0		
14-Oct-16	**PNC**		
15-Oct-16	**PNC**		
16-Oct-16	**35.0**		
17-Oct-16	9.3		
18-Oct-16	8.3		
19-Oct-16	4.3		
24-Oct-16	<4.0		
1-Nov-16	<4.0		
24-Nov-16	4.8		
25-Nov-16	<4.0		
26-Nov-16	<4.0		
27-Nov-16	<4.0		
28-Nov-16	<4.0		
5-Dec-16	<4.0		

Notes:

Values highlighted in **bold red** indicate a permit limit exceedance

PNC (Permit Non-Compliance) indicates a required TSS sample was not collected.

Table 28
2016-2017 Annual Report

EMS ID	E207409											
DISCHARGE FROM SETTLING POND # 4 (WD)												
Date	**April**	**April**	**May**	**May**	**June**	**June**	**July**	**July**	**August**	**August**	**September**	**September**
	Max. (m3/s)	Daily (m3/s)	Max. (m3/s)	Daily (m3/s)	Max. (m3/s)	Daily (m3/s)	Max. (m3/s)	Daily (m3/s)	Max. (m3/s)	Daily (m3/s)	Max. (m3/s)	Daily (m3/s)
1	**0.1670**	0.1478	**0.1620**	0.1506	**PNC**	**PNC**	0.0380	0.0277	0.0180	0.0120	**0.0900**	0.0642
2	**0.1740**	0.1599	**0.1830**	0.1699	**PNC**	**PNC**	0.0380	0.0243	0.0180	0.0111	**0.1150**	0.0925
3	**0.1810**	0.1709	**0.1870**	0.1824	**PNC**	**PNC**	0.0270	0.0178	0.0160	0.0098	**0.0870**	0.0648
4	**0.1650**	0.1552	**0.1710**	0.1259	**PNC**	**PNC**	0.0220	0.0159	0.0160	0.0094	**0.0610**	0.0491
5	**0.1770**	0.1551	**0.1430**	0.1262	**PNC**	**PNC**	0.0200	0.0110	0.0140	0.0077	**0.0600**	0.0562
6	**0.1800**	0.1741	**0.1430**	0.1333	**PNC**	**PNC**	**0.0590**	0.0224	0.0120	0.0095	**0.0580**	0.0521
7	**0.1870**	0.1669	**0.1320**	0.1291	0.0350	0.0245	**0.0850**	0.0706	0.0110	0.0080	**0.0670**	0.0582
8	**0.2110**	0.2002	**0.1300**	0.0973	0.0330	0.0291	**0.0820**	0.0769	0.0100	0.0085	**0.0680**	0.0543
9	**0.2140**	0.2026	**0.0850**	0.0554	0.0340	0.0286	**0.0840**	0.0755	0.0100	0.0069	**0.1210**	0.0631
10	**0.2150**	0.2011	0.0380	0.0185	0.0390	0.0346	**0.0840**	0.0729	0.0100	0.0062	**0.1710**	0.1525
11	**0.2090**	0.1970	0.0220	0.0155	0.0380	0.0298	**0.0860**	0.0832	0.0090	0.0053	**0.1700**	0.1580
12	**0.1870**	0.1654	0.0190	0.0130	0.0340	0.0301	**0.1480**	0.0964	0.0180	0.0052	**0.1670**	0.1519
13	**0.1440**	0.1299	0.0190	0.0130	0.0330	0.0290	**0.1530**	0.1463	**0.1370**	0.0935	**0.2050**	0.1809
14	**0.1330**	0.1187	0.0230	0.0172	0.0360	0.0295	**0.1360**	0.0775	**0.1650**	0.1561	**0.2110**	0.2059
15	**0.1040**	0.0796	0.0230	0.0161	0.0350	0.0265	**0.0580**	0.0508	**0.1580**	0.1409	**0.2100**	0.2038
16	**0.0800**	0.0680	0.0340	0.0188	0.0310	0.0242	**0.0610**	0.0527	**0.1260**	0.0926	**0.1970**	0.1937
17	**0.0810**	0.0705	0.0520	0.0420	0.0310	0.0231	**0.0680**	0.0606	**0.0880**	0.0580	**0.1930**	0.1862
18	**0.1050**	0.0797	**0.0610**	0.0514	0.0530	0.0341	**0.0750**	0.0564	**0.0570**	0.0338	**0.1740**	0.1303
19	**0.1260**	0.1076	**0.0590**	0.0493	**0.0560**	0.0402	**0.0720**	0.0628	0.0350	0.0216	**0.0810**	0.0686
20	**0.1310**	0.1158	0.0530	0.0448	0.0400	0.0296	**0.0750**	0.0666	0.0220	0.0115	**0.0800**	0.0764
21	**0.1520**	0.1368	**0.0590**	0.0459	0.0390	0.0276	**0.0750**	0.0611	0.0290	0.0196	**0.0850**	0.0720
22	**0.1570**	0.1429	**0.0590**	0.0449	0.0390	0.0293	**0.0730**	0.0634	0.0300	0.0218	**0.0850**	0.0705
23	**0.1350**	0.1177	0.0480	0.0441	0.0300	0.0262	**0.0710**	0.0626	0.0290	0.0198	**0.0810**	0.0755
24	**0.1370**	0.1138	**0.0590**	0.0433	0.0300	0.0218	**0.0700**	0.0627	0.0200	0.0109	**0.0790**	0.0734
25	**0.1540**	0.1221	**0.0590**	0.0498	0.0240	0.0173	**0.0660**	0.0593	0.0540	0.0328	**0.0780**	0.0730
26	**0.1570**	0.1437	**0.0550**	0.0428	0.0210	0.0118	**0.0550**	0.0438	**0.0570**	0.0476	**0.0770**	0.0726
27	**0.1410**	0.1069	0.0340	0.0200	0.0520	0.0176	0.0480	0.0335	**0.0550**	0.0472	**0.0810**	0.0687
28	**0.1550**	0.1403	0.0220	0.0179	**0.0650**	0.0526	0.0270	0.0171	**0.0580**	0.0542	**0.0810**	0.0681
29	**0.1570**	0.1332	0.0170	0.0120	**0.0630**	0.0439	0.0210	0.0135	**0.0620**	0.0558	**0.0800**	0.0694
30	**0.1540**	0.1363	**PNC**	**PNC**	0.0520	0.0405	0.0190	0.0122	**0.0660**	0.0592	**0.0770**	0.0696
31			**PNC**	**PNC**			0.0180	0.0116	**0.0710**	0.0589		
Monthly Max	0.2150		0.1870		0.0650		0.1530		0.1650		0.1130	
Monthly Avg		0.1387		0.0617		0.0292		0.0519		0.0366		0.0992

During Q1 the flow meter malfunctioned & erased the daily flow results.

P = Permit Limit Exceedance

BOLD = Flow requires TSS composite sample (Max daily flow > 0.054m^3/s)

For Decant Flow > 0.054 m^3/s

Table 29
2016-2017 Annual Report

EMS ID **E207409**

DISCHARGE FROM SETTLING POND # 4 (WD)

Date	October Max. (m3/s)	October Daily (m3/s)	November Max. (m3/s)	November Daily (m3/s)	December Max. (m3/s)	December Daily (m3/s)	January Max. (m3/s)	January Daily (m3/s)	February Max. (m3/s)	February Daily (m3/s)	March Max. (m3/s)	March Daily (m3/s)
1	**0.0820**	0.0764	**0.2090**	**0.2090**	**0.2260**	0.1873	**0.1350**	0.1290	**0.1180**	0.0949	**0.1640**	0.1538
2	**0.0820**	0.0755	**0.2090**	**0.2090**	**0.2300**	0.1947	**0.1320**	0.1210	**0.0850**	0.0799	**0.1480**	0.1398
3	**0.0750**	0.0692	**0.2090**	**0.2090**	**0.2120**	0.1770	**0.1310**	0.1130	**0.1150**	0.0864	**0.1520**	0.1448
4	**0.0610**	0.0458	**0.2090**	**0.2090**	**0.2360**	0.2086	**0.1310**	0.1137	**0.1220**	0.1059	**0.1500**	0.1398
5	**0.0560**	0.0463	**0.2090**	**0.2090**	**0.2150**	0.1946	**0.1330**	0.1229	**0.1150**	0.0983	**0.1520**	0.1428
6	**0.1170**	0.0473	**0.2090**	**0.2090**	**0.2070**	0.1842	**0.1360**	0.1310	**0.1130**	0.1003	**0.1550**	0.1460
7	**0.1670**	0.1441	0.1500	0.1500	**0.1800**	0.1522	**0.1370**	0.1243	**0.1080**	0.0922	**0.1460**	0.1358
8	**0.1800**	0.1742	**0.1500**	**0.1500**	**0.1780**	0.1557	**0.1420**	0.1365	**0.1150**	0.1018	**0.1530**	0.1424
9	**0.1680**	0.1450	**0.1500**	**0.1500**	**0.1800**	0.1592	**0.1420**	0.1365	**0.1040**	0.0859	**0.1450**	0.1360
10	**0.1430**	0.1301	0.1500	0.1500	**0.1680**	0.1422	**0.1370**	0.1286	**0.1360**	0.1237	**0.1690**	0.1449
11	**0.1300**	0.0993	**0.1500**	**0.1500**	**0.1750**	0.1621	**0.1350**	0.1310	**0.1360**	0.1291	**0.1770**	0.1681
12	**0.1200**	0.0999	**0.1500**	**0.1500**	**0.1620**	0.1469	**0.1350**	0.1246	**0.1440**	0.1331	**0.1640**	0.1545
13	**0.1350**	0.1156	**0.1500**	**0.1500**	**0.1480**	0.1326	**0.1350**	0.1280	**0.1490**	0.1378	**0.1590**	0.1506
14	**0.1740**	0.1549	**0.1500**	**0.1486**	**0.1390**	0.1300	**0.1340**	0.1253	**0.1530**	0.1391	**0.1680**	0.1603
15	**0.2020**	0.1656	**0.1500**	**0.1493**	**0.1370**	0.1225	**0.1370**	0.1304	**0.1850**	0.1664	**0.1680**	0.1618
16	**0.2070**	0.1822	**0.1500**	0.1500	**0.1360**	0.1228	**0.1680**	0.1483	**0.2080**	0.2000	**0.1610**	0.1400
17	**0.1910**	0.1770	**0.1500**	**0.1500**	**0.1350**	0.1153	**0.1750**	0.1645	**0.2190**	0.2116	**0.1410**	0.1326
18	**0.1720**	0.1529	**0.1500**	**0.1500**	**0.1390**	0.1318	**0.1820**	0.1766	**0.2220**	0.2114	**0.1430**	0.1188
19	**0.1430**	0.1334	**0.1500**	**0.1500**	**0.1430**	0.1017	**0.1890**	0.1791	**0.2200**	0.1996	**0.1510**	0.1101
20	**0.1300**	0.1187	**0.1500**	**0.1500**	**0.1480**	0.1391	**0.1860**	0.1835	**0.2250**	0.1974	**0.1520**	0.1241
21	**0.1720**	0.1326	**0.2020**	0.1964	**0.1340**	0.1273	**0.1920**	0.1796	**0.2260**	0.1934	**0.1630**	0.1547
22	**0.2010**	0.1888	**0.2360**	0.1838	**0.1350**	0.1314	**0.1660**	0.1636	**0.2120**	0.1864	**0.1580**	0.1537
23	**0.2010**	0.1776	**0.2170**	0.1712	**0.1370**	0.1292	**0.1670**	0.1579	**0.2160**	0.2049	**0.1520**	0.1464
24	**0.1940**	0.1809	**0.1530**	0.1508	**0.1340**	0.1271	**0.1510**	0.1297	**0.2120**	0.2052	**0.1540**	0.1491
25	**0.2140**	0.1879	**0.2340**	0.1844	**0.1380**	0.1298	**0.1530**	0.1244	**0.2120**	0.2047	**0.1580**	0.1483
26	**0.2140**	0.1900	**0.1570**	0.1508	**0.1410**	0.1306	**0.1380**	0.1157	**0.2110**	0.2050	**0.1500**	0.1450
27	**0.2150**	0.1924	**0.2150**	0.1680	**0.1370**	0.1324	**0.1430**	0.1382	**0.2060**	0.1902	**0.1510**	0.1445
28	**0.2170**	0.1901	**0.2190**	0.1671	**0.1360**	0.1320	**0.1430**	0.1361	**0.1720**	0.1578	**0.1550**	0.1481
29	**0.2140**	0.1944	**0.2120**	0.1706	**0.1330**	0.1270	**0.1440**	0.1375			**0.1670**	0.1603
30	**0.2090**	0.2054	**0.2300**	0.2150	**0.1400**	0.1340	**0.1430**	0.1062			**0.1750**	0.1598
31	**0.2090**	0.2090			**0.1350**	0.1280	**0.0950**	0.0713			**0.1790**	0.1647
Monthly Max	0.2170		0.2360		0.2360		0.1920		0.2260		0.1790	
Monthly Avg		0.1420		0.1703		0.1448		0.1357		0.1515		0.1459

During Q3 the flow meter repeatedly erased the daily flow results. New flow meter was purchased.

Bold **Daily Observations.**

Shaded Gray **Flow meter observations recorded in field book.**

P = Permit Limit Exceedance

BOLD = Flow requires TSS composite sample (Max daily flow > 0.054m^3/s)

For Decant Flow > 0.054 m^3/s

Table 30
2016-2017 Annual Report

EMS ID	E218582											
DISCHARGE FROM SETTLING POND # 1 (SPD)												
Date	**April**	**April**	**May**	**May**	**June**	**June**	**July**	**July**	**August**	**August**	**September**	**September**
	Max. (m3/s)	Daily (m3/s)	Max. (m3/s)	Daily (m3/s)	Max. (m3/s)	Daily (m3/s)	Max. (m3/s)	Daily (m3/s)	Max. (m3/s)	Daily (m3/s)	Max. (m3/s)	Daily (m3/s)
1	0.0230	0.0138	0.0040	0.0014	NF	NF	0.0060	0.0028	NF	NF	NF	NF
2	0.0210	0.0139	0.0030	0.0014	NF	NF	0.0030	0.0011	NF	NF	NF	NF
3	**0.0540**	0.0263	0.0020	0.0013	NF	NF	0.0020	0.0005	NF	NF	NF	NF
4	**0.0600**	0.0419	0.0020	0.0007	NF	NF	0.0010	0.0000	NF	NF	NF	NF
5	0.0300	0.0226	0.0010	0.0002	NF	NF	0.0200	0.0031	NF	NF	NF	NF
6	0.0240	0.0201	0.0010	0.0000	NF	NF	0.0260	0.0187	NF	NF	NF	NF
7	0.0200	0.0128	NF	NF	NF	NF	0.0100	0.0058	NF	NF	NF	NF
8	**0.0480**	0.0177	NF	NF	NF	NF	0.0050	0.0025	NF	NF	NF	NF
9	**0.0590**	0.0390	NF	NF	NF	NF	0.0050	0.0026	NF	NF	NF	NF
10	0.0310	0.0166	NF	NF	NF	NF	0.0050	0.0016	NF	NF	NF	NF
11	0.0210	0.0170	NF	NF	NF	NF	0.0030	0.0013	NF	NF	0.0350	0.0096
12	0.0200	0.0156	NF	NF	NF	NF	0.0260	0.0078	NF	NF	0.0420	0.0262
13	**0.0500**	0.0222	NF	NF	NF	NF	0.0220	0.0094	NF	NF	0.0430	0.0208
14	**0.0580**	0.0393	NF	NF	NF	NF	0.0090	0.0042	NF	NF	0.0350	0.0103
15	0.0290	0.0183	NF	NF	NF	NF	0.0070	0.0026	NF	NF	0.0320	0.0140
16	0.0180	0.0151	**NF**	NF	NF	NF	0.0060	0.0022	NF	NF	0.0140	0.0082
17	0.0160	0.0113	NF	NF	NF	NF	0.0050	0.0021	NF	NF	0.0380	0.0157
18	0.0160	0.0090	NF	NF	NF	NF	0.0080	0.0035	NF	NF	0.0320	0.0126
19	0.0160	0.0094	NF	NF	NF	NF	0.0070	0.0034	NF	NF	0.0080	0.0041
20	**0.0560**	0.0194	NF	NF	NF	NF	0.0050	0.0022	NF	NF	0.0440	0.0131
21	**0.0620**	0.0439	NF	NF	NF	NF	0.0040	0.0012	NF	NF	0.0350	0.0128
22	0.0300	0.0218	NF	NF	NF	NF	0.0030	0.0009	NF	NF	0.0150	0.0076
23	0.0210	0.0175	NF	NF	0.0010	0.0000	0.0020	0.0006	NF	NF	0.0130	0.0092
24	0.0190	0.0141	NF	NF	0.0270	0.0151	0.0010	0.0003	NF	NF	0.0110	0.0092
25	0.0180	0.0091	NF	NF	0.0210	0.0084	0.0010	0.0002	NF	NF	0.0120	0.0107
26	0.0150	0.0114	NF	NF	0.0070	0.0025	NF	NF	NF	NF	0.0120	0.0095
27	0.0160	0.0088	NF	NF	0.0040	0.0013	NF	NF	NF	NF	0.0120	0.0060
28	0.0150	0.0071	NF	NF	0.0190	0.0030	NF	NF	NF	NF	0.0100	0.0045
29	0.0070	0.0029	NF	NF	0.0290	0.0170	NF	NF	NF	NF	0.0090	0.0039
30	0.0040	0.0015	NF	NF	0.0160	0.0047	NF	NF	NF	NF	0.0070	0.0033
31			NF	NF			NF	NF	NF	NF		
Monthly Max	0.0620		0.0040		0.0290		0.0260		0.0000		0.0440	
Monthly Avg		0.01797		0.00082		0.00650		0.00322		0.00000		0.01056

PNC = Permit Non-compliance

Bold = TSS composite sample is required: **monthly** - no decant flow, **weekly** when max daily flow < 0.046m^3/s & **daily** when max daily flow > 0.046m^3/s

No Flow= NF

Table 31
2016-2017 Annual Report

EMS ID	E218582											
DISCHARGE FROM SETTLING POND # 1 (SPD)												
Date	October	October	November	November	December	December	January	January	February	February	March	March
	Max. (m3/s)	Daily (m3/s)	Max. (m3/s)	Daily (m3/s)	Max. (m3/s)	Daily (m3/s)	Max. (m3/s)	Daily (m3/s)	Max. (m3/s)	Daily (m3/s)	Max. (m3/s)	Daily (m3/s)
1	0.0140	0.0069	**0.0950**	0.0678	**0.1040**	0.0798	**0.0510**	0.0274	**0.0800**	0.0118	0.0370	0.0162
2	0.0160	0.0116	**0.2130**	0.1447	**0.1020**	0.0840	0.0320	0.0183	0.0000	0.0000	0.0060	0.0043
3	0.0150	0.0115	**0.2120**	0.2051	**0.0820**	0.0648	0.0170	0.0089	0.0000	0.0000	0.0090	0.0047
4	0.0280	0.0134	**0.1950**	0.1658	**0.0880**	0.0690	0.0100	0.0014	0.0150	0.0010	0.0060	0.0031
5	**0.0500**	0.0417	**0.1680**	0.1516	**0.0510**	0.0404	0.0070	0.0009	0.0060	0.0029	0.0050	0.0028
6	**0.1830**	0.0533	**0.1400**	0.1316	**0.0680**	0.0476	0.0000	0.0000	0.0040	0.0010	0.0040	0.0020
7	**0.2070**	0.1617	**0.1900**	0.1536	**0.0620**	0.0334	0.0000	0.0000	0.0010	0.0000	0.0070	0.0027
8	**0.1200**	0.1137	**0.1970**	0.1859	**0.0650**	0.0352	0.0000	0.0000	0.0430	0.0137	0.0050	0.0021
9	**0.1080**	0.0902	**0.1960**	0.1637	**0.0680**	0.0526	0.0000	0.0000	0.0440	0.0250	0.0040	0.0019
10	**0.0900**	0.0621	**0.1460**	0.1277	0.0310	0.0244	0.0000	0.0000	0.0220	0.0088	0.0050	0.0022
11	**0.0810**	0.0447	**0.1240**	0.1058	0.0300	0.0231	0.0000	0.0000	**0.0640**	0.0059	0.0110	0.0056
12	**0.0840**	0.0735	**0.1200**	0.1105	0.0200	0.0169	0.0170	0.0002	**0.0530**	0.0050	0.0430	0.0137
13	**0.0890**	0.0657	**0.1230**	0.0965	0.0170	0.0086	0.0000	0.0000	**0.0700**	0.0132	**0.0490**	0.0337
14	**0.2030**	0.1584	**0.1230**	0.1165	0.0160	0.0075	0.0000	0.0000	**0.0560**	0.0097	**0.0600**	0.0312
15	**0.2210**	0.1644	**0.1140**	0.1030	0.0430	0.0160	0.0000	0.0000	**0.1490**	0.0339	**0.0640**	0.0427
16	**0.2200**	0.1819	**0.1130**	0.0937	**0.0560**	0.0252	0.0230	0.0054	**0.1940**	0.0596	**0.0560**	0.0354
17	**0.1410**	0.1287	**0.1010**	0.0865	**0.0560**	0.0299	**0.1350**	0.0728	**0.1250**	0.1045	**0.0610**	0.0398
18	**0.1220**	0.1077	**0.0890**	0.0717	**0.0560**	0.0328	**0.1390**	0.1292	**0.1030**	0.0843	0.0320	0.0203
19	**0.1120**	0.1026	**0.1030**	0.0866	0.0330	0.0263	**0.1200**	0.0944	**0.0890**	0.0841	**0.0480**	0.0310
20	**0.1150**	0.0794	**0.1170**	0.0999	0.0290	0.0259	**0.1010**	0.0814	**0.0840**	0.0560	0.0420	0.0208
21	**0.0680**	0.0598	**0.1200**	0.0990	0.0270	0.0235	**0.0910**	0.0631	0.0460	0.0324	**0.0640**	0.0381
22	**0.0820**	0.0672	**0.1670**	0.1456	0.0450	0.0297	**0.0720**	0.0589	**0.0530**	0.0303	**0.0630**	0.0335
23	**0.0940**	0.0734	**0.1360**	0.1224	**0.0610**	0.0368	**0.0660**	0.0500	**0.0630**	0.0258	**0.0820**	0.0326
24	**0.0900**	0.0646	**0.1450**	0.1364	**0.0590**	0.0381	**0.0680**	0.0567	0.0410	0.0224	**0.0920**	0.0690
25	**0.1740**	0.1334	**0.1250**	0.1175	0.0370	0.0271	**0.0620**	0.0491	0.0400	0.0263	**0.0650**	0.0523
26	**0.1720**	0.1546	**0.1180**	0.1124	0.0380	0.0262	**0.0560**	0.0219	0.0320	0.0135	**0.0860**	0.0651
27	**0.1750**	0.1510	**0.1090**	0.0910	0.0250	0.0134	0.0000	0.0000	0.0360	0.0133	**0.0640**	0.0472
28	**0.1320**	0.1220	**0.1070**	0.0824	0.0320	0.0135	0.0000	0.0000	0.0170	0.0036	**0.0690**	0.0531
29	**0.1100**	0.0991	**0.0990**	0.0832	**0.0470**	0.0297	**0.1210**	0.0193			**0.0570**	0.0497
30	**0.1040**	0.0745	**0.1040**	0.0826	0.0300	0.0204	**0.0990**	0.0381			**0.0730**	0.0574
31	**0.1070**	0.0844			**0.0480**	0.0257	0.0420	0.0180			**0.0530**	0.0459
Monthly Max	0.221		0.213		0.104		0.1390		0.1940		0.0920	
Monthly Avg		0.089		0.118		0.033		0.02629		0.02457		0.02774

PNC = Permit Non-compliance

Bold = TSS composite sample is required: **monthly** - no decant flow, **weekly** when max daily flow < 0.046m^3/s & **daily** when max daily flow > 0.046m^3/s

No Flow= NF

Table 32
2016-2017 Annual Report

EMS ID E292069

DISCHARGE FROM 7-SOUTH SURFACE DECANT (7SSD)

Date	April	May	June	July	August	September	October	November	December	January	February	March
					Daily Average L/S							
1	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
2	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
3	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
4	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
5	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
6	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
7	NF	NF	NF	NF	NF	NF	0.7496	NF	NF	NF	NF	NF
8	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
9	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
10	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
11	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
12	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
13	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
14	NF	NF	NF	NF	NF	NF	0.5774	NF	NF	NF	NF	NF
15	NF	NF	NF	NF	NF	NF	0.3088	NF	NF	NF	NF	NF
16	NF	NF	NF	NF	NF	NF	1.5992	NF	NF	NF	NF	NF
17	NF	NF	NF	NF	NF	NF	0.9287	NF	NF	0.2912	NF	NF
18	NF	NF	NF	NF	NF	NF	NF	NF	NF	1.8074	NF	NF
19	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
20	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
21	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
22	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
23	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
24	NF	NF	NF	NF	NF	NF	NF	0.9823	NF	NF	NF	NF
25	NF	NF	NF	NF	NF	NF	NF	0.8283	NF	NF	NF	NF
26	NF	NF	NF	NF	NF	NF	NF	0.2016	NF	NF	NF	NF
27	NF	NF	NF	NF	NF	NF	NF	0.1297	NF	NF	NF	NF
28	NF	NF	NF	NF	NF	NF	NF	0.0597	NF	NF	NF	NF
29	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF		NF
30	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF		NF
31	NF	NF	NF	NF	NF		NF	NF	NF	NF		NF
Monthly Avg	0.000	0.000	0.000	0.000	0.000	0.000	0.833	0.440	0.000	1.049	0.000	0.000

Annual Avg

Cummulative Daily Totalizer Value

For Maximum Decant Flow (5.00 L/s)

Table 33
2016-2017 Annual Report

Dilution Ratio: 7S vs 7SSD Discharge

	April			May			June - August			September			October		
Date	**7S Q (L/s)**	**7SSD Q (L/s)**	**Dilution**	**7S Q (L/s)**	**7SSD Q (L/s)**	**Dilution**	**7S Q (L/s)**	**7SSD Q (L/s)**	**Dilution**	**7S Q (L/s)**	**7SSD Q (L/s)**	**Dilution**	**7S Q (L/s)**	**7SSD Q (L/s)**	**Dilution**
1	3.851	NF	∞	1.043	NF	∞	NF	NF	0.000	0.000	-	1.583	0.000	∞	
2	3.879	NF	∞	1.099	NF	∞	NF	NF	1.311	0.000	∞	3.111	0.000	∞	
3	4.429	NF	∞	1.063	NF	∞	NF	NF	3.574	0.000	∞	2.936	0.000	∞	
4	3.583	NF	∞	1.106	NF	∞	NF	NF	1.984	0.000	∞	2.813	0.000	∞	
5	2.899	NF	∞	0.928	NF	∞	NF	NF	1.756	0.000	∞	21.311	0.000	∞	
6	2.984	NF	∞	0.750	NF	∞	NF	NF	1.475	0.000	∞	22.939	0.000	∞	
7	3.475	NF	∞	NF	NF	∞	NF	NF	1.680	0.000	∞	181.763	0.750	242.50	
8	3.728	NF	∞	NF	NF	∞	NF	NF	1.705	0.000	∞	19.788	0.000	∞	
9	3.599	NF	∞	NF	NF	∞	NF	NF	1.734	0.000	∞	8.380	0.000	∞	
10	2.874	NF	∞	NF	NF	∞	NF	NF	1.965	0.000	∞	3.731	0.000	∞	
11	2.698	NF	∞	NF	NF	∞	NF	NF	1.246	0.000	∞	2.268	0.000	∞	
12	3.317	NF	∞	NF	NF	∞	NF	NF	1.003	0.000	∞	2.039	0.000	∞	
13	3.153	NF	∞	NF	NF	∞	NF	NF	0.762	0.000	∞	3.864	0.000	∞	
14	2.952	NF	∞	NF	NF	∞	NF	NF	0.443	0.000	∞	54.443	0.577	94.29	
15	2.043	NF	∞	NF	NF	∞	NF	NF	0.255	0.000	∞	39.761	0.309	128.76	
16	1.928	NF	∞	NF	NF	∞	NF	NF	0.563	0.000	∞	35.220	1.599	22.02	
17	1.775	NF	∞	NF	NF	∞	NF	NF	2.765	0.000	∞	7.449	0.929	8.02	
18	1.902	NF	∞	NF	NF	∞	NF	NF	1.932	0.000	∞	3.874	0.000	∞	
19	2.071	NF	∞	NF	NF	∞	NF	NF	2.132	0.000	∞	2.911	0.000	∞	
20	2.113	NF	∞	NF	NF	∞	NF	NF	1.816	0.000	∞	3.231	0.000	∞	
21	2.072	NF	∞	NF	NF	∞	NF	NF	1.676	0.000	∞	3.488	0.000	∞	
22	2.031	NF	∞	NF	NF	∞	NF	NF	1.765	0.000	∞	3.158	0.000	∞	
23	1.780	NF	∞	NF	NF	∞	NF	NF	2.038	0.000	∞	2.847	0.000	∞	
24	1.897	NF	∞	NF	NF	∞	NF	NF	1.741	0.000	∞	3.058	0.000	∞	
25	1.393	NF	∞	NF	NF	∞	NF	NF	1.766	0.000	∞	22.005	0.000	∞	
26	1.636	NF	∞	NF	NF	∞	NF	NF	1.832	0.000	∞	16.967	0.000	∞	
27	1.529	NF	∞	NF	NF	∞	NF	NF	1.579	0.000	∞	18.646	0.000	∞	
28	1.406	NF	∞	NF	NF	∞	NF	NF	1.505	0.000	∞	7.171	0.000	∞	
29	1.244	NF	∞	NF	NF	∞	NF	NF	1.371	0.000	∞	4.934	0.000	∞	
30	1.099	NF	∞	NF	NF	∞	NF	NF	1.301	0.000	∞	3.942	0.000	∞	
31	-	-	-	NF	NF	∞	-	-	-	-	-	3.648	0.000	∞	

Table 34
2016-2017 Annual Report

Dilution Ratio: 7S vs 7SSD Discharge

	November			December			January			February			March		
Date	7S Q (L/s)	7SSD Q (L/s)	Dilution	7S Q (L/s)	7SSD Q (L/s)	Dilution	7S Q (L/s)	7SSD Q (L/s)	Dilution	7S Q (L/s)	7SSD Q (L/s)	Dilution	7S Q (L/s)	7SSD Q (L/s)	Dilution
1	3.020	0.000	∞	7.812	0.000	∞	1.204	0.000	∞	4.818	0.000	∞	2.402	0.000	∞
2	20.186	0.000	∞	5.569	0.000	∞	1.078	0.000	∞	5.144	0.000	∞	4.051	0.000	∞
3	45.950	0.000	∞	4.386	0.000	∞	1.035	0.000	∞	4.317	0.000	∞	5.856	0.000	∞
4	15.288	0.000	∞	3.653	0.000	∞	0.905	0.000	∞	2.962	0.000	∞	5.026	0.000	∞
5	9.710	0.000	∞	2.938	0.000	∞	0.949	0.000	∞	3.630	0.000	∞	4.643	0.000	∞
6	5.366	0.000	∞	2.755	0.000	∞	0.787	0.000	∞	4.080	0.000	∞	3.159	0.000	∞
7	12.315	0.000	∞	2.717	0.000	∞	0.744	0.000	∞	2.485	0.000	∞	2.991	0.000	∞
8	19.995	0.000	∞	2.447	0.000	∞	0.813	0.000	∞	2.876	0.000	∞	2.569	0.000	∞
9	13.814	0.000	∞	1.879	0.000	∞	0.505	0.000	∞	3.498	0.000	∞	3.390	0.000	∞
10	5.946	0.000	∞	1.698	0.000	∞	0.524	0.000	∞	1.692	0.000	∞	2.071	0.000	∞
11	4.126	0.000	∞	1.509	0.000	∞	0.457	0.000	∞	1.990	0.000	∞	4.384	0.000	∞
12	5.586	0.000	∞	1.504	0.000	∞	0.496	0.000	∞	2.250	0.000	∞	4.188	0.000	∞
13	8.003	0.000	∞	1.433	0.000	∞	0.465	0.000	∞	2.933	0.000	∞	5.848	0.000	∞
14	10.651	0.000	∞	1.515	0.000	∞	0.479	0.000	∞	4.153	0.000	∞	7.716	0.000	∞
15	8.168	0.000	∞	1.554	0.000	∞	0.437	0.000	∞	56.693	0.000	∞	6.744	0.000	∞
16	6.231	0.000	∞	1.371	0.000	∞	0.621	0.000	∞	63.665	0.000	∞	4.231	0.000	∞
17	3.855	0.000	∞	1.217	0.000	∞	17.571	0.291	60.33	18.927	0.000	∞	5.551	0.000	∞
18	2.967	0.000	∞	0.939	0.000	∞	30.992	1.807	17.15	15.910	0.000	∞	4.240	0.000	∞
19	4.123	0.000	∞	1.414	0.000	∞	10.018	0.000	∞	11.316	0.000	∞	3.306	0.000	∞
20	16.669	0.000	∞	2.700	0.000	∞	5.312	0.000	∞	8.746	0.000	∞	4.063	0.000	∞
21	11.533	0.000	∞	3.254	0.000	∞	3.215	0.000	∞	6.783	0.000	∞	4.339	0.000	∞
22	37.569	0.000	∞	3.403	0.000	∞	3.179	0.000	∞	6.011	0.000	∞	3.334	0.000	∞
23	13.391	0.000	∞	3.808	0.000	∞	2.485	0.000	∞	5.627	0.000	∞	3.803	0.000	∞
24	27.343	0.982	27.84	3.261	0.000	∞	2.220	0.000	∞	4.417	0.000	∞	8.343	0.000	∞
25	11.214	0.828	13.54	2.879	0.000	∞	2.652	0.000	∞	4.974	0.000	∞	4.951	0.000	∞
26	10.634	0.202	52.75	2.369	0.000	∞	3.345	0.000	∞	4.170	0.000	∞	6.913	0.000	∞
27	7.967	0.130	61.42	2.079	0.000	∞	3.237	0.000	∞	4.442	0.000	∞	3.933	0.000	∞
28	4.986	0.060	83.56	1.789	0.000	∞	3.049	0.000	∞	3.265	0.000	∞	3.412	0.000	∞
29	3.348	0.000	∞	2.706	0.000	∞	2.982	0.000	∞				8.351	0.000	∞
30	10.517	0.000	∞	2.797	0.000	∞	4.020	0.000	∞				6.728	0.000	∞
31				2.790	0.000	∞	3.930	0.000	∞				5.469	0.000	∞

Table 35
2016-2017 Annual Report

Weekly Sulphate Results at WD, SPD, SPEFF & BDS				
EMS ID:	**E207409**	**E218582**	**Last Settling Pond from LLSTS**	**Downstream of confluence with SPEFF &**
Site Name	**Settling Pond #4**	**Settling Pond #1**		
Site Code	**WD**	**SPD**	**SPEFF**	**BDS**
Week of:				
4-Apr-16	647	391	323	388
11-Apr-16	643	414	321	400
18-Apr-16	1050	436	300	349
25-Apr-16	953	438	278	347
2-May-16	968	440	291	291
9-May-16	1070	448	303	305
17-May-16	1130	447	300	282
24-May-16	1110	**NF**	**NA**	**NA**
1-Jun-16	1000	444	297	302
8-Jun-16	1000	**NF**	**NA**	**NA**
15-Jun-16	420	**NF**	**NA**	**NA**
23-Jun-16	521	**NF**	**NA**	**NA**
29-Jun-16	650	446	287	428
5-Jul-16	629	441	295	386
12-Jul-16	858	466	287	323
21-Jul-16	1100	473	285	331
27-Jul-16	1170	480	315	319
2-Aug-16	818	484	329	328
8-Aug-16	762	423	285	275
15-Aug-16	559	**NF**	**NA**	**NA**
23-Aug-16	694	**NF**	**NA**	**NA**
29-Aug-16	853	**NF**	**NA**	**NA**
6-Sep-16	945	274	270	407
15-Sep-16	822	464	319	484
20-Sep-16	1020	501	284	358
26-Sep-16	1050	632	312	394
6-Oct-16	896	171	289	427
11-Oct-16	518	135	256	196
17-Oct-16	320	136	230	269
24-Oct-16	680	308	232	331
1-Nov-16	676	314	248	328
7-Nov-16	749	347	193	343
14-Nov-16	683	267	276	345
22-Nov-16	688	156	266	253
28-Nov-16	572	183	277	314
5-Dec-16	579	190	263	292
12-Dec-16	650	188	292	256
19-Dec-16	695	224	284	292
28-Dec-16	722	77.4	303	237
2-Jan-17	668	58.2	302	249
9-Jan-17	671	151	323	248
16-Jan-17	660	92.1	323	245
24-Jan-17	623	85.4	284	312
1-Feb-17	464	207	348	389
6-Feb-17	585	58.9	338	204
14-Feb-17	556	178	307	278
20-Feb-17	469	213	249	279
27-Feb-17	471	130	313	241
7-Mar-17	549	32.8	327	173
13-Mar-17	515	54.1	283	242
21-Mar-17	581	66.1	340	194
27-Mar-17	508	151	335	233
Annual Min	**320**	**33**	**193**	**173**
Annual Max	**1170**	**632**	**348**	**484**
Annual Average	**734**	**283**	**292**	**308**
Count	**52**	**45**	**45**	**45**

NA = Not Applicable

NF= No Flow

Sampling at SPEFF and BDS are only required when SPD is discharging. Highlighted grey indicates no discharge from SPD.

Table 36
2016-2017 Annual Report

Weekly Sulphate Results and Rolling Averages at LLE & LLO				
EMS ID	**E292130**		**EMS ID:**	**E219412**
Site Name	**Long Lake Entry**		**Long Lake Outlet**	
Site Code	**LLE**		**LLO**	
Week of:		**Sulphate Rolling Average**		**Sulphate Rolling Average**
4-Apr-16	187	**162**	63	46
11-Apr-16	167	**173**	71	58
18-Apr-16	186	**178**	73	69
25-Apr-16	212	**177**	69	69
5-May-16	207	**192**	72	70
9-May-16	433	**241**	75	72
19-May-16	430	**294**	79	74
24-May-16	467	**350**	92	77
2-Jun-16	502	**408**	90	82
8-Jun-16	566	**480**	96	86
15-Jun-16	385	**470**	101	92
23-Jun-16	280	**440**	93	95
29-Jun-16	212	**389**	91	94
7-Jul-16	221	**333**	78	92
12-Jul-16	263	**272**	88	90
21-Jul-16	189	**233**	69	84
27-Jul-16	251	**227**	63	78
2-Aug-16	324	**250**	57	71
8-Aug-16	349	**275**	67	69
18-Aug-16	496	**322**	63	64
23-Aug-16	552	**394**	63	62
29-Aug-16	505	**445**	65	63
6-Sep-16	224	**425**	99	71
15-Sep-16	337	**423**	84	75
20-Sep-16	252	**374**	77	78
26-Sep-16	249	**313**	94	84
6-Oct-16	151	**243**	87.2	88
11-Oct-16	108	**219**	47.5	78
17-Oct-16	105	**173**	10.7	63
24-Oct-16	160	**155**	30.9	54
1-Nov-16	166	**138**	11.2	38
7-Nov-16	181	**144**	21.3	24
14-Nov-16	140	**150**	35.0	22
24-Nov-16	103	**150**	26.2	25
28-Nov-17	148	**148**	23.1	23
5-Dec-16	147	**144**	43.4	30
12-Dec-16	123	**132**	33.0	32
19-Dec-16	229	**150**	50.9	35
28-Dec-16	114	**152**	50.4	40
2-Jan-17	144	**151**	47.3	45
9-Jan-17	124	**147**	56.2	48
16-Jan-17	139	**150**	62.9	54
24-Jan-17	142	**133**	20.0	47
2-Feb-17	132	**136**	31.1	44
6-Feb-17	111	**130**	25.1	39
14-Feb-17	154	**136**	32.6	34
20-Feb-17	157	**139**	21.2	26
27-Feb-17	141	**139**	33.9	29
7-Mar-17	82.1	**129**	32.6	29
13-Mar-17	123	**131**	44.6	33
21-Mar-17	88.2	118	28.4	32
27-Mar-17	81.3	103	23.2	33
Annual Min	**81**	**103**	**11**	**22**
Annual Max	**566**	**480**	**101**	**95**
Annual Average	**230**		**57**	
Count:	**52**		**52**	

Notes: Consecutive weekly samples were calculated using a rolling average at LLE & LLO. **Green Bold** indicates result is above **WQG-A of 128 mg/L using a background hardness of 30 mg/L.** **Shaded results** indicates above WQG-A of 218 mg/L using a Long Lake hardness of 63 mg/L. As per MoE guideance a background hardness of 30 mg/L applies to this site.

Table 37
2016-2017 Annual Report

Biweekly and Weekly TSS Results From WC, SPC, SPEFF and BDS

EMS ID	E207411	E217014		
Site Date	WC	SPC	SPEFF	BDS
4-Apr-16	<4.0	<4.0	<4.0	<4.0
11-Apr-16	NA	NA	<4.0	<4.0
18-Apr-16	<4.0	<4.0	<4.0	<4.0
25-Apr-16	NA	NA	<4.0	<4.0
2-May-16	<4.0	<4.0	<4.0	<4.0
9-May-16	NA	NA	<4.0	<4.0
17-May-16	<4.0	NA	<4.0	<4.0
24-May-16	NA	NA	NA	NA
1-Jun-16	<4.0	NA	<4.0	<4.0
8-Jun-16	NA	NA	NA	NA
15-Jun-16	<4.0	NA	NA	NA
23-Jun-16	NA	NA	NA	NA
29-Jun-16	<4.0	<4.0	<4.0	<4.0
7-Jul-16	<4.0	<4.0	<4.0	<4.0
12-Jul-16	NA	NA	<4.0	<4.0
21-Jul-16	<4.0	5.3	<4.0	<4.0
27-Jul-16	NA	NA	<4.0	<4.0
2-Aug-16	<4.0	NA	<4.0	<4.0
8-Aug-16	NA	NA	<4.0	<4.0
15-Aug-16	<4.0	NA	NA	NA
23-Aug-16	<4.0	NA	NA	NA
6-Sep-16	<4.0	<4.0	<4.0	<4.0
15-Sep-16	NA	<4.0	4.0	<4.0
20-Sep-16	<4.0	<4.0	<4.0	<4.0
26-Sep-16	NA	NA	<4.0	<4.0
6-Oct-16	<4.0	NA	<4.0	<4.0
11-Oct-16	NA	NA	5.0	7.0
17-Oct-16	<4.0	<4.0	<4.0	9.3
24-Oct-16	NA	NA	<4.0	5.3
1-Nov-16	<4.0	<4.0	<4.0	5.3
7-Nov-16	NA	NA	<4.0	11.8
14-Nov-16	<4.0	<4.0	<4.0	10.3
24-Nov-16	NA	<4.0	<4.0	8.5
28-Nov-16	<4.0	<4.0	<4.0	8.5
5-Dec-16	<4.0	NA	<4.0	6.8
12-Dec-16	<4.0	<4.0	<4.0	<4.0
19-Dec-16	NA	<4.0	<4.0	<4.0
28-Dec-16	<4.0	<4.0	<4.0	<4.0
2-Jan-17	<4.0	<4.0	<4.0	<4.0
9-Jan-17	<4.0	<4.0	<4.0	4.0
16-Jan-17	NA	NA	<4.0	7.5
24-Jan-17	<4.0	<4.0	<4.0	7.8
1-Feb-17	<4.0	<4.0	<4.0	<4.0
6-Feb-17	NA	NA	<4.0	<4.0
14-Feb-17	<4.0	<4.0	<4.0	<4.0
20-Feb-17	NA	NA	<4.0	6.5
27-Feb-17	<4.0	<4.0	<4.0	4.8
7-Mar-17	<4.0	NA	<4.0	<4.0
13-Mar-17	NA	NA	<4.0	<4.0
21-Mar-17	<4.0	NA	<4.0	4.5
27-Mar-17	NA	NA	<4.0	6.8

NA= Not Applicable. All sites are based on discharge from Settling Ponds. WC dependant on WD discharge & SPEFF, BDS & SPC dependant on SPD discharge.

Table 38
2016-2017 Annual Report

Field Conductivity (uS/cm) & pH (North Mine Area & 7-South)

EMS ID	E283433		E207409		E207412		E207411		E292069		E292109				GW and SW from 2N Area at Road		E292126	
Site Name	2-N-Portal Sump		Settling Pond #4		2 North Pit Sump		North Pit Culvert		Settling Pond at 7S		Stream 1 -7S		Seep Near Plant				South Dyke Sump	
Site Code	2NPS		WD		WP		WC		7SSD		7S		PDS		PDSR		SDS	
	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH
April 2016	2210	7.50	1951	8.00	1575	8.10	1881	8.10	217	8.10	56	8.10	2040	7.30	1431	7.50	2170	8.00
	2250	7.60	1900	7.60	1575	8.10	1866	7.90									2430	7.90
	2080	7.50	2070	7.70	1560	8.10	1899	8.20									2170	8.00
	2120	7.40	2250	7.60	1361	8.10	1881	8.10									2430	8.10
May 2016	1869	7.60	1936	8.00	1460	8.20	2090	7.70	308	8.00	53	8.00	1986	7.70	1405	7.80	2310	7.50
	1885	7.50	2180	7.60	1575	8.10	2090	7.70			66	7.20					2310	7.50
	1954	7.70	2120	7.90	1453	8.00	1971	8.30									**DRY**	**DRY**
	1815	7.50	2140	7.70	1419	8.00	2050	8.10										
June 2016	1955	7.30	2.01	7.90	1550	8.00	1694	7.90	420	7.80					1630	7.60		
	1987	7.60	1984	7.90	1586	8.00	2120	8.10										
	1961	7.60	1642	8.10	1489	8.00	1810	8.20										
	2060	7.60	1594	8.00	1547	8.20	1583	8.30										
	1757	7.70	1631	7.90	1506	8.20	1555	8.20										
July 2016	1913	7.40	1780	7.50	1513	7.70	1566	8.20	349	7.80			**NF**	**NF**	1636	7.50		
	1974	7.40	2.03	7.60	1624	7.90	1818	8.20									2114	6.92
	2.01	7.80	2.04	7.90	1585	7.80	1658	8.00										
	1998	7.50	1996	7.70	1665	7.80	1748	8.10										
August 2016	2160	7.70	2260	8.00	1882	8.10	2250	8.20	409	8.30			**NF**	**NF**	**NF**	**NF**	**DRY**	**DRY**
	2100	7.70	1970	7.90	1760	8.00	1873	8.00	367	8.00								
	2150	7.50	1777	7.80	1712	8.10	1886	8.20										
	1940	7.40	1859	8.00	2180	8.20	1868	8.20										
	2.05	7.70	2.07	7.90	1896	7.90	1910	8.20										
September 2016	1968	7.50	2190	7.70	1926	7.90	1945	8.30	337	7.90	48	8.00	**NF**	**NF**	**NF**	**NF**	**DRY**	**DRY**
	2013	7.47	2293	7.83	2061	7.98	2388	8.11										
	1817	7.60	2050	7.70	1988	8.00	2010	8.10										
	2210	7.50	2450	8.00	2190	8.20	2430	8.10										
October 2016	1819	7.60	2240	8.10	1667	8.30	1776	8.10	543	7.60	52	7.90	2160	7.20	953	7.10	1720	8.10
	1445	7.70	1674	7.90	1953	8.00	1513	8.00	181	7.70	46	7.90					2420	8.00
	1544	7.80	1031	7.60	1587	8.00	906	7.80	421	7.80	56	7.90					2330	8.00
	2180	7.70	1928	7.80	1837	8.00	1812	7.90									2420	7.90
November 2016	2360	7.40	1832	7.60	1834	7.70	1678	7.90	396	7.80	48	7.90	1939	7.60	1008	7.40	2430	7.60
	2060	7.50	1730	7.40	1852	7.60	1549	7.60	368	7.70	49	7.90					2430	7.80
	2800	7.60	2120	7.50	2100	7.70	1942	7.60	381	7.90	51	7.90					2760	7.90
	1625	7.80	1673	7.60	2.15	7.00	1526	7.70	332	7.60	38	7.40					2.34	7.20
	2210	7.70	1508	7.90	1731	7.90	1481	8.10	291	7.70	42	7.80					2320	8.00
December 2016	2370	7.50	1719	7.90	1777	8.10	1657	8.10	331	7.80	42	7.80	1980	7.30	1056	7.50	2090	8.00
	2260	7.60	1708	7.70	1826	8.10	1689	8.20	236	7.80							2060	8.00
	2020	7.50	1869	8.00	1536	8.20	1786	8.10	241	7.90							2160	7.90
	2090	7.70	1854	8.00	1469	8.10	1799	8.10	254	7.80							2270	8.00
January 2017	2150	7.50	1998	7.90	**Frozen**	**Frozen**	1954	8.10	342	7.50	39	7.70	1631	7.70	1424	7.80	2360	7.70
	2760	7.60	1794	8.00	**Frozen**	**Frozen**	1440	8.30		7.50	40	7.60					1001	7.30
	1975	7.70	1883	8.10	1737	7.90	1881	8.30									**Frozen**	
	2.09	7.80	1768	7.70	**Frozen**	**Frozen**	1518	8.10										
February 2017	2020	7.60	1613	8.00	**Frozen**	**Frozen**	1618	8.40	308	7.90	38	8.00	1909	7.50	1134	8.10	2560	7.90
	1003	7.60	1583	8.20	**Frozen**	**Frozen**	1395	7.70	323	7.80							995	7.80
	1902	7.60	1558	7.80	923	8.10	1360	8.20									1021	8.00
	1931	7.40	1527	7.40	950	8.20	1543	8.20									1406	7.80
	2050	7.20	1608	7.90	1531	8.00	**Could not access**										2440	7.60
March 2017	1986	7.50	1737	8.00	**Frozen**	**Frozen**	1641	8.30	337	7.70	42	7.80	1892	7.50	1234	7.90	2380	7.90
	1740	7.60	1508	8.00	**Frozen**	**Frozen**	1470	8.30	282	7.90							553	7.70
	1925	7.70	1640	8.10	1319	8.00	1506	8.30									2360	8.20
	1836	7.70	1503	7.90	1207	8.20	1316	8.30									2210	8.00

Table 39
2016-2017 Annual Report

Field Conductivity (uS/cm) & pH (South Mine Area)

EMS ID	E292127		E217015				E218582				E292128		E292129		E217014		E292130		E292131		E292131	
Site Name	2 South Pit CCR Water Cover		3 South Pit CCR Water Cover		LLSTS Settling Pond Effluent		Settling Pond # 1		Biocell Downstream		3S77		4 South Lower		South Pit Culvert		Long Lake Entry		Seep into Long Lake		Long Lake Middle Seep	
Site Code	2S (2SS)		3S		SPEFF		SPD		BDS		3S77		4SLO		SPC		LLE		LLS		LLSM	
	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH
April 2016	432	6.85	1313	8.10	1202	8.00	675	7.70	1210	7.80	1087	7.20	530	6.90	480	7.90	567	7.20	1471	7.50	1385	7.40
	418	7.60	1263	8.00	1065	8.10	1050	7.80	1057	7.90	1069	7.70	506	7.20	791	7.70	539	7.20				
	423	7.80	1278	8.10	1017	8.10	1004	8.00	1015	8.10	1045	7.70	572	7.40	613	7.90	539	7.60				
	340	8.10	1333	8.00	1047	8.10	1076	7.90	1068	8.10	1075	7.50	580	7.60	728	8.10	708	8.00				
May 2016	559	7.34	1268	8.00	1334	8.08	1287	7.96	1316	7.99	927	7.60	556	7.50	534	7.90	572.0	7.30	1430	7.20	1140	7.30
	717	8.10	1225	8.00	950	8.00	938	8.00	958	8.00	927	7.60	568	6.90	516	7.80	899	7.00				
	507	8.10	1270	8.00	952	8.10	820	8.00	931	8.10	996	7.70	568	6.90	516	7.80	858	7.50				
	828	8.20	1282	8.00			911	7.80			910	7.80	573	7.40			926	7.40				
June 2016	708	7.80	1172	8.20	1256	8.06	1151	7.98	1215	7.92	920	7.90	592	7.40	546	7.90	1000	7.00	960	7.80		
	1102	7.90	1385	8.10	968	8.10	1052	7.90	959	8.10	962	7.70	661	7.50			1043	7.50				
	1105	7.50	1114	7.90			970	7.30			974	7.70	642	7.10			917	7.10				
	1263	8.10	1242	7.70			897	7.60			951	7.80	593	7.80			761	7.70				
	1176	8.10	1341	7.90			932	8.10			921	7.60	683	7.40			662	7.00				
July 2016	1172	7.70	1397	7.30	1177.3	7.90	1148.7	7.81	1151.2	7.95	976	7.30	637	7.86	753	7.40	650	7.20	1015	8.00		
	800	7.80	1925	7.90	980	7.90	1070	7.80	1038	7.90	1048	7.50	670	7.40	701	7.70	740	7.50				
	1682	7.90	1320	7.80	965	7.90	920	8.00	964	7.90	982	7.80	654	7.60	519	7.90	572	7.50				
	1642	7.70	1482	7.90	973	8.00	923	8.01	934	8.00	987	7.70	675	7.50	513	8.00	574	7.50				
August 2016	1359	7.60	1516	8.20	1416	7.84	1279	7.77	1372	7.84	1007	7.60	721	7.50	**NF**	**NF**	843	7.60	1049	7.60		
	1371	7.60	1543	8.10	1109	8.10	1038	7.90	1062	8.10	1041	7.60	735	7.50	**NF**	**NF**	908	7.40				
	1348	8.00	1486	8.00			962	8.20			1012	7.70	776	7.70	**NF**	**NF**	1675	7.50				
	1319	8.10	1483	7.90			999	8.10			1045	7.60	751	7.60	**NF**	**NF**	1675	7.50				
	1521	7.80	1206	7.91			1086	7.83			1074	7.43	755	7.46	**NF**	**NF**	1043	7.64				
September 2016	1472	8.00	1653	8.00	1244	7.87	1107	7.90	1209	7.97	986	7.50	730	7.50	817	8.00	706	7.50	1080	7.50		
	1581	8.09	1813	7.91	1281	7.85	1516	7.84	1491	7.86	1080	7.51	872	7.58	765	7.90	859	7.65				
	1392	7.50	1471	7.90	1065	8.10	1177	7.90	1045	8.00	983	7.50	712	7.40	**NF**	**NF**	702	7.10				
	1529	7.60	1684	7.80	1195	8.20	1326	7.90	1219	8.00	953	7.50	763	7.60	**NF**	**NF**	746	7.50				
October 2016	1538	7.50	1509	7.70	1067	8.20	1186	8.20	1087	8.20	901	7.50	7.16	7.50	485	8.00	452	8.00	1126	7.50	1029	7.60
	1301	7.70	1532	7.80	1227	8.09	622	8.06	864	7.96	910	7.80	654	7.50	268	7.80	322	7.40				
	1189	7.70	1253	7.60	999	8.10	669	7.90	876	7.90	651	7.60	483	7.50	401	7.90	378	7.90				
	700	8.20	1540	8.00	1071	8.20	1043	7.60	1106	7.80	821	7.70	575	7.50	465	8.10	522	8.00				
November 2016	601	6.57	1492	7.70	807	7.37	972	6.70	784	6.90	898	7.70	537	7.50	564	7.70	561	7.70	1420	7.50	1303	7.70
	817	8.00	1236	7.60	792	7.80	1040	7.80	1051	7.80	785	7.50	496	7.50	501	7.70	584	7.90				
	618	7.90	1639	7.80	1238	8.20	1151	8.00	1210	8.00	948	7.60	500	7.60	588	8.00	572	8.00				
	705	7.50	1628	7.50	1332	8.20	1080	8.00	1170	8.10	1071	8.20	520	7.80	520	7.80	503	7.80				
	918	7.90	1206	8.00	970	8.20	505	7.30	956	7.70	769	7.70	469	7.80	540	8.20	520	7.80				
December 2016	333	7.21	1042	7.64	677.6	8.08	520.1	7.29	703.3	7.70	570	7.44	289.1	7.07	312.3	7.78	297.8	7.62	1630	6.50	1022.2	7.31
	462	7.70	1510	7.90	1077	8.10	770	7.20	908	7.50	734	7.30	472	7.40	407	7.70	411	7.60			1173	7.70
	512	7.70	1487	7.90	1067	7.80	1145	7.60	1174	7.60	764	7.40	486	7.40	625	7.50	679	7.50				
	552	7.70	663	7.80	983	7.80	503	7.60	876	7.70	703	7.50	451	7.40	400	7.70	418	7.60				
January 2017	438	7.60	1523	8.00	1318	7.96	451	6.75	495	7.27	980	7.70	480	7.60	536	8.10	487	7.50	1406	7.40	1631	7.40
	553	7.93	1996	7.72	1240	8.00	416	7.30	981	7.80	874	8.00	524	7.80	397	7.80	432	7.40				
	308	8.40	1598	7.80	1138	7.90	858	7.40	1098	7.60	403	7.40	497	7.50	245	7.90	457	7.50				
	359	8.10	1179	8.20	1105	8.10	263	7.80	918	7.70	620	7.80	433	7.70	543	7.90	500	7.90				
February 2017	514	7.71	1532	7.90	1347	7.99	807	7.70	1118	7.85	650	7.50	495	7.60	553	8.20	444	7.80	1531	7.60	1909	7.40
	463	8.10	1432	7.80	1273	8.10	989	7.70	958	7.70	982	7.70	512	7.80	402	7.60	315	7.50				
	354	8.20	1412	7.90	1282	8.50	682	7.60	962	8.10	830	8.10	428	7.80	582	8.00	534	7.40				
	243	8.00	1230	8.00	984	8.40	743	8.10	904	7.90	589	7.80	382	7.70	554	7.90	538	8.00				
	306	7.90	1388	7.90	1190	8.20	911	7.70	1002	7.90	653	7.90	395	7.80	505	8.10	499	8.00				
March 2017	284	8.10	1454	8.00	1266.2	8.00	200.2	7.77	640	7.32	682	7.60	408	7.60	306	8.10	320	7.30	1390	7.60	1892	7.70
	243	7.80	1316	8.00	982	8.00	202	7.50	730	7.70	640	7.60	384	7.30	381	7.80	433	7.90				
	269	8.10	1346	8.30	1145	8.00	284	7.10	700	7.80	637	8.00	409	7.30	315	7.70	312	7.60				
	298	7.90	1179	7.90	1095	8.40	532	7.20	733	8.00	684	7.60	402	7.70	483	8.00	335	7.80				

Table 40
2016-2017 Annual Report

Field Conductivity (uS/cm) & pH (Rivers & Wetland)

EMS ID	E297230		E297231		E297232		E0126402		E0900504		E217017		E219412		E292112		E286930		E292113		E299256	
Site Name	Iron River Upstream Site 1		Iron River Site 6		Iron River Site 8		Mid Quinsam Lake Inlet		Mid Quinsam Lake Outlet		No Name Lake Outlet		Long Lake Outlet		Lower Wetland Outlet (7S)		Quinsam River Downstream 1		7 South Quinsam River		Iron River & Quinsam River	
Site Code	IR1		IR6		IR8		WA		WB		NNO		LLO		LWO		QRDS1		7SQR		IRQR	
	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH	Cond	pH
April 2016	62	8.20	52	7.60	57	7.80	50	8.20	152	7.70	34	7.90	249	7.70	73	6.80	156	8.20	168	7.80	113	7.70
	62	8.20	52	7.60	57	7.80	50	7.70	163	7.50	33	7.30	110	7.90	113	8.10	171	7.70	168	7.80	113	7.70
	56	7.50	49	7.40	51	7.30	51	7.40	158	7.70	35	7.60	138	7.90	143	8.10	170	7.30	184	7.00	109	7.30
	67	8.10	61	8.10	56	8.30													168	7.90	136	7.70
May 2016	41	7.90	48	7.70	43	8.10	46	8.10	176	7.80	33	7.70	283	7.60	72	6.80	161	8.10	166	7.80	123	7.50
	41	7.70	49	7.90	51	7.90	46	7.60	168	7.60	33	7.40	243	7.30	64	7.10	173	7.60	166	7.80	124	7.40
June 2016	96	8.00	89	8.10	84	8.10													148	8.20	128	8.00
July 2016	101	7.40	100	7.90	101	7.70								7.70					157	7.00	149	7.30
August 2016	147	8.10	142	8.20	144	8.50	59	7.60	164	7.60	42	7.80	219	7.60	74	7.20	157	7.60	157	7.60	148	8.20
	131	8.00	136	8.00	139	8.00	50	7.80	151	8.00	43	8.00	228	7.80	69	8.00	155	8.00	150	7.90	144	7.90
	148	8.10	143	8.10	144	8.10	51	8.10	142	8.10	38	8.00	226	7.80	79	7.90	140	8.20	145	8.00	147	8.10
	161	8.10	164	7.20	164	7.20	50	7.40	139	8.00	52	7.20	236	7.70	78	7.20	141	8.00	141	7.70	141	7.70
	109	7.50	171	8.10	177	7.20	51	7.60	137	7.80	48	7.80	237	7.80	80	7.90	138	7.40	145	8.10	141	7.90
September 2016	135	8.10	128	7.60	126	7.40	47.9	7.51									146	7.84	135.5	7.32	132	7.30
																			176	7.60		
October 2016	89	8.00	80	8.10	78	8.00	50	7.90	180	7.80	40	7.90	184	7.60	37.5	6.80	189	8.00	176	8.00	138	8.00
	88	7.80	62	7.90	52	7.80	48	7.90	122	7.80	34	7.10	76	7.40	70	7.70	133	7.80	125	7.70	99	7.50
	56	7.50	54	7.60	54	7.60	48	7.80	178	7.60	38	7.80	143	7.60	76	7.60	157	7.80	148	7.70	90	7.80
	84	7.80	63	7.80	66	7.80	52	7.10	145	7.50	32	7.20	79	7.70	64	7.80	147	7.00	148	7.30	108	7.90
															88	6.50						
November 2016	73	7.50	53	7.60	58	7.70	54	7.20	97	7.20	32	6.90	105	7.00	68	6.70	88	7.20	85	7.20	76	7.30
December 2016	80	8.00	62	7.80	61	7.80													158	7.70	130	7.80
January 2017	53	8.00	56	8.00	56	8.00													150	8.10	115	8.00
February 2017																						
March 2017	79	8.20	128	7.70	54	7.70													133	8.20	98	7.90

Table 41
2016-2017 Annual Report

Relative Percent Difference Values Greater Than 20 %

Site	Date	Parameter	Units	Result1	Result2	RPD %	Detection Limit	Detection Limit X5
WA	12-Apr-16	Acidity83	mg/L	0.5	0.71	35	0.5	2.5
LLO	26-Oct-16	Al-T	mg/L	0.102	0.0768	28	0.003	0.015
NNL1	13-Apr-16	As-D	mg/L	0.00032	0.00025	25	0.0001	0.0005
MQL9	9-Nov-16	As-T	mg/L	0.00014	0.00011	24	0.0001	0.0005
NNL1	13-Apr-16	As-T	mg/L	0.00018	0.00023	24	0.0001	0.0005
WB	19-Apr-16	As-T	mg/L	0.00014	0.00018	25	0.0001	0.0005
MQL1	22-Nov-16	As-T	mg/L	0.00013	0.00017	27	0.0001	0.0005
MQL9	17-Aug-16	As-T	mg/L	0.00011	0.00017	43	0.0001	0.0005
WA	12-Oct-16	As-T	mg/L	0.00029	0.00018	47	0.0001	0.0005
NNL1	13-Apr-16	Ba-D	mg/L	0.0017	0.0013	27	0.001	0.005
NNL1	13-Apr-16	Ba-D	mg/L	0.0017	0.0011	43	0.001	0.005
WA	12-Apr-16	Cd-T	mg/L	0.000014	0.00001	33	0.00001	0.00005
NNL1	9-Aug-16	Chlr-a	ug/L	0.95	1.55	48	0.5	2.5
NNL1	13-Apr-16	Cu-D	mg/L	0.00052	0.00042	21	0.0002	0.001
MQL9	9-Nov-16	Cu-D	mg/L	0.0006	0.00075	22	0.0002	0.001
NNL4	3-Nov-16	Cu-D	mg/L	0.00053	0.00068	25	0.0002	0.001
QRDS1	29-Aug-16	Cu-D	mg/L	0.0005	0.00068	31	0.0002	0.001
LQLB	4-May-16	Cu-D	mg/L	0.00042	0.00059	34	0.0002	0.001
LQL1	25-Aug-16	Cu-D	mg/L	0.0005	0.00075	40	0.0002	0.001
WB	19-Apr-16	Cu-D	mg/L	0.00094	0.00062	41	0.0002	0.001
WA	14-Sep-16	Cu-T	mg/L	0.00076	0.0006	24	0.0005	0.0025
NNL1	9-Aug-16	Cu-T	mg/L	0.00056	0.00072	25	0.0005	0.0025
WA	12-Oct-16	Cu-T	mg/L	0.00073	0.00054	30	0.0005	0.0025
NNLB	17-Nov-16	Cu-T	mg/L	0.0006	0.00083	32	0.0005	0.0025
QRDS1	29-Aug-16	Cu-T	mg/L	0.00114	0.00072	45	0.0005	0.0025
MQL9	17-Aug-16	Fe-D	mg/L	0.0066	0.0085	25	0.005	0.025
NNL1	13-Apr-16	Fe-D	mg/L	0.0327	0.0247	28	0.005	0.025
WA	4-Aug-16	Fe-D	mg/L	0.0131	0.0175	29	0.005	0.025
NNL1	13-Apr-16	Fe-D	mg/L	0.0327	0.0243	29	0.005	0.025
NNL1	13-Apr-16	Fe-T	mg/L	0.046	0.036	24	0.01	0.05
NNL1	13-Apr-16	Fe-T	mg/L	0.046	0.035	27	0.01	0.05
QRDS1	29-Aug-16	Fe-T	mg/L	0.027	0.038	34	0.01	0.05
QRDS1	10-Nov-16	Hg-D	mg/L	0.000002	0.0000025	22	0.000002	0.00001
NNL9	17-Aug-16	Hg-D	mg/L	0.000002	0.0000031	43	0.000002	0.00001
NNL9	9-Nov-16	Hg-T	mg/L	0.000002	0.0000026	26	0.000002	0.00001
LLO	26-Oct-16	Hg-T	mg/L	0.0000035	0.0000049	33	0.000002	0.00001
WA	12-Oct-16	Hg-T	mg/L	0.000002	0.000003	40	0.000002	0.00001
NNL1	27-Oct-16	Hg-T	mg/L	0.000004	0.0000066	49	0.000002	0.00001
NNL1	3-Aug-16	K-D	mg/L	0.09	0.07	25	0.05	0.25
MQL1	3-Aug-16	K-T	mg/L	0.149	0.198	28	0.05	0.25
NNL1	3-Aug-16	K-T	mg/L	0.069	0.05	32	0.05	0.25
WB	19-Apr-16	Mn-D	mg/L	0.0017	0.0013	27	0.001	0.005
NNL1	3-Aug-16	Mn-D	mg/L	0.0041	0.003	31	0.001	0.005
NNL4	3-Nov-16	Mn-D	mg/L	0.001	0.0014	33	0.001	0.005
NNL4	28-Apr-16	Mn-D	mg/L	0.0018	0.0012	40	0.001	0.005
WB	11-Aug-16	Mn-T	mg/L	0.0069	0.0086	22	0.001	0.005
NNL1	13-Apr-16	P-T	mg/L	0.002	0.003	40	0.002	0.01
LQLB	4-May-16	S-D	mg/L	4.8	6	22	3	15
QRDS1	29-Aug-16	Se-D	mg/L	0.0001	0.00013	26	0.0001	0.0005
MQL4	20-Apr-16	Se-D	mg/L	0.00016	0.00012	29	0.0001	0.0005
LQL1	25-Aug-16	Sn-T	mg/L	0.0062	0.005	21	0.005	0.025
NNL1	13-Apr-16	SO4-D	mg/L	1.42	1.77	22	0.5	2.5
NNL4	28-Apr-16	SO4-D	mg/L	2.38	1.82	27	0.5	2.5
NNL1	3-Aug-16	SO4-D	mg/L	0.81	1.1	30	0.5	2.5
NNL1	27-Oct-16	SO4-D	mg/L	0.5	0.7	33	0.5	2.5
MQL1	3-Aug-16	S-T	mg/L	8	11.4	35	3	15
QRDS1	29-Aug-16	TSS	mg/L	4	5.8	37	4	20
WA	14-Sep-16	Turb	NTU	0.19	0.15	24	0.1	0.5
NNL4	3-Nov-16	Turb	NTU	1.09	0.86	24	0.1	0.5
NNL1	13-Apr-16	Turb	NTU	0.24	0.38	45	0.1	0.5

All values with an RPD > 20% and one or more results greater than 5 X DL

Relative Percent Difference Values Greater Than 50 %

Site	Date	Paramater	Units	Result1	Result2	RPD %	Detection Limit	Detection Limit X5
QRDS1	29-Aug-16	Al-T	mg/L	0.0122	0.0243	66	0.003	0.015
NNL9	17-Aug-16	Al-T	mg/L	0.041	0.0918	77	0.003	0.015
NNL1	13-Apr-16	As-D	mg/L	0.00032	0.00018	56	0.0001	0.0005
LQLB	04-May-16	Cd-D	mg/L	0.000005	0.000009	57	0.000005	0.000025
MQL4	20-Apr-16	Cd-D	mg/L	0.000019	0.000005	117	0.000005	0.000025
WB	11-Aug-16	Cu-D	mg/L	0.00075	0.00039	63	0.0002	0.001
NNL4	28-Apr-16	Cu-D	mg/L	0.00047	0.00094	67	0.0002	0.001
LQL1	25-Aug-16	Cu-T	mg/L	0.00132	0.00072	59	0.0005	0.0025
WA	12-Apr-16	Cu-T	mg/L	0.00356	0.00134	91	0.0005	0.0025
LLO	26-Oct-16	Hg-D	mg/L	0.0000036	0.000002	57	0.000002	0.00001
NNL4	28-Apr-16	K-D	mg/L	0.071	0.191	92	0.05	0.25
WA	04-Aug-16	Mn-T	mg/L	0.0024	0.0011	74	0.001	0.005
QRDS1	29-Aug-16	Mn-T	mg/L	0.0026	0.0063	83	0.001	0.005
NNL1	03-Aug-16	Ni-D	mg/L	0.0029	0.001	97	0.001	0.005
WA	12-Apr-16	Pb-T	mg/L	0.00039	0.0002	64	0.0002	0.001
WB	14-Jul-16	P-T	mg/L	0.005	0.0087	54	0.002	0.01
NNL1	09-Aug-16	P-T	mg/L	0.0163	0.0056	98	0.002	0.01
NNL4	28-Apr-16	S-D	mg/L	3	6.6	75	3	15
NNL4	03-Nov-16	SO4-D	mg/L	0.87	0.51	52	0.5	2.5
NNL9	17-Aug-16	Turb	NTU	0.45	1.16	88	0.1	0.5
MQL4	20-Apr-16	U-D	mg/L	0.00018	0.0001	57	0.0001	0.0005
NNL9	17-Aug-16	Zn-T	mg/L	0.005	0.0105	71	0.005	0.025
LWM	5-Oct-2016	Cu-T	mg/L	0.0035	0.00164	72	0.0005	0.0025

All values with an RPD > 50% and one or more results greater than 5 X DL

Table 42
2016-2017 Annual Report

Sample Blanks									
Site	Field Blank (mg/L)	Equipment Blank (mg/L)							Trip Blank (mg/L)
Parameter	4-Apr-16	13-Apr-16	14-Apr-16	28-Apr-16	3-Aug-16	9-Aug-16	17-Nov-16	4-Apr-16	27-Oct-16
Acidity45	<0.50		<0.50	<0.50		<0.50		<0.50	
Acidity83	<0.50		<0.50	0.70		<0.50		<0.50	
Ag-D	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Ag-T	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Al-D	0.0035	0.0032	0.0030	<0.0030	<0.0030	0.0031	<0.0030	0.0037	<0.0030
Alk-PP	<0.50	<0.50	<0.50	<0.50		<0.50		<0.50	
Alk-T	0.59	<0.50	<0.50	<0.50		<0.50		<0.50	
Al-T	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
As-D	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
As-T	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Ba-D	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ba-T	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
B-D	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Be-D	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Be-T	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bicarb	0.72	<0.50	<0.50	<0.50		<0.50		<0.50	
Bi-D	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bi-T	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
B-T	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Ca-D	<0.050	0.081	<0.050	<0.050	<0.050	<0.050	0.065	0.059	<0.050
Carb	<0.50	<0.50	<0.50	<0.50		<0.50		<0.50	
Ca-T	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Cd-D	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Cd-T	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010
Co-D	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Co-T	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cr-D	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cr-T	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cu-D	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Cu-T	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Fe-D	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0078	<0.0050	<0.0050	<0.0050
Fe-T	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Hard-D	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Hard-T	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Hg-D	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Hg-T	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Hydrox	<0.50	<0.50	<0.50	<0.50		<0.50		<0.50	
K-D	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
K-T	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Li-D	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Li-T	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Mg-D	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Mg-T	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Mn-D	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Mn-T	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Mo-D	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Mo-T	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Na-D	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Na-T	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Ni-D	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ni-T	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Pb-D	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Pb-T	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Sb-D	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Sb-T	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
S-D	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Se-D	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Se-T	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Si-D	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Si-T	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sn-D	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Sn-T	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
SO4-D	<0.50	0.97	0.74	0.64	<0.50	<0.50	<0.50	<0.50	<0.50
Sr-D	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sr-T	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
S-T	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Ti-D	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Ti-T	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Tl-D	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Tl-T	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
TSS	<4.0							<4.0	
U-D	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
U-T	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
V-D	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
V-T	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zn-D	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zn-T	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zr-D	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zr-T	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

Notes:
Bold indicates parameter is detected greater than 2 times greater than labortory mean dection limits (MDL).

Table 43
2016-2017 Annual Report

Daily Precipitation (mm)

DATE	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
1	0.00	0.00	0.00	0.00	0.00	8.80	0.00	2.80	9.10	0.00	1.20	0.10
2	0.00	0.00	4.20	1.40	0.00	27.90	11.40	6.50	0.10	0.00	0.00	0.60
3	0.00	0.30	0.00	0.00	0.00	9.70	2.80	58.90	4.80	0.00	0.00	1.40
4	0.10	0.70	0.00	0.30	0.00	0.00	0.00	28.70	1.60	0.10	0.00	0.50
5	0.70	0.00	0.00	0.00	0.00	1.80	18.40	15.70	0.00	0.00	0.00	2.40
6	5.80	0.00	0.00	0.10	0.40	7.90	19.10	0.70	0.00	0.00	0.30	0.10
7	1.50	0.00	0.00	0.00	5.60	2.70	52.90	1.60	1.90	0.00	0.20	0.60
8	0.00	0.00	0.00	2.60	1.70	5.70	13.70	46.70	0.00	0.00	0.10	1.00
9	0.00	0.00	0.00	7.30	2.70	0.00	11.60	26.70	0.00	0.00	0.60	1.50
10	0.00	0.00	2.80	4.30	1.60	2.90	0.10	0.20	0.00	0.00	0.00	1.10
11	0.00	0.00	4.00	0.00	0.10	0.00	0.10	0.10	0.10	0.00	0.00	0.00
12	6.00	0.00	1.40	7.20	0.00	0.00	0.10	10.00	0.00	0.00	22.20	7.30
13	1.80	0.00	1.30	33.00	0.00	0.00	6.80	7.00	0.00	0.00	7.30	4.30
14	1.30	0.00	5.60	0.00	0.00	0.00	33.70	17.10	0.00	0.00	3.10	1.60
15	0.00	0.00	13.00	0.30	0.00	0.00	42.50	0.90	0.00	0.00	0.00	3.30
16	0.10	1.00	0.10	0.00	0.00	0.00	45.00	7.90	0.00	0.00	8.30	1.30
17	0.70	0.00	6.10	0.00	0.00	12.30	1.40	1.40	0.00	2.70	29.30	1.00
18	0.00	0.00	0.00	0.00	0.00	7.10	4.00	0.10	0.00	19.70	5.50	0.10
19	0.00	1.60	7.60	11.40	0.00	2.20	0.30	1.80	0.00	36.80	0.10	0.70
20	0.00	0.00	0.00	0.90	0.00	2.40	7.60	14.90	0.00	11.70	0.10	2.40
21	0.00	0.00	0.00	0.00	0.00	1.40	2.30	12.20	15.10	0.90	4.80	0.00
22	0.50	0.00	2.30	0.00	0.00	0.00	8.60	0.00	0.10	1.30	4.90	0.10
23	0.10	1.80	1.40	0.10	0.00	0.00	2.30	26.60	4.20	0.80	0.10	5.30
24	2.90	0.00	27.40	0.00	0.00	7.40	2.90	13.40	0.10	1.00	0.00	1.10
25	4.80	0.00	0.20	0.00	0.00	2.20	7.40	7.30	0.10	0.20	0.00	10.00
26	0.00	0.00	0.00	0.00	0.00	0.90	36.30	4.10	0.00	0.10	0.60	2.90
27	2.80	1.30	0.00	0.00	0.00	0.30	19.50	4.70	0.00	0.00	0.00	0.10
28	0.50	7.10	0.00	0.00	0.00	0.00	3.70	2.50	5.90	0.00	11.90	4.30
29	0.00	8.20	0.00	0.00	1.70	0.00	2.70	0.10	3.10	0.00		0.00
30	0.00	0.10	0.90	0.00	4.20	0.00	4.00	2.00	11.00	0.00		2.70
31		0.00		0.00	12.60		2.00		0.80	6.80		10.30
Monthly Total (mm)	**29.60**	**22.10**	**78.30**	**68.90**	**30.60**	**103.60**	**363.20**	**322.60**	**58.00**	**82.10**	**100.60**	**68.10**
2016-17 Annual Total (mm)		**1327.70**										

Table 44
2016-2017 Annual Report

2011-12 Statistics

Stn.Code																													
EMS. ID	**Site Name**	**Statistics**	**As-T**	**As-D**	**Al-T**	**Al-D**	**Alk-T**	**Cd-T**	**Cd-D**	**Cu-T**	**Cu-D**	**Fe-T**	**Fe-D**	**Mn-T**	**Mn-D**	**Hg-T**	**Hg-D**	**Hard-T**	**Ni-T**	**Ni-D**	**Pb-T**	**Pb-D**	**SO4-D**	**Zn-T**	**Zn-D**	**P-T**	**P-D**	**N-NO23**	**N-NH3**
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
WA	Middle Quinsam Lake Inlet - Quinsam River at Argonaut Road upstream of mining operation.	Average	0.00008	0.000067	0.034	0.0224	18.7	0.000005	0.0000062	0.0007	0.00103	0.033	0.0150	0.0020	0.00117	0.0000088	0.0000083	18.90	0.0005	0.00050	0.00011	0.000100	2.400	0.0025	0.00250	0.00250	0.00250	0.0100	0.0213
E0126402		Count	12	12	12	12	51	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	51	12	12	11	11	11	11
		Minimum	<0.0001	<0.0001	0.019	0.015	15	<0.00001	<0.00001	0.0006	0.0005	0.015	0.0079	<0.001	<0.001	<0.000010	<0.000010	16.3	<0.001	<0.001	<0.0002	<0.0002	<0.5	<0.005	<0.005	<0.005	<0.005	<0.02	0.005
		Maximum	0.0002	0.0001	0.090	0.028	24	0.00001	0.00002	0.0009	0.00245	0.134	0.023	0.005	0.0020	<0.00002	<0.00002	<50	0.001	<0.001	0.0002	<0.0002	32	<0.005	<0.005	<0.005	<0.005	<0.02	0.043
		Geometric Mean	0.00007	0.000063	0.031	0.0221	18.6	0.000005	0.0000056	0.0007	0.00096	0.026	0.0146	0.0016	0.00100	0.0000084	0.0000079	18.81	0.0005	0.00050	0.00011	0.000100	1.375	0.0025	0.00250	0.00250	0.00250	0.0100	0.0175
		Count <DL	8	8	0	0	0	11	11	0	0	0	0	2	4	12	12	1	11	12	11	12	3	12	12	11	11	11	0
		Standard Deviation	0.00005	0.000025	0.019	0.0038	2.3	0.000001	0.0000043	0.0001	0.00048	0.033	0.0038	0.0013	0.00065	0.0000023	0.0000025	2.07	0.0001	0.00000	0.00003	0.000000	5.095	1E-10	1E-10	1E-10	1E-10	3E-10	0.0124
		1st Quartile	<0.0001	<0.0001	0.026	0.0198	17	<0.00001	<0.00001	0.0006	0.0009	0.018	0.0135	0.001	<0.0010	0.0000088	<0.000010	17.98	<0.001	<0.001	<0.0002	<0.0002	1.0	<0.005	<0.005	<0.0050	<0.0050	<0.020	0.0097
		Median	<0.0001	<0.0001	0.030	0.0224	17.9	<0.00001	<0.000010	0.0006	0.0009	0.024	0.0152	0.002	0.001	<0.000020	<0.00002	18.75	<0.001	<0.0010	<0.0002	<0.00020	1.37	<0.005	<0.0050	<0.005	<0.005	<0.02	0.024
		3rd Quartile	0.0001	0.0001	0.033	0.0251	21	<0.00001	<0.00001	0.0008	0.00104	0.032	0.0161	0.0023	0.0020	<0.00002	<0.00002	18.92	<0.001	<0.001	<0.0002	<0.0002	1.745	<0.005	<0.005	<0.005	<0.005	<0.02	0.0290
WD	Settling Pond #4	Average	0.0014	0.00093	0.066	0.0131	327	0.000025	0.0000113	0.0016	0.00086	0.260	0.03212	0.060	0.0557	0.0000088	0.0000088	400	0.004	0.0035	0.00015	0.000100	689	0.0025	0.00250	0.00313	0.00250	0.0427	0.042
E207409		Count	12	12	12	12	52	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	52	12	12	12	12	12	12
		Minimum	0.0008	0.0006	0.014	0.006	247	<0.00001	<0.00001	0.0006	0.0005	0.113	<0.005	0.014	0.001	<0.000010	<0.000010	273	0.002	0.002	<0.0002	<0.0002	407	<0.005	<0.005	<0.005	<0.005	<0.02	0.021
		Maximum	0.0021	0.00156	0.176	0.024	370	0.00007	0.000021	0.0039	0.0013	0.530	0.233	0.097	0.0930	<0.00002	<0.00002	490	0.006	0.006	0.0005	<0.0002	1100	<0.005	<0.005	0.0064	<0.005	0.09	0.069
		Geometric Mean	0.0013	0.00089	0.051	0.0112	326	0.000019	0.0000093	0.0014	0.00083	0.235	0.00915	0.053	0.0405	0.0000084	0.0000084	393	0.004	0.0032	0.00013	0.000100	670	0.0025	0.00250	0.00292	0.00250	0.0292	0.040
		Count <DL	0	0	0	0	2	3	7	0	0	5	0	3	0	12	12	0	0	0	10	12	0	12	12	10	12	5	0
		Standard Deviation	0.0005	0.00030	0.054	0.0077	26	0.000018	0.0000072	0.0009	0.00025	0.130	0.06798	0.025	0.0266	0.0000023	0.0000023	75	0.002	0.0015	0.00012	0.000000	155	1E-10	1E-10	0.00148	1E-10	0.0324	0.014
		1st Quartile	0.0010	0.00078	0.031	0.0068	310	0.000018	<0.000010	0.0011	0.0006	0.174	0.00438	0.038	0.0372	0.0000088	0.0000088	337	0.002	0.002	<0.0002	<0.0002	552	<0.005	<0.005	<0.005	<0.005	<0.02	0.030
		Median	0.0012	0.0008	0.051	0.0094	331	0.00002	0.0000075	0.0013	0.0009	0.218	0.00665	0.064	0.0612	<0.000020	<0.000020	436	0.004	0.0036	<0.0002	<0.00020	725	<0.005	<0.0050	<0.005	<0.0050	0.0405	0.040
		3rd Quartile	0.0018	0.00098	0.064	0.0194	346	0.00003	0.00002	0.0015	0.00101	0.297	0.01040	0.080	0.074	<0.00002	<0.00002	448	0.006	0.0043	<0.0002	<0.0002	800	<0.005	<0.005	<0.005	<0.005	0.0718	0.051
WC	2-North Pit Culvert discharge into Middle Quinsam Lake	Average	0.0007	0.00060	0.037	0.0145	299	0.000021	0.0000142	0.0011	0.00133	0.112	0.0152	0.028	0.01292	0.0000088	0.0000083	360	0.0018	0.00141	0.00010	0.000108	634	0.0025	0.00250	0.0025	0.00260	0.0453	
E207411		Count	12	12	12	12	51	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	52	12	12	2	30	18	
		Minimum	0.0004	0.0003	0.007	0.005	210	<0.00001	<0.00001	0.0003	0.0003	0.028	0.0055	0.005	<0.001	<0.000010	<0.000010	273	<0.001	<0.001	<0.0002	<0.0002	307	<0.005	<0.005	<0.005	<0.005	<0.02	
		Maximum	0.0013	0.00091	0.076	0.023	337	0.00007	0.00005	0.0043	0.00530	0.239	0.040	0.046	0.023	<0.00002	<0.00002	452	0.004	0.0030	<0.0002	0.0002	840	<0.005	<0.005	<0.005	<0.005	0.0055	0.084	
		Geometric Mean	0.0007	0.00058	0.031	0.0135	298	0.000012	0.0000100	0.0009	0.00098	0.098	0.0126	0.024	0.01008	0.0000084	0.0000079	356	0.0015	0.00118	0.00010	0.000106	616	0.0025	0.00250	0.0025	0.00257	0.0375	
		Count <DL	0	0	0	0	0	7	7	0	0	0	0	0	1	12	12	0	2	3	12	11	0	12	12	2	29	3	
		Standard Deviation	0.0003	0.00017	0.020	0.0052	23	0.000023	0.0000138	0.0011	0.00135	0.058	0.0103	0.013	0.00637	0.0000023	0.0000025	59	0.0011	0.00088	0.00000	0.000029	143	1E-10	1E-10	0.0000	0.00055	0.0233	
		1st Quartile	0.0006	0.0005	0.025	0.0120	290	<0.00001	<0.000010	0.0006	0.00068	0.079	0.0078	0.019	0.00975	0.0000088	<0.000010	317	0.001	0.00088	<0.0002	<0.0002	502	<0.005	<0.005	<0.005	<0.0050	0.03	
		Median	0.0006	0.0006	0.037	0.0155	300	0.000008	0.0000075	0.0009	0.00095	0.100	0.0120	0.030	0.01125	<0.000020	<0.00002	377	0.002	0.00120	<0.0002	<0.00020	675	<0.005	<0.0050	<0.005	<0.005	0.0540	
		3rd Quartile	0.0009	0.00065	0.044	0.0176	310	0.000029	0.0000163	0.0012	0.00141	0.137	0.0190	0.038	0.01662	<0.00002	<0.00002	392	0.0023	0.00170	<0.0002	<0.0002	762	<0.005	<0.005	<0.005	<0.005	0.0615	
MQL1	Middle Quinsam Lake 1 metre below surface	Average	0.00009	0.00008	0.025	0.023	26.2	0.000006	0.000027	0.0011	0.0009	0.046	0.026	0.008	0.006	0.001382	0.00133	28.8	0.0005	0.0005	0.00010	0.00016	15.0	0.0037	0.0055	0.0060	0.0042	0.010	0.0129
E206618		Count	6	5	6	5	6	6	5	6	5	6	5	6	5	6	5	6	6	5	6	5	6	6	5	6	6	6	6
		Minimum	<0.0001	<0.0001	0.016	0.018	23	<0.00001	<0.00001	0.0006	0.0005	0.033	0.017	0.004	0.003	<0.00002	0.00060	21.7	<0.001	<0.001	<0.0002	<0.0002	7.7	<0.005	<0.005	<0.005	<0.005	<0.02	<0.005
		Maximum	0.0001	0.0001	0.035	0.028	31	0.00001	0.00007	0.0021	0.0017	0.061	0.036	0.012	0.009	0.00369	0.00241	45.8	<0.001	<0.001	<0.0002	0.0004	29	0.007	0.007	0.014	0.010	<0.02	0.029
		Geometric Mean	0.00009	0.00008	0.024	0.022	26.0	0.000006	0.000013	0.0010	0.0008	0.044	0.025	0.008	0.006	0.000575	0.00118	27.9	0.0005	0.0005	0.00010	0.00013	13.5	0.0033	0.0052	0.0050	0.0035	0.010	0.0103
		Count <DL	1	2	0	0	0	5	3	0	0	0	0	0	0	1	0	0	6	5	6	4	0	4	1	2	4	6	1
		Standard Deviation	0.00002	0.00003	0.006	0.005	2.9	0.000002	0.000031	0.0006	0.0005	0.012	0.007	0.003	0.003	0.001320	0.00072	8.7	0.0000	0.0000	0.00000	0.00013	8.0	0.0019	0.0019	0.0042	0.0030	0.000	0.0089
		1st Quartile	0.0001	<0.0001	0.022	0.020	24.2	<0.00001	<0.00001	0.0007	0.0007	0.036	0.021	0.006	0.004	0.000555	0.00090	23.8	<0.001	<0.001	<0.0002	<0.0002	9.6	<0.005	0.005	0.0031	<0.005	<0.02	0.0095
		Median	0.0001	0.0001	0.024	0.020	26.0	<0.00001	<0.00001	0.0009	0.0007	0.046	0.027	0.008	0.007	0.001090	0.00105	26.8	<0.001	<0.001	<0.0002	<0.0002	12.4	<0.005	0.006	0.0055	<0.005	<0.02	0.011
		3rd Quartile	0.0001	0.0001	0.026	0.027	27	<0.00001	0.00005	0.0012	0.0009	0.053	0.028	0.011	0.008	0.001798	0.00167	28.6	<0.001	<0.001	<0.0002	<0.0002	18.0	0.0044	0.007	0.006	0.0044	<0.02	0.0140
MQLB	Middle Quinsam Lake 1 metre from bottom	Average	0.00007	0.00005	0.018	0.0085	36.5	0.000005	0.000011	0.0006	0.0005	0.091	0.017	0.117	0.113	0.000180	0.00011	118.8	0.0005	0.0005	0.00010	0.00010	115	0.0025	0.0034	0.0029	0.0025	0.028	0.039
E206618		Count	6	5	6	5	6	6	5	6	5	6	5	6	5	6	5	6	6	5	6	5	6	6	5	6	6	6	6
		Minimum	<0.0001	<0.0001	0.005	<0.003	33	<0.00001	<0.00001	0.0004	0.0003	0.024	0.011	0.012	0.007	<0.00002	0.00003	46.5	<0.001	<0.001	<0.0002	<0.0002	44	<0.005	<0.005	<0.005	<0.005	<0.02	0.009
		Maximum	0.0001	<0.0001	0.044	0.016	43	<0.00001	0.00002	0.0008	0.0008	0.150	0.022	0.217	0.220	0.00036	0.00017	156	<0.001	<0.001	<0.0002	<0.0002	170	<0.005	0.007	0.005	<0.005	0.04	0.061
		Geometric Mean	0.00006	0.00005	0.014	0.0062	36.4	0.000005	0.000009	0.0006	0.0005	0.080	0.016	0.089	0.072	0.000119	0.00009	111.2	0.0005	0.0005	0.00010	0.00010	107	0.0025	0.0031	0.0028	0.0025	0.026	0.033
		Count <DL	4	5	0	1	0	6	3	0	0	0	0	0	0	1	0	0	6	6	6	5	0	6	4	5	6	1	0
		Standard Deviation	0.00003	0.00000	0.014	0.0063	3.4	1E-13	0.000008	0.0002	0.0002	0.042	0.004	0.067	0.081	0.000124	0.00006	38.4	0.0000	0.0000	0.00000	0.00000	41	0.0000	0.0020	0.0010	0.0000	0.012	0.019
		1st Quartile	<0.0001	<0.0001	0.010	0.004	35.2	<0.00001	<0.00001	0.0004	0.0005	0.082	0.015	0.097	0.067	0.000122	0.00007	114.8	<0.001	<0.001	<0.0002	<0.0002	110	<0.005	<0.005	<0.005	<0.005	0.022	0.028
		Median	<0.0001	<0.0001	0.014	0.007	36	<0.00001	<0.00001	0.0006	0.0005	0.086	0.016	0.120	0.124	0.000155	0.00014	129.0	<0.001	<0.001	<0.0002	<0.0002	120	<0.005	<0.005	<0.005	<0.005	0.03	0.046
		3rd Quartile	0.00009	<0.0001	0.018	0.014	36	<0.00001	0.00002	0.0007	0.0006	0.110	0.019	0.139	0.147	0.000255	0.00015	138.8	<0.001	<0.001	<0.0002	<0.0002	130	<0.005	<0.005	<0.005	<0.005	0.038	0.048
NNO	No Name Lake Outlet	Average	0.0003	0.00029	0.045	0.0315	12.59	0.000008	0.0000068	0.0008	0.00130	0.079	0.0587	0.008	0.0066	0.00000854	0.0000088	16.949	0.0005	0.00050	0.00011	0.000100	5.091	0.0029	0.00250	0.00332	0.00250	0.0131	0.0162
E217017		Count	12	12	12	12	48	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	49	12	12	11	4	11	3
		Minimum	0.0002	0.00016	0.018	0.018	7.29	<0.00001	<0.00001	0.0004	0.0007	0.049	0.032	0.002	0.0018	0.0000025	<0.000010	8.59	<0.001	<0.001	<0.0002	<0.0002	<0.50	<0.005	<0.005	<0.005	<0.005	<0.02	0.0095
		Maximum	0.0004	0.0005	0.073	0.0507	18	0.00003	0.000027	0.0017	0.00306	0.143	0.133	0.019	0.018	<0.00002	<0.00002	28.8	0.001	<0.001	0.0002	<0.0002	13.2	0.007	<0.005	0.008	<0.005	0.029	0.025
		Geometric Mean	0.0003	0.00027	0.042	0.0302	12.23	0.000007	0.0000058	0.0007	0.00120	0.075	0.0547	0.006	0.0051	0.00000794	0.0000084	15.569	0.0005	0.00050	0.00011	0.000100	3.333	0.0027	0.00250	0.00301	0.00250	0.0120	0.0149
		Count <DL	0	0	0	0	0	8	11	0	0	0	0	0	0	11	12	1	11	12	11	12	5	11	12	9	4	9	0
		Standard Deviation	0.0001	0.00012	0.017	0.0093	2.95	0.000007	0.0000064	0.0004	0.00063	0.028	0.0267	0.006	0.0051	0.00000271	0.0000023	7.056	0.0001	0.00000	0.00003	0.000000	3.562	0.0013	1E-10	0.00187	0.00000	0.0069	0.0080
		1st Quartile	0.0002	0.00019	0.035	0.0235	10.22	<0.00001	<0.00010	0.0005	0.00090	0.056	0.0436	0.004	0.0032	0.00000875	0.0000088	10.150	<0.001	<0.001	<0.0002	<0.0002	1.9	<0.005	<0.005	<0.0050	<0.0050	<0.020	0.0118
		Median	0.0002	0.00025	0.046	0.0320	12.70	<0.00001	<0.00001	0.0007	0.00115	0.077	0.0550	0.006	0.005	<0.000020	<0.000020	17.000	<0.001	<0.0010	<0.0002	<0.00020	4.7	<0.005	<0.0050	<0.005	<0.0050	<0.02	0.014
		3rd Quartile	0.0004	0.0004	0.054	0.0372	15	0.00001	<0.00001	0.0008	0.0015	0.089	0.0592	0.010	0.0088	<0.00002	<0.00002	22.400	<0.001	<0.001	<0.0002	<0.0002	7.2	<0.005	<0.005	<0.005	<0.005	<0.02	0.0195
LLS	Small Seep into Long Lake	Average	0.0024	0.00184	0.0220	0.01107	199.0	0.000011	0.0000157	0.00044	0.00135	0.982	0.571	0.271	0.283	0.0000088	0.0000088	442	0.002	0.0024	0.00010	0.000100	465	0.0025	0.05609				
E292131		Count	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12				
		Minimum	0.0004	0.0003	<0.003	<0.003	158	<0.00001	<0.00001	<0.0002	0.0003	0.187	0.018	0.116	0.111	<0.000010	<0.000010	369	0.001	0.001	<0.0002	<0.0002	380	<0.005	<0.005				
		Maximum	0.0052	0.00356	0.093	0.037	220	0.00004	0.000040	0.0016	0.0068	2.27	1.29	0.377	0.402	<0.00002	<0.00002	547	0.004	0.0042	<0.0002	<0.0002	593	<0.005	0.642				
		Geometric Mean	0.0019	0.00146	0.0124	0.00796	198.3	0.000008	0.0000114	0.00029	0.00079	0.810	0.343	0.258	0.267	0.0000084	0.0000084	439	0.002	0.0021	0.00010	0.000100	460	0.0025	0.00428				
		Count <DL	0	0	1	1	0	7	5	4	0	0	0	0	0	12	12	0	0	0	12	12	0	12	10				
		Standard Deviation	0.0014	0.00110	0.0256	0.00979	17.0	0.000011	0.0000127	0.00045	0.00185	0.596	0.399	0.079	0.090	0.0000023	0.0000023	51	0.001	0.0011	0.00000	0.000000	69	1E-10	0.18452				
		1st Quartile	0.0014	0.00092	0.0048	0.00542	190	<0.00001	<0.000010	<0.0002	0.0004	0.635	0.299	0.226	0.238	0.0000088	0.0000088	414	0.001	0.0018	<0.0002	<0.0002	417	<0.005	<0.0050				
		Median	0.0023	0.00192	0.0165	0.00785	197.0	<0.00001	0.00001	0.00035	0.00055	0.851	0.554	0.286	0.291	<0.000020	<0.000020	431	0.002	0.002	<0.0002	<0.00020	445	<0.005	<0.005				
		3rd Quartile	0.0030	0.00240	0.0253	0.01418	210	0.000012	0.0000278	0.0005	0.00152	1.238	0.874	0.331	0.357	<0.00002	<0.00002	456	0.003	0.0030	<0.0002	<0.0002	505	<0.005	<0.005				
LLSM	Long Lake Middle Seep	Average	0.0010	0.00079	0.031	0.0096	178.2	0.000018	0.0000160	0.0005	0.00109	0.375	0.178	0.143	0.139	0.0000081	0.0000081	451	0.0022	0.00211	0.00013	0.000100	447	0.0025	0.00250				
E292131		Count	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8				
		Minimum	0.0003	0.0002	0.005	0.004	157	<0.00001	<0.00001	0.0002	0.0003	0.066	0.008	0.033	0.037	<0.000010	<0.000010	394	<0.001	<0.001	<0.0002	<0.0002	340	<0.005	<0.005				
		Maximum	0.0017	0.00146	0.118	0.0172	197	0.00005	0.0000033	0.0012	0.00425	0.815	0.374	0.282	0.253	<0.00002	<0.00002	554	0.004	0.0040	0.0003	<0.0002	588	<0.005	<0.005				
		Geometric Mean	0.0007	0.00059	0.015	0.0085	177.8	0.000013	0.0000129	0.0004	0.00075	0.235	0.085	0.113	0.112	0.0000077	0.0000077	448	0.0015	0.00153	0.00011	0.000100	440	0.0025	0.00250				
		Count <DL	0	0	0	0	0	2	2	0	0	0	0	0	0	8	8	0	3	3	7	8	0	8	8				
		Standard Deviation	0.0007	0.00057	0.042	0.0050	13.7	0.000015	0.0000107	0.0004	0.00130	0.317	0.163	0.094	0.088	0.0000026	0.0000026	53	0.0017	0.00146	0.00007	0.000000	86	3E-11	3E-11				
		1st Quartile	0.0003	0.00027	0.006	0.0065	170	0.000009	0.0000088	0.0003	0.00049	0.080	0.036	0.066	0.064	<0.000010	<0.000010	418	<0.001	<0.001	<0.0002	<0.00020	400	<0.005	<0.0050				
		Median	0.0010	0.00074	0.011	0.0075	175.5	0.000015	0.0000125	0.0003	0.0006	0.360	0.159	0.132	0.129	<0.000020	<0.000020	435	0.0020	0.00240	<0.0002	<0.00020	434	<0.005	<0.0050				
		3rd Quartile	0.0016	0.00131	0.032	0.0138	190.2	0.00002	0.0000225	0.0008	0.00098	0.611	0.320	0.214	0.216	<0.00002	<0.00002	463	0.004	0.00310	<0.0002	<0.0002	470	<0.005	<0.005				

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 45
2016-2017 Annual Report

2011-12 Statistics

Stn.Code																												
EMS. ID	**Site Name**	**Statistics**	**As-T**	**As-D**	**Al-T**	**Al-D**	**Alk-T**	**Cd-T**	**Cd-D**	**Cu-T**	**Cu-D**	**Fe-T**	**Fe-D**	**Mn-T**	**Mn-D**	**Hg-T**	**Hg-D**	**Hard-T**	**Ni-T**	**Ni-D**	**Pb-T**	**Pb-D**	**SO4-D**	**Zn-T**	**Zn-D**	**P-T**	**P-D**	**N-NO23**	**N-NH3**
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
SPD		Average	0.0008	0.00060	0.084	0.0177	67.09	0.000025	0.0000152	0.0011	0.00109	0.347	0.0611	0.079	0.0713	0.0000088	0.0000088	291	0.002	0.0020	0.00012	0.000133	215.6	0.0031	0.00271	0.00463	0.00250	0.0100	0.028
E218582		Count	12	12	12	12	50	12	12	11	12	12	12	12	12	12	12	12	12	12	12	12	50	12	12	12	12	12	12
		Minimum	0.0003	0.00013	0.007	0.004	8.42	<0.00001	<0.00001	0.0005	0.0006	0.211	0.010	0.014	0.006	<0.000010	<0.000010	158	0.001	0.001	<0.0002	<0.0002	16.5	<0.005	<0.005	<0.005	<0.005	<0.02	0.007
		Maximum	0.0015	0.0013	0.581	0.0582	100	0.00008	0.00006	0.0037	0.00371	0.920	0.105	0.204	0.190	<0.00002	<0.00002	481	0.004	0.003	0.0002	0.0005	447	0.007	0.005	0.0134	<0.005	<0.02	0.044
	Settling Pond # 1	Geometric Mean	0.0007	0.00049	0.035	0.0127	63.41	0.000018	0.0000115	0.0009	0.00094	0.318	0.0507	0.056	0.0452	0.0000084	0.0000084	280	0.002	0.0019	0.00011	0.000114	197.3	0.0029	0.00265	0.00397	0.00250	0.0100	0.024
		Count <DL	0	9	0	0	0	1	3	0	0	0	0	0	0	12	12	0	0	0	10	11	0	10	11	6	12	12	9
		Standard Deviation	0.0004	0.00038	0.160	0.0164	17.90	0.000024	0.0000150	0.0009	0.00085	0.190	0.0331	0.068	0.0645	0.0000023	0.0000023	84	0.001	0.0008	0.00004	0.000115	73.1	0.0014	0.00072	0.00314	1E-10	2E-10	0.013
		1st Quartile	0.0005	0.00025	0.017	0.0078	58.97	0.00001	0.0000088	0.0006	0.00068	0.252	0.0382	0.034	0.0308	0.0000088	0.0000088	255	0.002	0.0014	<0.0002	<0.00020	190	<0.005	<0.005	<0.0050	<0.005	<0.02	0.017
		Median	0.0008	0.00055	0.028	0.0095	70	0.00002	0.0000105	0.0008	0.00094	0.300	0.0545	0.048	0.0476	<0.000020	<0.000020	281	0.002	0.002	<0.0002	<0.0002	215.0	<0.005	<0.0050	0.00375	<0.0050	<0.020	0.030
		3rd Quartile	0.0010	0.00078	0.073	0.0280	77.92	0.00002	0.0000148	0.0011	0.0011	0.357	0.0948	0.096	0.0918	<0.00002	<0.00002	303	0.003	0.0029	<0.0002	<0.0002	240.5	<0.005	<0.005	0.00555	<0.005	<0.02	0.039
LLE		Average	0.0016	0.00130	0.112	0.0368	40.6	0.000010	0.0000071	0.0009	0.00095	2.165	1.534	0.230	0.2113	0.0000088	0.0000085	160.3	0.0007	0.00060	0.00011	0.000112	136.9	0.0025	0.00281	0.00526	0.00418	0.0210	0.055
E292130		Count	12	13	12	13	52	12	13	12	13	12	13	12	13	12	13	12	12	13	12	13	52	12	13	11	11	11	11
		Minimum	0.0005	0.00049	0.026	0.008	17.8	<0.00001	<0.00001	0.0003	0.0003	0.196	0.136	0.014	0.007	<0.000010	<0.000010	46.9	<0.001	<0.001	<0.0002	<0.0002	14	<0.005	<0.005	<0.005	<0.005	<0.02	0.013
		Maximum	0.0055	0.0050	0.606	0.078	130	0.00002	0.00002	0.0027	0.00202	13.2	12.6	1.43	1.32	<0.00002	<0.00002	515	0.002	<0.0025	0.0002	<0.00050	400	<0.005	<0.013	0.013	0.0135	0.05	0.18
	South mine effluent discharge into Long Lake	Geometric Mean	0.0012	0.00106	0.074	0.0321	34.3	0.000008	0.0000063	0.0007	0.00084	0.825	0.547	0.092	0.0779	0.0000084	0.0000081	128.6	0.0006	0.00057	0.00011	0.000107	109.9	0.0025	0.00269	0.00444	0.00331	0.0171	0.038
		Count <DL	0	0	0	0	0	9	11	0	0	0	0	0	0	12	13	0	10	12	11	13	0	12	13	5	9	6	0
		Standard Deviation	0.0014	0.00117	0.158	0.0186	29.3	0.000007	0.0000045	0.0007	0.00048	3.879	3.371	0.406	0.3693	0.0000023	0.0000024	132.0	0.0004	0.00024	0.00003	0.000042	102.9	1E-10	0.00111	0.00338	0.00382	0.0145	0.054
		1st Quartile	0.0009	0.0007	0.059	0.0308	24.0	<0.00001	<0.000010	0.0005	0.0006	0.365	0.176	0.044	0.0447	0.0000088	<0.000010	95.9	<0.001	<0.0010	<0.0002	<0.00020	81.1	<0.005	<0.0050	<0.0050	<0.0050	<0.020	0.020
		Median	0.0011	0.0010	0.065	0.035	28	<0.00001	<0.00001	0.0006	0.0008	0.688	0.395	0.070	0.069	<0.000020	<0.00002	108.0	<0.001	<0.001	<0.0002	<0.0002	97.1	<0.005	<0.005	0.0052	<0.005	<0.02	0.031
		3rd Quartile	0.0015	0.0014	0.076	0.040	39.8	0.000016	<0.00001	0.0009	0.0011	1.128	1.03	0.161	0.142	<0.00002	<0.00002	160.0	<0.001	<0.001	<0.0002	<0.0002	130	<0.005	<0.005	0.00610	<0.005	0.0305	0.071
LLM1		Average	0.0005	0.0004	0.026	0.017	31.2	0.000015	0.000012	0.0008	0.0007	0.065	0.035	0.016	0.0093	0.001240	0.001120	70.8	0.0005	0.0005	0.00010	0.00010	57.2	0.0025	0.0025	0.0062	0.0048	0.012	0.0252
E206619		Count	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
		Minimum	0.0002	0.0002	0.009	0.006	25	<0.00001	<0.00001	0.0004	0.0004	0.037	0.012	0.006	<0.001	<0.00002	<0.00002	52.7	<0.001	<0.001	<0.0002	<0.0002	36	<0.005	<0.005	<0.005	<0.005	<0.02	<0.005
		Maximum	0.0006	0.0006	0.038	0.038	39	0.00005	0.00004	0.0020	0.0013	0.092	0.054	0.033	0.028	0.00284	0.00290	99.7	<0.001	<0.001	<0.0002	<0.0002	79	<0.005	<0.005	0.010	0.009	0.02	0.057
	Long Lake Middle 1 metre below Surface	Geometric Mean	0.0004	0.0004	0.024	0.015	30.8	0.000009	0.000008	0.0007	0.0006	0.063	0.032	0.013	0.0039	0.000551	0.000475	69.2	0.0005	0.0005	0.00010	0.00010	55.5	0.0025	0.0025	0.0054	0.0041	0.011	0.0166
		Count <DL	0	0	0	0	0	4	4	0	0	0	0	0	2	1	1	0	6	6	6	6	0	6	6	2	3	5	1
		Standard Deviation	0.0002	0.0002	0.011	0.012	5.2	0.000018	0.000014	0.0006	0.0004	0.019	0.015	0.011	0.0104	0.001008	0.001064	16.8	0.0000	0.0000	0.00000	0.00000	15.0	0.0000	0.0000	0.0032	0.0028	0.004	0.0206
		1st Quartile	0.0004	0.0003	0.021	0.010	27.8	<0.00001	<0.00001	0.0005	0.0004	0.057	0.030	0.008	0.0014	0.000560	0.000410	59.2	<0.001	<0.001	<0.0002	<0.0002	50.5	<0.005	<0.005	0.0034	<0.005	<0.02	0.0105
		Median	0.0005	0.0004	0.028	0.014	30.5	<0.00001	<0.00001	0.0005	0.0005	0.064	0.033	0.012	0.0075	0.001255	0.000865	70.0	<0.001	<0.001	<0.0002	<0.0002	55.0	<0.005	<0.005	0.0065	0.0038	<0.02	0.0225
		3rd Quartile	0.0006	0.0006	0.034	0.022	34.0	0.000016	0.000009	0.0009	0.0009	0.076	0.045	0.024	0.0118	0.001628	0.001583	75.0	<0.001	<0.001	<0.0002	<0.0002	65.5	<0.005	<0.005	0.0085	0.0065	<0.02	0.0360
LLMB		Average	0.0002	0.0002	0.035	0.011	54.2	0.000008	0.000010	0.0011	0.0009	0.060	0.0185	0.276	0.121	0.000113	0.000075	158.8	0.0005	0.0005	0.00010	0.00010	151.7	0.0032	0.0025	0.0025	0.0025	0.08	0.016
E206619		Count	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
		Minimum	0.0002	0.0002	0.011	0.005	52	<0.00001	<0.00001	0.0005	0.0004	0.036	<0.005	0.195	0.001	<0.00002	<0.00002	149	<0.001	<0.001	<0.0002	<0.0002	140	<0.005	<0.005	<0.005	<0.005	0.05	0.005
		Maximum	0.0003	0.0002	0.098	0.017	56	0.00002	0.00002	0.0023	0.0024	0.082	0.043	0.367	0.279	0.00022	0.00017	165	<0.001	<0.001	<0.0002	<0.0002	160	0.007	<0.005	<0.005	<0.005	0.10	0.037
	Long Lake Middle 1 metre From Bottom	Geometric Mean	0.0002	0.0002	0.027	0.010	54.1	0.000006	0.000009	0.0008	0.0008	0.058	0.0114	0.269	0.056	0.000081	0.000054	158.7	0.0005	0.0005	0.00010	0.00010	151.4	0.0030	0.0025	0.0025	0.0025	0.08	0.013
		Count <DL	0	0	0	0	0	5	2	0	0	0	2	0	0	1	1	0	6	6	6	6	0	5	6	6	6	0	0
		Standard Deviation	0.0001	0.0000	0.032	0.005	1.6	0.000006	0.000005	0.0009	0.0007	0.017	0.0157	0.070	0.096	0.000075	0.000058	5.8	0.0000	0.0000	0.00000	0.00000	9.8	0.0018	0.0000	0.0000	0.0000	0.02	0.013
		1st Quartile	0.0002	0.0002	0.018	0.007	53.2	<0.00001	0.000006	0.0005	0.0006	0.050	0.0051	0.218	0.065	0.000082	0.000038	157.2	<0.001	<0.001	<0.0002	<0.0002	142.5	<0.005	<0.005	<0.005	<0.005	0.08	0.008
		Median	0.0002	0.0002	0.024	0.012	54	<0.00001	0.00001	0.0005	0.0006	0.062	0.0180	0.278	0.114	0.000095	0.000065	159.0	<0.001	<0.001	<0.0002	<0.0002	155.0	<0.005	<0.005	<0.005	<0.005	0.08	0.011
		3rd Quartile	0.0003	0.0002	0.032	0.015	55.5	<0.00001	0.00001	0.0017	0.0008	0.070	0.0260	0.324	0.153	0.000160	0.000100	163.0	<0.001	<0.001	<0.0002	<0.0002	160	<0.005	<0.005	<0.005	<0.005	0.08	0.022
LLO		Average	0.0004	0.00041	0.045	0.0242	26.5	0.000005	0.0000058	0.0008	0.00087	0.097	0.0532	0.015	0.0110	0.0000088	0.0000088	54.8	0.0005	0.00050	0.00013	0.000100	47.5	0.0029	0.00250	0.00250	0.00250	0.0139	0.0291
E219412		Count	12	12	12	12	50	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	50	12	12	12	12	12	12
		Minimum	0.0002	0.0002	0.013	0.007	10.0	<0.00001	<0.00001	0.0003	0.0005	0.061	0.031	0.008	0.004	<0.000010	<0.000010	31.1	<0.001	<0.001	<0.0002	<0.0002	14.8	<0.005	<0.005	<0.005	<0.005	<0.02	0.0079
		Maximum	0.0006	0.0006	0.125	0.0568	42	<0.00001	0.00001	0.0023	0.00219	0.162	0.0836	0.022	0.018	<0.00002	<0.00002	87	0.001	<0.001	0.0004	<0.0002	89	0.007	<0.005	<0.005	<0.005	0.03	0.069
	Long Lake Outlet	Geometric Mean	0.0004	0.00039	0.036	0.0202	25.0	0.000005	0.0000056	0.0007	0.00079	0.091	0.0508	0.015	0.0101	0.0000084	0.0000084	52.1	0.0005	0.00050	0.00011	0.000100	44.0	0.0027	0.00250	0.00250	0.00250	0.0126	0.0249
		Count <DL	0	0	0	0	0	12	10	0	0	0	0	0	0	12	12	0	11	12	11	12	0	11	12	12	12	9	0
		Standard Deviation	0.0001	0.00014	0.034	0.0150	8.5	1E-13	0.0000019	0.0005	0.00048	0.037	0.0170	0.004	0.0044	0.0000023	0.0000023	17.9	0.0001	0.00000	0.00009	0.000000	17.8	0.0013	1E-10	1E-10	1E-10	1E-10	0.0073	0.0166
		1st Quartile	0.0004	0.00029	0.024	0.011	21.7	<0.00001	<0.000010	0.0004	0.00065	0.064	0.0405	0.014	0.007	0.0000088	0.0000088	39.2	<0.001	<0.001	<0.0002	<0.0002	33.2	<0.005	<0.005	<0.005	<0.005	<0.02	0.0188
		Median	0.0004	0.00038	0.030	0.020	27.0	<0.00001	<0.00001	0.0007	0.0007	0.084	0.0505	0.015	0.0110	<0.000020	<0.000020	57.3	<0.001	<0.0010	<0.0002	<0.00020	47	<0.005	<0.0050	<0.0050	<0.0050	<0.02	0.0260
		3rd Quartile	0.0006	0.00052	0.058	0.0313	32.8	<0.00001	<0.00001	0.0009	0.00087	0.122	0.0648	0.018	0.0140	<0.00002	<0.00002	64.0	<0.001	<0.001	<0.0002	<0.0002	58.8	<0.005	<0.005	<0.005	<0.005	0.0132	0.0365
WB		Average	0.00010	0.000124	0.031	0.0186	28.4	0.000008	0.0000058	0.0007	0.00082	0.051	0.0275	0.008	0.00558	0.0000088	0.0000083	30.20	0.0005	0.00050	0.00010	0.000100	21.8	0.0025	0.00250	0.00250	0.00250	0.0108	0.027
E0900504		Count	12	12	12	12	51	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	51	12	12	12	12	12	12
		Minimum	<0.0001	<0.0001	0.015	0.008	20	<0.00001	<0.00001	0.0005	0.0004	0.031	0.0191	0.003	<0.001	<0.000010	<0.000010	22.6	<0.001	<0.001	<0.0002	<0.0002	9.3	<0.005	<0.005	<0.005	<0.005	<0.02	0.012
		Maximum	0.0002	0.0002	0.082	0.0281	43.6	0.00004	0.00001	0.0010	0.00110	0.089	0.035	0.013	0.012	<0.00002	<0.00002	39.0	0.001	<0.001	<0.0002	<0.0002	54.4	<0.005	<0.005	<0.005	<0.005	0.02	0.041
	Middle Quinsam Lake Outlet	Geometric Mean	0.00009	0.000113	0.028	0.0178	28.1	0.000006	0.0000056	0.0007	0.00080	0.049	0.0268	0.007	0.00437	0.0000084	0.0000079	29.67	0.0005	0.00050	0.00010	0.000100	20.0	0.0025	0.00250	0.00250	0.00250	0.0106	0.026
		Count <DL	2	2	0	0	0	11	10	0	0	0	0	0	1	12	12	1	11	12	12	12	0	12	12	12	12	11	0
		Standard Deviation	0.00004	0.000053	0.017	0.0054	4.5	0.000010	0.0000019	0.0002	0.00018	0.018	0.0063	0.004	0.00352	0.0000023	0.0000025	5.93	0.0001	0.00000	0.00000	0.000000	9.6	1E-10	1E-10	1E-10	1E-10	0.0029	0.008
		1st Quartile	0.0001	0.0001	0.024	0.0155	26	<0.00001	<0.00001	0.0006	0.00080	0.040	0.0217	0.005	0.00345	0.0000088	<0.000010	24.65	<0.001	<0.001	<0.0002	<0.0002	14	<0.005	<0.005	<0.005	<0.005	<0.02	0.021
		Median	0.0001	0.000110	0.027	0.0202	28	<0.00001	<0.000010	0.0006	0.00082	0.048	0.0278	0.006	0.00410	<0.000020	<0.00002	29.20	<0.001	<0.0010	<0.0002	<0.00020	19.7	<0.005	<0.0050	<0.0050	<0.0050	<0.020	0.028
		3rd Quartile	0.0001	0.000155	0.030	0.0213	30	<0.00001	<0.00001	0.0008	0.0009	0.054	0.0332	0.011	0.00750	<0.00002	<0.00002	34.83	<0.001	<0.001	<0.0002	<0.0002	26.2	<0.005	<0.005	<0.005	<0.005	<0.02	0.033
7S		Average	0.00008	0.000064	0.052	0.0330	16.41	0.000006	0.0000067	0.0006	0.00101	0.028	0.0134	0.0024	0.00079	0.0000089	0.0000089	15.5	0.0006	0.00050	0.00013	0.000100	0.860	0.0025	0.00250	0.00250	0.00250	0.1134	0.017
E292109		Count	9	9	9	9	30	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	29	9	9	9	9	9	9
		Minimum	<0.0001	<0.0001	0.026	0.019	6.51	<0.00001	<0.00001	0.0004	0.0004	0.008	0.005	<0.001	<0.001	<0.000010	<0.000010	11.5	<0.001	<0.001	<0.0002	<0.0002	<0.5	<0.005	<0.005	<0.005	<0.005	<0.02	0.010
		Maximum	0.0002	0.00013	0.110	0.0582	28	0.00001	0.00002	0.0010	0.00400	0.080	0.0396	0.009	0.002	<0.00002	<0.00002	24.7	0.001	<0.001	0.0004	<0.0002	2.7	<0.005	<0.005	<0.005	<0.005	0.325	0.032
	Stream 1-7S discharge to LWO	Geometric Mean	0.00007	0.000060	0.047	0.0304	15.59	0.000006	0.0000058	0.0005	0.00076	0.021	0.0106	0.0011	0.00069	0.0000086	0.0000086	15.1	0.0005	0.00050	0.00012	0.000100	0.638	0.0025	0.00250	0.00250	0.00250	0.0588	0.016
		Count <DL	6	7	0	0	0	7	8	0	0	0	0	6	6	9	9	0	8	9	8	9	10	9	9	9	9	2	0
		Standard Deviation	0.00005	0.000030	0.027	0.0153	5.31	0.000002	0.0000050	0.0002	0.00113	0.024	0.0111	0.0031	0.00051	0.0000022	0.0000022	4.4	0.0002	0.00000	0.00010	0.000000	0.691	4E-11	4E-11	4E-11	4E-11	0.1255	0.007
		1st Quartile	<0.0001	<0.00010	0.029	0.022	12.52	<0.00001	<0.000010	0.0005	0.0006	0.011	0.006	<0.001	<0.0010	<0.00002	<0.00002	12.4	<0.001	<0.0010	<0.0002	<0.00020	<0.5	<0.005	<0.0050	<0.0050	<0.0050	0.04	0.012
		Median	<0.0001	<0.0001	0.043	0.025	16	<0.00001	<0.00001	0.0005	0.00070	0.020	0.009	<0.001	<0.001	<0.00002	<0.00002	14.8	<0.001	<0.001	<0.0002	<0.0002	0.7	<0.005	<0.005	<0.005	<0.005	0.04	0.015
		3rd Quartile	0.0001	<0.0001	0.064	0.0373	20	<0.00001	<0.00001	0.0006	0.0008	0.029	0.0138	0.005	0.001	<0.00002	<0.00002	17.3	<0.001	<0.001	<0.0002	<0.0002	1.1	<0.005	<0.005	<0.005	<0.005	0.162	0.018
7SQR		Average	0.00018	0.000262	0.055	0.0262	25.5	0.000006	0.0000087	0.0020	0.00116	0.100	0.0589	0.007	0.02530	0.0000882	0.0000090	28.806	0.0008	0.00053	0.00011	0.000100	19.037	0.0027	0.00450	0.00315	0.00280	0.0343	0.0602
E292113		Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
		Minimum	<0.0001	<0.00010	0.029	0.010	10.3	<0.00001	<0.00001	0.0005	0.0006	0.062	0.0249	0.002	<0.0010	0.0000023	<0.000010	6.39	<0.001	<0.001	<0.0002	<0.0002	<0.50	<0.005	<0.005	<0.005	<0.005	<0.02	0.0081
	7-South Quinsam River downstream of 7-South Mining Operation	Maximum	0.0003	0.0014	0.158	0.100	31	0.00002	0.00002	0.0168	0.00308	0.176	0.224	0.011	0.311	<0.00002	<0.00002	37.4	0.005	0.001	0.0002	<0.0002	32	0.006	0.027	0.0078	0.0070	0.288	0.44
		Geometric Mean	0.00017	0.000195	0.048	0.0212	24.6	0.000006	0.0000072	0.0010	0.00105	0.097	0.0508	0.006	0.00569	0.0000827	0.0000087	26.922	0.0006	0.00052	0.00010	0.000100	13.875	0.0027	0.00317	0.00289	0.00268	0.0167	0.0345
		Count <DL	1	1	0	0	0	13	10	0	0	0	0	0	1	14	15	1	14	14	14	15	1	14	13	13	14	10	0
		Standard Deviation	0.00007	0.000320	0.036	0.0230	5.8	0.000004	0.0000061	0.0041	0.00064	0.027	0.0470	0.002	0.07906	0.00000251	0.0000021	8.398	0.0012	0.00013	0.00003	0.000000	9.495	0.0009	0.00638	0.00173	0.00116	0.0711	0.1065
		1st Quartile	0.00015	0.000170	0.036	0.0155	24.3	<0.00001	<0.00001	0.0006	0.00087	0.090	0.0395	0.006	0.004	<0.00002	<0.00002	25.250	<0.001	<0.0010	<0.0002	<0.00020	12.900	<0.005	<0.0050	<0.0050	<0.005	<0.020	0.0220
		Median	0.0002	0.0002	0.039	0.019	27	<0.00001	<0.00001	0.0008	0.0009	0.095	0.0486	0.007	0.005	<0.00002	<0.00002	30.9	<0.001	<0.001	<0.0002	<0.0002	18	<0.005	<0.005	<0.005	<0.005	<0.02	0.032
		3rd Quartile	0.0002	0.0002	0.056	0.024	29	<0.00001	0.00001	0.0010	0.00108	0.105	0.059	0.008	0.00650	<0.00002	<0.00002	34.950	<0.001	<0.001	<0.0002	<0.0002	27.450	<0.005	<0.005	<0.005	<0.005	0.0230	0.0445

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 46
2016-2017 Annual Report

2012-13 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
WA			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E0126402		Average	0.000091	0.000074	0.0275	0.0196	18.8	0.00000375	0.00000375	0.00089	0.00073	0.0246	0.0119	0.0016	0.00070	0.0020010	0.0020010	19.2	0.00073	0.00050	0.000100	0.000100	1.905	0.00250	0.00339	0.00250	0.00250	0.0121	0.00923
		Count	10	10	10	10	42	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	42	10	10	7	8	7	7
		Minimum	<0.00010	<0.00010	0.0186	0.0127	14.2	<0.0000050	<0.0000050	0.0006	0.00049	0.0153	0.0071	0.0010	<0.0010	<0.000010	<0.000010	15.4	<0.001	<0.0010	<0.0002	<0.00020	<0.50	<0.005	<0.0050	<0.0050	<0.0050	<0.020	<0.0050
	Middle Quinsam Lake Inlet - Quinsam River at Argonaut Road upstream of mining operation.	Maximum	0.00012	0.00012	0.056	0.0386	22.7	<0.00001	<0.000010	0.00167	0.00142	0.039	0.0202	0.0022	0.0015	<0.010	<0.010	20.5	0.0028	<0.0010	<0.0002	<0.00020	23.1	<0.005	0.0114	<0.0050	<0.0050	0.025	0.023
		Geometric Mean	0.000086	0.000068	0.0259	0.0187	18.6	0.00000354	0.00000354	0.00082	0.00070	0.0239	0.0111	0.0016	0.00064	0.0005617	0.0005617	19.1	0.00059	0.00050	0.000100	0.000100	1.253	0.00250	0.00291	0.00250	0.00250	0.0114	0.00749
		Count <DL	3	6	0	0	0	10	10	0	0	0	0	0	7	10	10	0	9	10	10	10	4	10	9	7	8	6	1
		Standard Deviation	0.000029	0.000031	0.0114	0.0073	2.0	0.00000132	0.00000132	0.00039	0.00026	0.0061	0.0047	0.0004	0.00035	0.0021071	0.0021071	1.5	0.00073	0.00000	0.000000	0.000000	3.432	4E-11	0.00281	0.00000	3E-11	0.0057	0.00684
		1st Quartile	0.000062	<0.00010	0.0202	0.0154	17.4	<0.0000050	<0.0000050	0.00063	0.00058	0.0216	0.0080	0.0015	<0.0010	<0.0020	<0.0020	19.0	<0.0010	<0.0010	<0.00020	<0.00020	1.05	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.0059
		Median	0.0001	<0.00010	0.0232	0.0180	18.0	0.00000375	0.00000375	0.00070	0.00071	0.0246	0.0104	0.0016	<0.0010	<0.0020	<0.0020	19.5	<0.0010	<0.0010	<0.00020	<0.00020	1.325	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.0067
		3rd Quartile	0.00011	0.000108	0.0295	0.0208	20.3	<0.00001	<0.000010	0.00092	0.00075	0.0258	0.0155	0.0019	0.00088	0.0040000	0.0040000	20.1	<0.001	<0.0010	<0.0002	<0.00020	1.725	<0.005	<0.0050	<0.0050	<0.0050	<0.020	0.01030
WD		Average	0.00220	0.00145	0.0703	0.00935	341	0.0000149	0.0000105	0.00135	0.00090	380	0.00984	0.0669	0.05858	0.0027513	0.0029242	382	0.0033	0.0033	0.000100	0.000100	635	0.00250	0.00250	0.00425	0.00250	0.0324	0.04035
E207409		Count	12	13	12	13	46	12	13	12	13	12	13	12	13	12	13	12	12	13	12	13	53	12	13	11	11	11	11
		Minimum	0.00056	0.00048	0.0147	<0.0030	282	<0.00001	<0.000010	0.00050	0.00035	0.179	<0.0050	0.0252	<0.0010	<0.000010	<0.000010	248	0.0014	0.0014	<0.0002	<0.00020	370	<0.005	<0.0050	<0.0050	<0.0050	<0.020	<0.0050
		Maximum	0.00824	0.00446	0.222	0.0239	441	0.000044	0.000021	0.0039	0.00357	0.673	0.0240	0.097	0.0988	<0.010	<0.010	600	0.0062	0.0057	<0.0002	<0.00020	977	<0.005	<0.0050	0.0076	<0.0050	0.067	0.13
		Geometric Mean	0.00162	0.00117	0.0511	0.00684	340	0.0000113	0.0000090	0.00117	0.00073	0.339	0.00798	0.0621	0.04057	0.0005946	0.0007004	369	0.0030	0.0030	0.000100	0.000100	623	0.00250	0.00250	0.00381	0.00250	0.0224	0.02416
	Settling Pond #4	Count <DL	0	0	0	2	0	6	8	0	0	0	2	0	1	12	13	0	0	0	12	13	0	12	13	6	11	6	1
		Standard Deviation	0.00222	0.00118	0.0638	0.00736	29	0.0000124	0.0000059	0.00089	0.00083	0.186	0.00652	0.0242	0.02875	0.0023773	0.0023600	107	0.0017	0.0014	0.000000	0.000000	122	1E-10	1E-10	0.00207	1E-10	0.0260	0.03831
		1st Quartile	0.00101	0.00078	0.0375	0.0044	325	<0.000010	<0.000010	0.00087	0.00053	0.224	0.0059	0.0480	0.0472	0.0007512	<0.0020	298	0.0019	0.0022	<0.00020	<0.00020	536	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.01270
		Median	0.00136	0.00095	0.0470	0.0066	338	0.0000118	0.000012	0.00105	0.00068	0.334	0.0074	0.0695	0.0572	0.0030000	<0.010	358	0.0030	0.0027	<0.00020	<0.00020	647	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.030
		3rd Quartile	0.00195	0.00126	0.0699	0.0119	358	0.0000178	0.000015	0.00141	0.00096	0.546	0.0125	0.0895	0.0831	<0.010	<0.010	444	0.0043	0.0041	<0.0002	<0.00020	696	<0.005	<0.0050	0.00615	<0.0050	0.0575	0.06300
		Average	0.0240	0.0183	19.54	0.0388	91.6	0.000206	0.0000075	0.07093	0.00364	18.95	0.0100	0.4310	0.000528	0.0000150	0.0000050	22.8	0.01469	0.0003375	0.002564	0.0000375	33.4	0.0469	0.00125	0.374	0.135		0.0125
MW001D		Count	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		1
		Minimum	0.0185	0.0175	1.47	0.0350	91.6	0.000017	<0.000010	0.00886	0.00331	1.60	<0.010	0.0321	0.00021	<0.000010	<0.000010	21.3	0.00158	<0.00050	0.000229	<0.000050	28.8	0.0062	<0.0020	0.128	0.125		0.0125
		Maximum	0.0294	0.0190	37.6	0.0426	91.6	0.000396	<0.000020	0.133	0.00397	36.3	<0.030	0.830	0.000846	<0.000050	<0.000010	24.3	0.0278	<0.0010	0.00490	<0.00010	38.1	0.0876	<0.0030	0.619	0.145		0.0125
	Exsitu 2-North deep groundwater well below the coal wash plant (Till)	Geometric Mean	0.0233	0.0182	7.43	0.0386	91.6	0.000082	0.0000071	0.03433	0.00363	7.62	0.0087	0.1632	0.000421	0.0000112	0.0000050	22.8	0.00663	0.000354	0.001059	0.0000354	33.1	0.0233	0.00122	0.281	0.135		0.0125
		Count <DL	0	0	0	0	0	0	2	0	0	0	2	0	0	2	2	0	0	2	0	2	0	0	2	0	0		0
		Standard Deviation	0.0077	0.0011	25.55	0.0054	0.0	0.000268	0.0000035	0.08778	0.00047	24.54	0.0071	0.5642	0.000450	0.0000141	0.0000000	2.1	0.01854	0.000177	0.003303	0.0000177	6.6	0.0576	0.00035	0.347	0.014		0.0000
		1st Quartile	0.0212	0.0179	10.50	0.0369	91.6	0.000112	0.0000062	0.03990	0.00348	10.27	0.0075	0.2316	0.000369	0.0000100	<0.000010	22.0	0.00814	0.000312	0.001397	0.0000312	31.1	0.0266	0.00113	0.251	0.130		0.0125
		Median	0.0240	0.0183	19.54	0.0388	91.6	0.000206	0.0000075	0.07093	0.00364	18.95	0.0100	0.4310	0.000528	0.0000150	<0.000010	22.8	0.01469	0.000375	0.002564	0.0000375	33.4	0.0469	0.00125	0.374	0.135		0.0125
		3rd Quartile	0.0267	0.0186	28.57	0.0407	91.6	0.000301	0.0000088	0.10196	0.00380	27.62	0.0125	0.6305	0.000687	0.0000200	<0.000010	23.6	0.02124	0.000438	0.003732	0.0000438	35.8	0.0672	0.00138	0.496	0.140		0.0125
MW001S		Average	0.024	0.0183	19.54000	0.0388	91.6	0.000206	0.000008	0.07093	0.00364	18.9500	0.01	0.431	0.000528	0.0000150	0.0000050	22.8	0.01469	0.0003375	0.002564	0.0000375	33.4	0.0469	0.00125	0.37400	0.13500		0.0125
		Count	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		1
		Minimum	0.0185	0.0175	1.47	0.035	91.6	0.000017	<0.000010	0.00886	0.00331	1.6	<0.010	0.0321	0.00021	<0.000010	<0.000010	21.3	0.00158	<0.00050	0.000229	<0.000050	28.8	0.0062	<0.0020	0.128	0.125		0.0125
		Maximum	0.0294	0.019	37.6	0.0426	91.6	0.000396	<0.000020	0.133	0.00397	36.3	<0.030	0.830	0.000846	<0.000050	<0.000010	24.3	0.0278	<0.0010	0.0049	<0.00010	38.1	0.0876	<0.0030	0.619	0.145		0.0125
	Exsitu 2-North shallow groundwater well below the coal wash plant (Till)	Geometric Mean	0.0233	0.01820	7.43	0.0386	91.6	0.000082	0.0000071	0.034330	0.00363	7.62	0.0087	0.1632	0.000421	0.0000112	0.0000050	22.8	0.00663	0.000354	0.001059	0.0000354	33.1	0.0233	0.00122	0.281	0.135		0.0125
		Count <DL	0	0	0	0	0	0	2	0	0	0	2	0	0	2	2	0	0	2	0	2	0	0	2	0	0		0
		Standard Deviation	0.0077	0.0011	25.55	0.0054	0	0.000268	0.0000035	0.08778	0.00047	24.54	0.0071	0.5642	0.00045	0.0000141	0.0000000	2.1	0.01854	0.000177	0.003303	0.0000177	6.6	0.0576	0.00035	0.347	0.01400		0.0000
		1st Quartile	0.0212	0.0179	10.5	0.0369	91.6	0.000112	0.0000062	0.0399	0.00348	10.2700	0.0075	0.2316	0.000369	0.00001	<0.000010	22	0.00814	0.000312	0.001397	0.0000312	31.1	0.0266	0.00113	0.25100	0.13000		0.0125
		Median	0.024	0.0183	19.54000	0.0388	91.6	0.000206	0.000008	0.07093	0.00364	18.9500	0.01	0.431	0.000528	0.000015	<0.000010	22.8	0.01469	0.000375	0.002564	0.0000375	33.4	0.0469	0.00125	0.37400	0.13500		0.0125
		3rd Quartile	0.0267	0.0186	28.57	0.0407	91.6	0.0003010	0.0000088	0.10196	0.0038	27.62	0.0125	0.63050	0.000687	0.0000200	<0.000010	23.6	0.021240	0.000438	0.003732	0.0000438	35.8	0.0672	0.00138	0.496	0.14		0.0125
MW006D		Average	0.0278	0.0276	0.1057	0.0174	87.2	0.0000120	0.0000050	0.00173	0.00078	0.094	0.0100	0.00360	0.000238	0.0000050	0.0000050	51.9	0.000250	0.000250	0.000079	0.0000250	16.8	0.0035	0.00100	0.156	0.142		0.0061
		Count	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		1
		Minimum	0.0273	0.0268	0.0484	0.0174	87.2	<0.000010	<0.000010	0.00151	0.00065	0.043	<0.010	0.00185	0.000138	<0.000010	<0.000010	47.4	<0.00050	<0.00050	0.000057	<0.000050	13.1	0.0033	<0.0010	0.147	0.131		0.0061
		Maximum	0.0282	0.0285	0.163	0.0175	87.2	0.000019	<0.000010	0.00195	0.00092	0.145	<0.030	0.00535	0.000338	<0.000010	<0.000010	56.4	<0.00050	<0.00050	0.000100	<0.000050	20.4	0.0037	<0.0030	0.164	0.153		0.0061
	Exsitu 2-North deep groundwater well below the coal wash plant (Till)	Geometric Mean	0.0277	0.0276	0.0888	0.0174	87.2	0.0000097	0.0000050	0.00172	0.00077	0.079	0.0087	0.00315	0.000216	0.0000050	0.0000050	51.7	0.000250	0.000250	0.000075	0.0000250	16.3	0.0035	0.00087	0.155	0.142		0.0061
		Count <DL	0	0	0	0	0	1	2	0	0	0	2	0	0	2	2	0	2	2	0	2	0	0	2	0	0		0
		Standard Deviation	0.0006	0.0012	0.0810	0.0001	0.0	0.0000099	0.0000000	0.00031	0.00019	0.072	0.0071	0.00247	0.000141	0.0000000	0.0000000	6.4	0.000000	0.000000	0.000030	0.0000000	5.2	0.0003	0.00071	0.012	0.016		0.0000
		1st Quartile	0.0275	0.0272	0.0771	0.0174	87.2	0.0000085	<0.000010	0.00162	0.00072	0.068	0.0075	0.00272	0.000188	<0.000010	<0.000010	49.6	<0.00050	<0.00050	0.000068	<0.000050	14.9	0.0034	0.00075	0.151	0.136		0.0061
		Median	0.0278	0.0276	0.1057	0.0174	87.2	0.0000120	<0.000010	0.00173	0.00078	0.094	0.0100	0.00360	0.000238	<0.000010	<0.000010	51.9	<0.00050	<0.00050	0.000079	<0.000050	16.8	0.0035	0.00100	0.156	0.142		0.0061
		3rd Quartile	0.0280	0.0281	0.1344	0.0175	87.2	0.0000155	<0.000010	0.00184	0.00085	0.120	0.0125	0.00448	0.000288	<0.000010	<0.000010	54.2	<0.00050	<0.00050	0.000089	<0.000050	18.6	0.0036	0.00125	0.160	0.148		0.0061
MW006S		Average	0.00152	0.00136	0.0437	0.0220	261.0	0.000035	0.0000032	0.00126	0.000705	0.048	0.0100	0.0828	0.0723	0.0000050	0.0000050	675.5	0.00168	0.00151	0.0000545	0.0001115	849.0	0.00225	0.00220	0.0490	0.0442		0.0161
		Count	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2
		Minimum	0.00127	0.00121	0.0404	0.0014	261	0.000023	0.000018	0.00111	<0.0010	0.044	<0.010	0.0226	0.0176	<0.000010	<0.000010	656	0.00107	0.00093	<0.00010	<0.00010	842	<0.0030	0.0014	0.0458	0.0384		0.0063
		Maximum	0.00177	0.00150	0.0470	<0.0060	261	0.000047	0.000046	0.0014	0.00091	0.051	<0.030	0.143	0.127	<0.000010	<0.000010	695	0.0023	0.0021	0.000059	0.000173	856	<0.0060	<0.0060	0.0522	0.050		0.0260
	Exsitu 2-North shallow groundwater well below the coal wash plant (Till)	Geometric Mean	0.00150	0.00135	0.0436	0.00205	261.0	0.000033	0.000029	0.00125	0.000675	0.047	0.0087	0.0568	0.0473	0.0000050	0.0000050	675.2	0.00157	0.00140	0.0000543	0.0000930	849.0	0.00212	0.00205	0.0489	0.0438		0.0128
		Count <DL	0	0	0	1	0	0	0	0	1	0	2	0	0	2	2	0	0	0	1	1	0	2	1	0	0		0
		Standard Deviation	0.00035	0.00021	0.0047	0.00113	0.0	0.0000017	0.0000020	0.00021	0.000290	0.005	0.0071	0.0851	0.0774	0.0000000	0.0000000	27.6	0.00087	0.00083	0.0000064	0.0000870	9.9	0.00106	0.00113	0.0045	0.0082		0.0139
		1st Quartile	0.00140	0.00128	0.0420	0.00180	261	0.0000029	0.0000025	0.00118	0.000602	0.046	0.0075	0.0527	0.0450	<0.000010	<0.000010	665.8	0.00138	0.00122	0.0000522	0.0000808	845.5	0.00188	0.00180	0.0474	0.0413		0.0112
		Median	0.00152	0.00136	0.0437	0.00220	261	0.0000035	0.0000032	0.00126	0.000705	0.048	0.0100	0.0828	0.0723	<0.000010	<0.000010	675.5	0.00168	0.00151	0.0000545	0.0001115	849.0	0.00225	0.00220	0.0490	0.0442		0.0161
		3rd Quartile	0.00165	0.00143	0.0454	0.00260	261	0.0000041	0.0000039	0.00133	0.000808	0.049	0.0125	0.1129	0.0996	<0.000010	<0.000010	685.2	0.00199	0.00181	0.0000568	0.0001423	852.5	0.00262	0.00260	0.0506	0.0471		0.0211
WC		Average	0.00107	0.00092	0.0221	0.0084	306	0.0000078	0.0000064	0.00063	0.000573	0.1218	0.02321	0.0249	0.0137	0.0030009	0.0030009	325	0.00129	0.00102	0.000100	0.000100	598	0.00250	0.00400	0.00385	0.00250	0.0590	0.140
E207411		Count	11	11	11	11	42	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	44	11	11	2	18	5	2
		Minimum	0.00031	0.00038	0.0073	0.0044	256	<0.00001	<0.000010	0.00034	<0.00020	0.0552	<0.0050	0.0127	0.0015	<0.000010	<0.000010	182	<0.0010	<0.0010	<0.0002	<0.00020	345	<0.005	<0.0050	<0.0050	<0.0050	<0.020	0.019
		Maximum	0.00249	0.00206	0.058	0.0142	405	0.000020	<0.000025	0.00104	0.00119	0.205	0.0896	0.0478	0.0346	<0.010	<0.010	439	0.0022	0.0019	<0.0002	<0.00020	817	<0.005	0.0190	0.0052	<0.0050	0.098	0.26
	2-North Pit Culvert discharge into Middle Quinsam Lake	Geometric Mean	0.00091	0.00081	0.0189	0.0078	305	0.0000068	0.0000059	0.00060	0.000503	0.1140	0.01537	0.0228	0.0102	0.0009181	0.0009181	316	0.00112	0.00088	0.000100	0.000100	585	0.00250	0.00301	0.00361	0.00250	0.0468	0.070
		Count <DL	0	0	0	0	0	9	11	0	1	0	1	0	0	11	11	0	3	5	11	11	0	11	10	1	18	1	0
		Standard Deviation	0.00067	0.00056	0.0141	0.0035	27	0.0000050	0.0000030	0.00021	0.000267	0.0453	0.02479	0.0115	0.0101	0.0023225	0.0023225	72	0.00066	0.00054	0.000000	0.000000	121	1E-10	0.00497	0.00191	3E-11	0.0328	0.170
		1st Quartile	0.00074	0.00060	0.0144	0.0058	290	<0.000010	<0.000010	0.00044	0.000480	0.0996	0.01020	0.0175	0.0067	<0.0020	<0.0020	284	0.00075	<0.0010	<0.00020	<0.00020	503	<0.0050	<0.0050	0.00318	<0.0050	0.047	0.079
		Median	0.0009	0.00068	0.0170	0.0070	299	<0.00001	<0.000010	0.00072	0.00052	0.106	0.0137	0.0203	0.0120	<0.010	<0.010	318	0.0011	0.0012	<0.00020	<0.00020	607	<0.0050	<0.0050	0.00385	<0.0050	0.068	0.140
		3rd Quartile	0.00106	0.00096	0.0266	0.0105	315	0.0000092	<0.000010	0.00074	0.000650	0.1510	0.02735	0.0298	0.0188	<0.010	<0.010	367	0.00180	0.0013	<0.0002	<0.00020	693	<0.005	<0.0050	0.00452	<0.0050	0.072	0.200
MQL1		Average	0.000142	0.0001290	0.0224	0.0173	28.0	0.00000575	0.00000458	0.00094	0.001375	0.0469	0.0226	0.0069	0.00430	0.0003035	0.00320020	27.5	0.000688	0.0004392	0.00008442	0.00010875	13.74	0.00523	0.00594	0.00447	0.00250	0.0120	0.02810
E206618		Count	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	6	6	6	6	6	6	6	6	6	6	6	6
		Minimum	0.00010	<0.00010	0.0180	0.0119	23.5	<0.0000050	<0.0000050	0.000541	0.000512	0.0366	0.0140	0.0039	<0.0010	0.0000021	<0.0000020	22.5	<0.0010	0.000075	0.0000065	<0.0000050	6.34	0.00134	0.00066	<0.0050	<0.0050	<0.020	<0.0050
		Maximum	0.00018	0.00016	0.0357	0.0258	39.1	0.000017	0.000010	0.00211	0.00285	0.0551	0.0340	0.0118	0.0109	<0.010	<0.010	35.1	0.00163	<0.0010	<0.00020	0.00025	30.2	0.0120	0.0126	0.0117	<0.0050	0.022	0.048
	Middle Quinsam Lake 1 metre below surface	Geometric Mean	0.000139	0.0001203	0.0217	0.0168	27.5	0.00000434	0.00000397	0.000829	0.001071	0.0464	0.0216	0.0065	0.00300	0.00104637	0.00065975	27.2	0.000609	0.0003645	0.00006341	0.00006300	11.85	0.004271	0.004203	0.00364	0.00250	0.0114	0.01903
		Count <DL	0	1	0	0	0	5	5	0	0	0	0	0	1	5	5	0	5	5	5	5	0	2	1	4	6	5	1
		Standard Deviation	0.000029	0.0000431	0.0067	0.0048	5.8	0.00000565	0.00000292	0.000589	0.001077	0.0073	0.0075	0.0028	0.00359	0.00234458	0.00248966	4.5	0.000461	0.0001735	0.00003817	0.00007943	8.84	0.004404	0.004352	0.00369	0.00000	0.0049	0.01840
		1st Quartile	0.000125	0.0001175	0.0186	0.0146	24.3	<0.0000050	<0.0000050	0.000615	0.000610	0.0417	0.0173	0.0056	0.00230	0.00200000	<0.0020	24.7	<0.0010	<0.0010	<0.00020	<0.00020	7.86	<0.0050	0.003175	<0.0050	<0.0050	<0.020	0.01432
		Median	0.000145	0.0001470	0.0200	0.0164	26.1	0.00000375	0.00000375	0.000760	0.000835	0.0482	0.0216	0.0060	0.00390	<0.010	<0.010	27.1	<0.0010	<0.0010	<0.00020	<0.00020	11.40	0.004300	0.005400	<0.0050	<0.0050	<0.020	0.03550
		3rd Quartile	0.000158	0.0001585	0.0219	0.0185	28.4	<0.000010	<0.000010	0.000837	0.002222	0.0523	0.0270	0.0077	0.00460	<0.010	<0.010	28.9	<0.0010	<0.0010	<0.00020	<0.00020	15.18	0.008950	0.008225	0.00445	<0.0050	<0.020	0.03875
MQLB		Average	0.000127	0.0001202	0.0173	0.01324	45.4	0.0000375	0.0000375	0.00081	0.000498	0.0317	0.0100	0.0076	0.00443	0.00350917	0.00320020	53.0	0.0004635	0.0004292	0.0000847	0.00008375	54.5	0.002360	0.002153	0.00250	0.00250	0.0120	0.0310
E206618		Count	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	6	6	6	6	6	6	6	6	6	6	6	6
		Minimum	0.00010	<0.00010	0.0093	0.0047	44.6	<0.0000050	<0.0000050	0.00047	0.00037	0.0190	0.0076	0.0022	<0.0010	<0.0000020	<0.0000020	49.8	0.000281	0.000075	0.0000308	<0.0000050	51.6	0.00166	0.00042	<0.0050	<0.0050	<0.020	0.0052
		Maximum	0.00017	0.00017	0.0353	0.0380	46.1	<0.000010	<0.000010	0.00156	0.00065	0.0395	0.0128	0.0198	0.0168	<0.010	<0.010	59.6	<0.0010	<0.0010	<0.00020	<0.00020	56.5	<0.0050	<0.0050	<0.0050	<0.0050	0.022	0.047
	Middle Quinsam Lake 1 metre from bottom	Geometric Mean	0.000125	0.0001128	0.0156	0.01024	45.4	0.00000354	0.00000354	0.00073	0.000490	0.0306	0.0098	0.0059	0.00208	0.00092466	0.00065975	52.9	0.0004542	0.0003645	0.00008218	0.00005407	54.5	0.002335	0.001857	0.00250	0.00250	0.0114	0.0247
		Count <DL	0	1	0	0	0	6	6	0	0	0	0	0	2	6	5	0	5	5	5	6	0	5	5	6	6	5	0
		Standard Deviation	0.000027	0.0000401	0.0095	0.01241	0.6	0.00000137	0.00000137	0.00043	0.000101	0.0085	0.0022	0.0064	0.00624	0.00234491	0.00248966	3.5	0.0000894	0.0001735	0.00002825	0.00003980	1.7	0.000343	0.000849	0.00000	0.00000

Table 47
2016-2017 Annual Report

2012-13 Statistics Stn.Code																													
EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
NNL1			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E217018		Average	0.000419	0.000380	0.0200	0.0142	15.6	0.00001265	0.00000312	0.000520	0.000514	0.0827	0.0498	0.00617	0.00210	0.00375025	0.00375025	17.8	0.0003948	0.0003912	0.00008045	0.00007663	3.48	0.003452	0.002008	0.00402	0.00530	0.0177	0.060
		Count	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		Minimum	0.00039	0.00026	0.0113	0.0083	14.3	<0.0000050	<0.0000050	0.00039	0.00042	0.0637	0.0413	0.00507	0.00119	<0.0000020	<0.0000020	16.5	0.000079	0.000065	0.0000218	0.0000065	2.92	0.00101	0.00053	<0.0050	<0.0050	<0.020	0.014
		Maximum	0.00045	0.00044	0.0266	0.0175	16.6	0.0000351	<0.000010	0.00067	0.00077	0.0954	0.0577	0.0088	0.0036	<0.010	<0.010	19.0	<0.0010	<0.0010	<0.00020	<0.00020	3.97	0.0078	<0.0050	0.0086	0.0137	0.030	0.18
		Geometric Mean	0.000418	0.000373	0.0190	0.0136	15.6	0.00000770	0.00000297	0.000506	0.000496	0.0818	0.0493	0.00600	0.00192	0.00059460	0.00059460	17.8	0.0003152	0.0003002	0.00006833	0.00005049	3.45	0.002649	0.001696	0.00340	0.00383	0.0158	0.034
	No Name Lake 1 metre below surface	Count <DL	0	0	0	0	0	2	4	0	0	0	0	0	0	4	4	0	3	3	3	3	0	2	3	3	3	2	0
		Standard Deviation	0.000030	0.000082	0.0067	0.0040	1.0	0.00001513	0.00000125	0.000136	0.000171	0.0136	0.0086	0.00178	0.00105	0.00249950	0.00249950	1.1	0.0002105	0.0002175	0.00003910	0.00004675	0.43	0.002982	0.000985	0.00305	0.00560	0.0097	0.080
		1st Quartile	0.000395	0.000366	0.0166	0.0135	15.3	0.00000438	<0.0000050	0.000412	0.000424	0.0782	0.0430	0.00509	0.00150	0.00375025	0.00375025	17.2	0.0003948	0.0003912	0.00008045	0.00007663	3.35	0.002128	0.002008	<0.0050	<0.0050	<0.020	0.019
		Median	0.000419	0.000410	0.0210	0.0154	15.8	0.00000650	<0.0000050	0.000509	0.000432	0.0858	0.0502	0.00540	0.00180	<0.010	<0.010	17.9	<0.0010	<0.0010	<0.00020	<0.00020	3.50	<0.0050	<0.0050	<0.0050	<0.0050	0.0155	0.023
		3rd Quartile	0.000442	0.000425	0.0245	0.0161	16.1	0.00001478	0.00000312	0.000617	0.000522	0.0903	0.0570	0.00648	0.00240	<0.010	<0.010	18.5	<0.0010	<0.0010	<0.00020	<0.00020	3.63	0.003825	<0.0050	0.00402	0.00530	0.0232	0.064
NNLB		Average	0.000204	0.000163	0.0254	0.0190	13.2	0.00000498	0.00000312	0.000459	0.000446	0.125	0.0555	0.0536	0.0467	0.00375025	0.00375025	30.6	0.0003898	0.0003925	0.00007748	0.00007563	16.2	0.002052	0.002020	0.00250	0.00250	0.056	0.0249
E217018		Count	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		Minimum	0.00016	0.00013	0.0191	0.0148	11.4	<0.0000050	<0.0000050	0.000356	0.000306	0.100	0.0473	0.0429	0.0383	<0.0000020	<0.0000020	27.7	0.000059	0.000070	0.0000099	<0.0000050	13.7	0.00071	0.00058	<0.0050	<0.0050	0.039	0.0065
		Maximum	0.00024	0.00022	0.0327	0.0211	14.7	0.0000064	<0.000010	0.00062	0.00063	0.183	0.0688	0.0616	0.0523	<0.010	<0.010	32.0	<0.0010	<0.0010	<0.00020	<0.00020	17.6	<0.0050	<0.0050	<0.0050	<0.0050	0.069	0.060
		Geometric Mean	0.000201	0.000160	0.0249	0.0188	13.2	0.00000468	0.00000297	0.000449	0.000432	0.121	0.0548	0.0532	0.0464	0.00059460	0.00059460	30.5	0.0002930	0.0003058	0.00005609	0.00003976	16.1	0.001825	0.001735	0.00250	0.00250	0.055	0.0180
	No Name Lake 1 metre from bottom	Count <DL	0	0	0	0	0	2	4	0	0	0	0	0	0	4	4	0	3	3	3	4	0	3	3	4	4	0	0
		Standard Deviation	0.000036	0.000039	0.0056	0.0029	1.4	0.00000175	0.00000125	0.000115	0.000136	0.039	0.0102	0.0078	0.0062	0.00249950	0.00249950	2.0	0.0002205	0.0002150	0.00004505	0.00004875	1.7	0.000895	0.000960	0.00000	0.00000	0.013	0.0239
		1st Quartile	0.000183	0.000145	0.0229	0.0186	12.7	0.00000438	<0.0000050	0.000389	0.000376	0.102	0.0476	0.0518	0.0441	0.00375025	0.00375025	30.1	0.0003898	0.0003925	0.00007748	0.00007563	15.9	0.002052	0.002020	<0.0050	<0.0050	0.051	0.0136
		Median	0.000208	0.000151	0.0248	0.0200	13.4	0.00000550	<0.0000050	0.000430	0.000425	0.108	0.0530	0.0550	0.0481	<0.010	<0.010	31.2	<0.0010	<0.0010	<0.00020	<0.00020	16.8	<0.0050	<0.0050	<0.0050	<0.0050	0.057	0.0165
		3rd Quartile	0.000229	0.000169	0.0273	0.0205	14.0	0.00000610	0.00000312	0.000500	0.000495	0.130	0.0608	0.0569	0.0507	<0.010	<0.010	31.7	<0.0010	<0.0010	<0.00020	<0.00020	17.1	<0.0050	<0.0050	<0.0050	<0.0050	0.062	0.0278
NNO		Average	0.00035	0.00031	0.0502	0.0261	13.35	0.00001835	0.00000885	0.00065	0.00069	0.1286	0.0762	0.0161	0.0129	0.0026510	0.0024010	16.3	0.00056	0.00050	0.000100	0.000100	3.81	0.00366	0.00318	0.00311		0.0135	0.0142
E217017		Count	10	10	10	10	42	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	42	10	10	8		8	8
		Minimum	0.0002	0.00018	0.0139	0.0069	9.93	<0.0000050	<0.0000050	0.00039	0.00050	0.0523	0.0326	0.0041	0.0020	<0.000010	<0.000010	12.7	<0.001	<0.0010	<0.0002	<0.00020	0.80	<0.005	<0.0050	<0.0050		<0.020	0.0051
		Maximum	0.00044	0.00044	0.147	0.0507	17.3	0.000120	0.0000480	0.00111	0.00105	0.312	0.205	0.0912	0.0951	<0.010	<0.010	19.4	0.0011	<0.0010	<0.0002	<0.00020	6.61	0.0104	0.0093	0.0074		0.027	0.021
		Geometric Mean	0.00034	0.00030	0.0367	0.0220	13.16	0.00000824	0.00000534	0.00062	0.00067	0.1077	0.0643	0.0089	0.0051	0.0007759	0.0006598	16.1	0.00054	0.00050	0.000100	0.000100	3.40	0.00316	0.00285	0.00286		0.0124	0.0123
	No Name Lake Outlet	Count <DL	0	0	0	0	0	6	8	0	0	0	0	0	0	8	10	0	9	10	10	10	0	8	9	7		6	0
		Standard Deviation	0.00008	0.00008	0.0434	0.0146	2.25	0.00003594	0.00001386	0.00021	0.00018	0.0880	0.0548	0.0268	0.0289	0.0021564	0.0022694	2.5	0.00019	0.00000	0.000000	0.000000	1.51	0.00264	0.00215	0.00173		0.0067	0.0069
		1st Quartile	0.00030	0.00025	0.0188	0.0165	11.27	<0.000010	0.00000312	0.00052	0.00053	0.0778	0.0498	0.0053	0.0032	<0.0020	<0.0020	14.8	<0.0010	<0.0010	<0.00020	<0.00020	2.97	<0.0050	<0.0050	<0.0050		<0.020	0.0074
		Median	0.00036	0.00032	0.0334	0.0242	13.2	<0.000010	<0.000010	0.00060	0.00070	0.0882	0.0574	0.0067	0.0041	0.0022500	<0.0020	16.2	<0.0010	<0.0010	<0.00020	<0.00020	4.10	<0.005	<0.0050	<0.0050		<0.020	0.0170
		3rd Quartile	0.00041	0.00036	0.0731	0.0360	15.18	0.00001100	<0.000010	0.00076	0.00080	0.1502	0.0641	0.0084	0.0048	<0.010	<0.010	18.5	<0.001	<0.0010	<0.0002	<0.00020	4.59	<0.0050	<0.0050	<0.0050		0.0128	0.020
LLS		Average	0.00573	0.00302	0.0340	0.00667	220.9	0.00000880	0.00000910	0.000511	0.001017	1.728	0.49360	0.377	0.368	0.0024010	0.0024010	552	0.0024	0.0026	0.000100	0.000119	546	0.00295	0.00365				
E292131		Count	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10				
		Minimum	0.00171	0.00101	0.0047	<0.0030	163	<0.0000050	<0.0000050	<0.00020	<0.00020	0.726	<0.0050	0.203	0.211	<0.000010	<0.000010	484	0.0012	0.0010	<0.0002	<0.00020	410	<0.0050	<0.0050				
		Maximum	0.00894	0.00554	0.255	0.0244	242	0.00002	0.000022	0.0021	0.00505	3.02	1.67	0.544	0.541	<0.010	<0.010	633	0.007	0.0067	<0.0002	0.00029	660	0.007	0.0096				
		Geometric Mean	0.00513	0.00256	0.0119	0.00456	219.7	0.00000649	0.00000659	0.000347	0.000579	1.622	0.06304	0.361	0.348	0.0006598	0.0006598	550	0.0021	0.0023	0.000100	0.000111	539	0.00277	0.00317				
	Small Seep into Long Lake	Count <DL	0	0	0	3	0	7	7	2	1	0	3	0	0	10	10	0	0	0	10	9	0	9	8				
		Standard Deviation	0.00244	0.00165	0.0778	0.00681	22.2	0.00000687	0.00000735	0.000581	0.001464	0.615	0.66634	0.111	0.122	0.0022694	0.0022694	48	0.0017	0.0017	0.000000	0.000060	93	0.00142	0.00251				
		1st Quartile	0.00466	0.00141	0.0061	0.00215	221.2	0.00000312	0.00000312	0.000232	0.000378	1.540	0.00338	0.318	0.242	<0.0020	<0.0020	520	0.0016	0.0015	<0.00020	<0.00020	470	<0.0050	<0.0050				
		Median	0.00576	0.00321	0.0090	0.0050	224.5	<0.000010	<0.000010	0.000425	0.000470	1.745	0.12325	0.400	0.398	<0.0020	<0.0020	540	0.0020	0.0022	<0.00020	<0.00020	555	<0.0050	<0.0050				
		3rd Quartile	0.00728	0.00423	0.0125	0.00805	230.8	0.00001438	0.00001512	0.00047	0.000890	1.925	1.05400	0.442	0.457	<0.010	<0.010	587	0.0022	0.0032	<0.0002	<0.00020	630	<0.0050	<0.0050				
LLSM		Average	0.00330	0.00160	0.03229	0.00900	207	0.00000829	0.00000663	0.000768	0.00057	1.112	0.17700	0.2705	0.2701	0.0021675	0.0021675	489	0.0026	0.0025	0.000163	0.000238	465	0.00358	0.00337				
E292131		Count	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12				
		Minimum	0.00083	0.00050	<0.0030	<0.0030	134	<0.0000050	<0.0000050	<0.00020	0.00024	0.232	<0.0050	0.0900	0.0929	<0.000010	<0.000010	386	0.0013	0.0012	<0.0002	<0.00020	324	<0.0050	<0.0050				
		Maximum	0.00841	0.00260	0.211	0.0241	241	0.0000440	0.0000280	0.0021	0.00120	1.92	0.663	0.389	0.400	<0.010	<0.010	565	0.005	0.0052	0.00086	0.00175	611	0.0093	0.0096				
		Geometric Mean	0.00264	0.00146	0.01151	0.00648	204	0.00000546	0.00000517	0.000507	0.00050	0.960	0.02743	0.2492	0.2498	0.0007071	0.0007071	487	0.0023	0.0023	0.000120	0.000127	459	0.00319	0.00300				
	Long Lake Middle Seep	Count <DL	0	0	1	2	0	9	10	2	0	0	3	0	0	12	12	0	0	0	11	11	0	9	10				
		Standard Deviation	0.00242	0.00064	0.05950	0.00756	29	0.00001157	0.00000542	0.000680	0.00030	0.568	0.26660	0.0989	0.0972	0.0021240	0.0021240	43	0.0013	0.0013	0.000219	0.000476	79	0.00217	0.00219				
		1st Quartile	0.00169	0.00129	0.00382	0.00418	201	0.00000438	<0.0000050	0.000338	0.00038	0.717	0.00670	0.2270	0.2160	<0.0020	<0.0020	475	0.0015	0.0016	<0.00020	<0.00020	436	<0.0050	<0.0050				
		Median	0.00254	0.00154	0.01085	0.00775	209	<0.000010	<0.000010	0.000475	0.00050	0.948	0.01040	0.2735	0.2710	<0.0020	<0.0020	492	0.0023	0.0022	<0.00020	<0.00020	470	<0.0050	<0.0050				
		3rd Quartile	0.00378	0.00209	0.02210	0.00962	222	<0.000010	0.00000675	0.001080	0.00066	1.517	0.31325	0.3570	0.3582	<0.010	<0.010	512	0.0033	0.0028	<0.00020	<0.00020	508	0.00318	<0.0050				
MW002		Average	0.00034	0.00024	0.00300	0.00233	223.5	0.0000100	0.0000100	0.00050	0.000400	0.684	0.658	2.80	2.77	0.0000050	0.0000050	1230	0.0042	0.0040	0.000050	0.000050	1230	0.00300	0.00233	0.00400	0.05890		
		Count	3	3	3	3	2	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3		
		Minimum	0.00025	0.00022	<0.0060	<0.0020	211	<0.000020	<0.000020	<0.0010	<0.00040	0.466	0.426	2.37	2.34	<0.000010	<0.000010	1170	0.0037	0.0034	<0.00010	<0.00010	1160	<0.0060	<0.0020	<0.0020	0.0017		
		Maximum	0.00044	0.00027	<0.0060	<0.0060	236	<0.000020	<0.000020	<0.0010	<0.0010	0.933	0.881	3.16	3.19	<0.000010	<0.000010	1280	0.0046	0.0044	<0.00010	<0.00010	1280	<0.0060	<0.0060	<0.020	<0.30		
	Ex-situ 2-3 South shallow groundwater well beside 3-South Pit (1 Seam)	Geometric Mean	0.00033	0.00024	0.00300	0.00208	223.2	0.0000100	0.0000100	0.00050	0.000368	0.657	0.631	2.78	2.75	0.0000050	0.0000050	1229	0.0042	0.0040	0.000050	0.000050	1228	0.00300	0.00208	0.00215	0.01854		
		Count <DL	0	0	3	3	0	3	3	3	3	0	0	0	0	3	2	0	0	0	3	3	0	3	3	3	2		
		Standard Deviation	0.00010	0.00003	0.00000	0.00115	17.7	0.0000000	0.0000000	0.00000	0.000173	0.235	0.228	0.40	0.43	0.0000000	0.0000000	55	0.0005	0.0005	0.000000	0.000000	62	0.00000	0.00115	0.00520	0.07975		
		1st Quartile	0.00029	0.00022	<0.0060	0.00200	217.2	<0.000020	<0.000020	<0.0010	0.000350	0.559	0.547	2.62	2.56	<0.000010	<0.000010	1205	0.0040	0.0038	<0.00010	<0.00010	1205	<0.0060	0.00200	<0.0020	0.01335		
		Median	0.00033	0.00023	<0.0060	<0.0060	223.5	<0.000020	<0.000020	<0.0010	<0.0010	0.652	0.668	2.87	2.78	<0.000010	<0.000010	1240	0.0042	0.0042	<0.00010	<0.00010	1250	<0.0060	<0.0060	<0.0020	<0.050		
		3rd Quartile	0.00038	0.00025	<0.0060	<0.0060	229.8	<0.000020	<0.000020	<0.0010	<0.0010	0.792	0.774	3.02	2.98	<0.000010	<0.000010	1260	0.0044	0.0043	<0.00010	<0.00010	1265	<0.0060	<0.0060	0.00550	0.08750		
QU1009D		Average	0.119	0.122	0.00370	0.00310		0.0000050	0.0000050	0.000250	0.000100	0.214	0.210	0.0246	0.0233	0.0000050	0.0000050	161.5	0.000250	0.000250	0.0000250	0.0000250	100.4	0.00150	0.00050	0.0084	0.0250		0.140
		Count	2	2	2	2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		1
		Minimum	0.119	0.120	<0.0030	<0.0010		<0.000010	<0.000010	<0.00050	<0.00020	0.202	0.196	0.0214	0.0202	<0.000010	<0.000010	158	<0.00050	<0.00050	<0.000050	<0.000050	96.9	<0.0030	<0.0010	0.0076	<0.050		0.140
		Maximum	0.119	0.123	0.0059	0.0057		<0.000010	<0.000010	<0.00050	<0.00020	0.225	0.223	0.0277	0.0264	<0.000010	<0.000010	165	<0.00050	<0.00050	<0.000050	<0.000050	104	<0.0030	<0.0010	0.0091	<0.050		0.140
	Ex-situ 4-South deep groundwater well. Down gradient of 4-South Mine. Base of Dunsmuir Member. Assesses vertical gradients & water quality down gradient of the 4-South Mine workings. Just outside of mine pool. (Below 3 Seam)	Geometric Mean	0.119	0.121	0.00297	0.00169		0.0000050	0.0000050	0.000250	0.000100	0.213	0.209	0.0243	0.0231	0.0000050	0.0000050	161.5	0.000250	0.000250	0.0000250	0.0000250	100.4	0.00150	0.00050	0.0083	0.0250		0.140
		Count <DL	0	0	1	1		2	2	2	2	0	0	0	0	2	2	0	2	2	2	2	0	2	2	0	2		0
		Standard Deviation	0.000	0.002	0.00311	0.00368		0.0000000	0.0000000	0.000000	0.0000000	0.016	0.019	0.0045	0.0044	0.0000000	0.0000000	4.9	0.000000	0.000000	0.0000000	0.0000000	5.0	0.00000	0.00000	0.0011	0.0000		0.000
		1st Quartile	0.119	0.121	0.00260	0.00180		<0.000010	<0.000010	<0.00050	<0.00020	0.208	0.203	0.0230	0.0217	<0.000010	<0.000010	159.8	<0.00050	<0.00050	<0.000050	<0.000050	98.7	<0.0030	<0.0010	0.0080	<0.050		0.140
		Median	0.119	0.122	0.00370	0.00310		<0.000010	<0.000010	<0.00050	<0.00020	0.214	0.210	0.0246	0.0233	<0.000010	<0.000010	161.5	<0.00050	<0.00050	<0.000050	<0.000050	100.4	<0.0030	<0.0010	0.0084	<0.050		0.140
		3rd Quartile	0.119	0.122	0.00480	0.00440		<0.000010	<0.000010	<0.00050	<0.00020	0.219	0.216	0.0261	0.0248	<0.000010	<0.000010	163.2	<0.00050	<0.00050	<0.000050	<0.000050	102.2	<0.0030	<0.0010	0.0087	<0.050		0.140
QU1009S		Average	0.0948	0.0938	0.134	0.00080		0.0000050	0.0000050	0.000250	0.000100	5.83	5.56	0.403	0.399	0.0000050	0.0000050	231.0	0.000415	0.000400	0.000076	0.0000250	103.0	0.00150	0.00050	0.0118	0.0250		0.0384
		Count	2	2	2	2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2
		Minimum	0.0845	0.0805	0.117	<0.0010		<0.000010	<0.000010	<0.00050	<0.00020	5.47	5.23	0.387	0.388	<0.000010	<0.000010	227	<0.00050	<0.00050	0.000066	<0.000050	103	<0.0030	<0.0010	0.0117	<0.050		0.0349
	Ex-situ 4-South shallow groundwater well. Fracture zone 10 m below till. Assesses vertical gradients & water quality down gradient of the 4-South Mine workings. Just outside of mine pool. (Below 3 Seam)	Maximum	0.105	0.107	0.152	0.0011		<0.000010	<0.000010	<0.00050	<0.00020	6.19	5.88	0.419	0.411	<0.000010	<0.000010	235	0.00058	0.00055	0.000087	<0.000050	103	<0.0030	<0.0010	0.0120	<0.050		0.0420
		Geometric Mean	0.0942	0.0928	0.133	0.00074		0.0000050	0.0000050	0.000250	0.000100	5.82	5.55	0.403	0.399	0.0000050	0.0000050	231.0	0.000381	0.000371	0.000076	0.0000250	103.0	0.00150	0.00050	0.0118	0.0250		0.0383
		Count <DL	0	0	0	1		2	2	2	2	0	0	0	0	2	2	0	1	1	0	2	0	2	2	0	2		0
		Standard Deviation	0.0145	0.0187	0.025	0.00042		0.0000000	0.0000000	0.000000	0.000000	0.51	0.46	0.023	0.016	0.0000000	0.0000000	5.7	0.000233	0.000212	0.000015	0.0000000	0.0	0.00000	0.00000	0.0002	0.0000		0.0050
		1st Quartile	0.0896	0.0871	0.126	0.00065		<0.000010	<0.000010	<0.00050	<0.00020	5.65	5.39	0.395	0.394	<0.000010	<0.000010	229.0	0.000332	0.000325	0.000071	<0.000050	103	<0.0030	<0.0010	0.0118	<0.050		0.0367
		Median	0.0948	0.0938	0.134	0.00080		<0.000010	<0.000010	<0.00050	<0.00020	5.83	5.56	0.403	0.399	<0.000010	<0.000010	231.0	0.000415	0.000400	0.000076	<0.000050	103	<0.0030	<0.0010	0.0118	<0.050		0.0384
		3rd Quartile	0.0999	0.1004	0.143	0.00095		<0.000010	<0.000010	<0.00050	<0.00020	6.01	5.72	0.411	0.405	<0.000010	<0.000010	233.0	0.000498	0.000475	0.000082	<0.000050	103	<0.0030	<0.0010	0.0119	<0.050		0.0402

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 48
2016-2017 Annual Report

2012-13 Statistics Stn.Code																												
EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
SPD			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E218582		Average	0.00097	0.00074	0.0628	0.02813	50.10	0.00006076	0.00002316	0.00082	0.00061	0.282	0.0975	0.0709	0.06640	0.0034712	0.0035561	132.8	0.00125	0.00116	0.000187	0.000100	134.16	0.01070	0.00829	0.00719	0.00325	0.0100	0.01751
		Count	17	19	17	19	51	17	19	17	19	17	19	17	19	17	18	17	17	19	17	19	58	17	19	12	10	12	12
		Minimum	0.00027	0.00019	0.0045	<0.0030	7.00	<0.000010	<0.0000050	0.00048	0.00025	0.158	0.0236	0.0179	<0.0010	<0.000010	<0.000010	14.1	<0.0010	<0.0010	<0.0002	<0.00020	1.23	<0.005	<0.0050	<0.0050	<0.0050	<0.020	<0.0050
		Maximum	0.00186	0.00166	0.141	0.0677	83.0	0.000798	0.000230	0.00136	0.00099	0.507	0.331	0.300	0.264	<0.010	<0.010	307	0.0037	0.0033	0.00142	<0.00020	312	0.104	0.0960	0.0113	0.0072	<0.020	0.036
		Geometric Mean	0.00084	0.00061	0.0416	0.01577	39.14	0.00001319	0.00000937	0.00078	0.00057	0.261	0.0741	0.0511	0.03365	0.0015190	0.0016230	71.6	0.00100	0.00094	0.000124	0.000100	76.50	0.00427	0.00348	0.00656	0.00300	0.0100	0.01464
		Count <DL	0	0	0	3	0	7	10	0	0	0	0	0	1	17	18	0	7	9	15	19	0	12	16	2	8	12	1
		Standard Deviation	0.00050	0.00046	0.0457	0.02274	27.03	0.00019047	0.00005208	0.00026	0.00022	0.116	0.0857	0.0729	0.07468	0.0021530	0.0021196	114.0	0.00091	0.00085	0.000320	0.000000	94.59	0.02474	0.02147	0.00272	0.00164	2E-10	0.00939
		1st Quartile	0.0005	0.00035	0.0184	0.00575	14.75	<0.000010	<0.000010	0.00061	0.00044	0.184	0.0530	0.0299	0.02125	<0.002	<0.002	15.9	<0.0010	<0.0010	<0.00020	<0.00020	27.25	<0.0050	<0.0050	0.00615	<0.0050	<0.020	0.01135
		Median	0.00090	0.00065	0.0503	0.0246	60.3	0.0000090	<0.000010	0.00079	0.00061	0.260	0.0779	0.0403	0.0349	<0.010	<0.010	159	0.0011	0.0011	<0.00020	<0.00020	145.00	<0.005	<0.0050	0.00735	<0.0050	<0.020	0.01700
		3rd Quartile	0.00125	0.00102	0.0944	0.04275	70.25	0.000020	0.00001400	0.00101	0.00076	0.381	0.0910	0.0783	0.07495	<0.010	<0.010	217	0.0015	0.0014	<0.0002	<0.00020	206.75	0.0051	<0.0050	0.00860	<0.0050	<0.020	0.02150
LLE		Average	0.00133	0.00113	0.1063	0.03340	45.1	0.00000840	0.00000560	0.00083	0.00054	0.971	0.6467	0.1117	0.1080	0.0038052	0.0036910	203.8	0.00060	0.00058	0.000114	0.000100	249.9	0.00339	0.00250	0.00695	0.00372	0.0327	0.02420
E292130		Count	21	21	21	21	46	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	53	21	21	15	14	15	15
		Minimum	0.00077	0.00065	0.0035	<0.0030	15.6	<0.0000050	<0.0000050	0.00038	0.00031	0.174	0.0248	0.0218	0.0179	<0.000010	<0.000010	55.3	<0.001	<0.0010	<0.0002	<0.00020	41.0	<0.005	<0.0050	<0.0050	<0.0050	<0.020	<0.0050
		Maximum	0.00226	0.00187	0.307	0.0584	93.1	0.0000350	0.000013	0.00204	0.00125	3.14	2.61	0.616	0.610	<0.050	<0.050	892	0.0015	0.0015	0.00040	<0.00020	1000	0.0091	<0.0050	0.0118	0.0057	0.071	0.0660
		Geometric Mean	0.00127	0.00108	0.0770	0.02519	39.3	0.00000593	0.00000457	0.00076	0.00051	0.723	0.3590	0.0757	0.0706	0.0015116	0.0014028	142.0	0.00057	0.00055	0.000107	0.000100	159.6	0.00309	0.00250	0.00638	0.00346	0.0265	0.01871
		Count <DL	0	0	0	2	0	16	18	0	0	0	0	0	0	17	19	0	18	19	20	21	0	16	21	2	8	4	1
		Standard Deviation	0.00043	0.00035	0.0775	0.01570	25.3	0.00000893	0.00000386	0.00042	0.00021	0.783	0.6601	0.1312	0.1303	0.0052294	0.0052781	238.3	0.00027	0.00026	0.000065	0.000000	274.6	0.00178	0.00000	0.00267	0.00147	0.0207	0.01615
		1st Quartile	0.00099	0.00085	0.0637	0.0275	27.4	<0.00001	<0.000005	0.00057	0.00043	0.417	0.200	0.0385	0.0321	<0.0020	<0.0020	99.4	<0.0010	<0.0010	<0.00020	<0.00020	93.3	<0.0050	<0.0050	0.00535	<0.0050	0.0170	0.01350
		Median	0.00123	0.00107	0.0796	0.0375	36.4	<0.000010	<0.000010	0.00070	0.00051	0.677	0.330	0.0706	0.0680	0.0022	0.0020	111	<0.0010	<0.0010	<0.00020	<0.00020	118	<0.005	<0.0050	0.0066	<0.0050	0.030	0.022
		3rd Quartile	0.00154	0.00137	0.133	0.0448	57.8	0.0000060	<0.000010	0.00095	0.00058	1.28	1.01	0.120	0.123	<0.010	<0.010	156	<0.0010	<0.0010	<0.00020	<0.00020	268	<0.0050	<0.0050	0.00870	0.00518	0.0370	0.03100
LLM1		Average	0.00055	0.00056	0.0148	0.0113	32.9	0.00001650	0.00000417	0.00042	0.00050	0.0627	0.0418	0.0141	0.00908	0.00350017	0.00350017	71.1	0.00050	0.00050	0.000100	0.000100	60.8	0.00560	0.00250	0.00292	0.00250	0.0100	0.018
E206619		Count	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
		Minimum	0.00028	0.00035	0.0066	0.0049	22.3	<0.000010	<0.0000050	0.00030	0.00032	0.0333	0.0098	0.0063	<0.0010	<0.0000020	<0.0000020	45.8	<0.0010	<0.0010	<0.00020	<0.00020	34.4	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.011
		Maximum	0.00085	0.00069	0.0295	0.0199	43.8	0.000054	<0.000010	0.00065	0.00088	0.0868	0.0717	0.0230	0.0210	<0.010	<0.010	103	<0.0010	<0.0010	<0.00020	<0.00020	84.1	0.0211	<0.0050	0.0050	<0.0050	<0.020	0.029
		Geometric Mean	0.00052	0.00054	0.0129	0.0104	32.2	0.00001083	0.00000397	0.00040	0.00047	0.0595	0.0356	0.0126	0.00366	0.00092466	0.00092466	69.2	0.00050	0.00050	0.000100	0.000100	58.5	0.00357	0.00250	0.00281	0.00250	0.0100	0.017
		Count <DL	0	0	0	0	0	2	6	0	0	0	0	0	2	6	6	0	6	6	6	6	0	5	6	5	6	6	0
		Standard Deviation	0.00019	0.00013	0.0085	0.0050	7.7	0.00001910	0.00000129	0.00013	0.00021	0.0203	0.0212	0.0071	0.00976	0.00234491	0.00234491	18.3	0.00000	0.00000	0.000000	0.000000	17.6	0.00759	0.00000	0.00102	0.00000	0.0000	0.006
		1st Quartile	0.00048	0.00049	0.0082	0.0091	29.7	0.00000550	0.00000312	0.00034	0.00038	0.0497	0.0322	0.0086	0.00098	0.00200000	0.00200000	67.6	<0.0010	<0.0010	<0.00020	<0.00020	55.7	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.015
		Median	0.00054	0.00059	0.0142	0.0105	31.2	0.00000800	<0.000010	0.00040	0.00042	0.0705	0.0431	0.0126	0.00575	<0.010	<0.010	69.4	<0.0010	<0.0010	<0.00020	<0.00020	57.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.017
		3rd Quartile	0.00061	0.00066	0.0169	0.0127	37.7	0.00001650	<0.000010	0.00043	0.00055	0.0720	0.0515	0.0202	0.01802	<0.010	<0.010	71.5	<0.0010	<0.0010	<0.00020	<0.00020	72.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.019
LLMB		Average	0.00024	0.00022	0.0104	0.0058	53.0	0.00000800	0.00000567	0.00044	0.00034	0.0447	0.00870	0.2693	0.1793	0.00350017	0.00350017	142.2	0.00050	0.00050	0.000100	0.000100	136.2	0.00520	0.00250	0.00250	0.00250	0.081	0.0153
E206619		Count	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
		Minimum	0.00019	0.00019	0.0065	0.0031	52.3	<0.0000050	<0.0000050	0.00027	0.00027	0.0303	<0.0050	0.0632	0.0033	<0.0000020	<0.0000020	137	<0.0010	<0.0010	<0.00020	<0.00020	131	<0.0050	<0.0050	<0.0050	<0.0050	0.070	0.0080
		Maximum	0.00028	0.00025	0.0133	0.0085	53.9	0.000028	0.000014	0.00084	0.00040	0.0559	0.0172	1.14	1.02	<0.010	<0.010	147	<0.0010	<0.0010	<0.00020	<0.00020	142	0.0187	<0.0050	<0.0050	<0.0050	0.093	0.030
		Geometric Mean	0.00024	0.00022	0.0102	0.0055	53.0	0.00000529	0.00000471	0.00041	0.00034	0.0436	0.00733	0.1355	0.0182	0.00092466	0.00092466	142.1	0.00050	0.00050	0.000100	0.000100	136.1	0.00350	0.00250	0.00250	0.00250	0.080	0.0140
		Count <DL	0	0	0	0	0	5	5	0	0	0	1	0	0	6	6	0	6	6	6	6	0	5	6	6	6	0	0
		Standard Deviation	0.00004	0.00002	0.0025	0.0017	0.6	0.00000987	0.00000426	0.00021	0.00005	0.0105	0.00528	0.4282	0.4120	0.00234491	0.00234491	3.5	0.00000	0.00000	0.000000	0.000000	4.0	0.00661	0.00000	0.00000	0.00000	0.009	0.0078
		1st Quartile	0.00021	0.00020	0.0095	0.0054	52.7	0.00000312	0.00000312	0.00033	0.00032	0.0368	0.00578	0.0657	0.0051	0.00200000	0.00200000	141	<0.0010	<0.0010	<0.00020	<0.00020	133.5	<0.0050	<0.0050	<0.0050	<0.0050	0.074	0.0112
		Median	0.00025	0.00021	0.0104	0.0058	53.0	<0.000010	<0.000010	0.00036	0.00036	0.0472	0.00730	0.0979	0.0094	<0.010	<0.010	141.5	<0.0010	<0.0010	<0.00020	<0.00020	136.0	<0.0050	<0.0050	<0.0050	<0.0050	0.078	0.0130
		3rd Quartile	0.00027	0.00023	0.0122	0.0061	53.4	<0.000010	<0.000010	0.00047	0.00037	0.0526	0.01130	0.1458	0.0248	<0.010	<0.010	144.2	<0.0010	<0.0010	<0.00020	<0.00020	138.5	<0.0050	<0.0050	<0.0050	<0.0050	0.088	0.0162
LLO		Average	0.00048	0.00045	0.0496	0.0184	28.5	0.00000389	0.00000500	0.00076	0.00062	0.1480	0.0716	0.0202	0.0118	0.0025567	0.0025567	68.4	0.00062	0.00050	0.000100	0.000100	48.3	0.00250	0.00250	0.00321	0.00250	0.0126	0.01657
E219412		Count	9	9	9	9	39	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	48	9	9	7	9	7	7
		Minimum	0.00030	0.00033	0.0109	0.0036	12.1	<0.0000050	<0.0000050	0.0004	0.00042	0.0467	0.0174	0.0066	0.0025	<0.000010	<0.000010	45.8	<0.001	<0.0010	<0.0002	<0.00020	13.2	<0.005	<0.0050	<0.0050	<0.0050	<0.020	<0.0050
		Maximum	0.00061	0.00059	0.137	0.0372	44.5	<0.00001	0.000015	0.00217	0.00097	0.353	0.220	0.0514	0.0242	<0.010	<0.010	98.1	0.0016	<0.0010	<0.0002	<0.00020	108	<0.005	<0.0050	0.0075	<0.0050	0.028	0.043
		Geometric Mean	0.00047	0.00044	0.0388	0.0152	27.1	0.00000367	0.00000415	0.00065	0.00059	0.1262	0.0583	0.0167	0.0091	0.0006300	0.0006300	66.5	0.00057	0.00050	0.000100	0.000100	43.2	0.00250	0.00250	0.00292	0.00250	0.0116	0.01269
		Count <DL	0	0	0	0	0	9	8	0	0	0	0	0	0	9	9	0	8	9	9	9	0	9	9	6	9	6	1
		Standard Deviation	0.00011	0.00010	0.0393	0.0110	8.7	0.00000132	0.00000395	0.00055	0.00018	0.0941	0.0579	0.0137	0.0081	0.0023498	0.0023498	17.4	0.00037	0.00000	0.000000	0.000000	22.1	4E-11	4E-11	0.00189	4E-11	0.0068	0.01274
		1st Quartile	0.0004	0.00036	0.0256	0.0114	21.6	<0.0000050	<0.0000050	0.00046	0.00045	0.0904	0.0535	0.0116	0.0056	<0.0020	<0.0020	57.0	<0.0010	<0.0010	<0.00020	<0.00020	30.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.01125
		Median	0.00051	0.00044	0.036	0.0138	29.6	<0.000010	<0.000010	0.00059	0.00059	0.113	0.0553	0.0189	0.0119	<0.0020	<0.0020	68.3	<0.0010	<0.0010	<0.00020	<0.00020	46.2	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.014
		3rd Quartile	0.00058	0.00052	0.0493	0.0252	35.6	<0.00001	<0.000010	0.00079	0.00074	0.160	0.0648	0.0250	0.0183	<0.010	<0.010	76.1	<0.0010	<0.0010	<0.0002	<0.00020	59.6	<0.005	<0.0050	<0.0050	<0.0050	<0.020	0.01700
WB		Average	0.00018	0.000148	0.0220	0.0143	29.9	0.00000375	0.00000375	0.00064	0.00071	0.0495	0.0256	0.0069	0.0042	0.0024010	0.0024010	32.1	0.00050	0.00050	0.000100	0.000100	21.65	0.00250	0.00250	0.00250	0.00250	0.0100	0.0095
E0900504		Count	10	10	10	10	43	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	43	10	10	8	9	8	8
		Minimum	0.00013	<0.00010	0.0121	0.0072	22.2	<0.0000050	<0.0000050	0.0005	0.00045	0.0366	0.0171	0.0031	0.0018	<0.000010	<0.000010	24.0	<0.001	<0.0010	<0.0002	<0.00020	5.93	<0.005	<0.0050	<0.0050	<0.0050	<0.020	0.0059
		Maximum	0.00027	0.00020	0.0360	0.0203	44.2	<0.00001	<0.000010	0.00091	0.00121	0.0944	0.0350	0.0150	0.0107	<0.010	<0.010	49.6	<0.001	<0.0010	<0.0002	<0.00020	49.5	<0.005	<0.0050	<0.0050	<0.0050	<0.020	0.021
		Geometric Mean	0.00017	0.000140	0.0211	0.0137	29.3	0.00000354	0.00000354	0.00063	0.00068	0.0476	0.0250	0.0062	0.0036	0.0006598	0.0006598	31.4	0.00050	0.00050	0.000100	0.000100	18.65	0.00250	0.00250	0.00250	0.00250	0.0100	0.0087
		Count <DL	0	1	0	0	0	10	10	0	0	0	0	0	0	10	10	0	10	10	10	10	0	10	10	8	9	8	0
		Standard Deviation	0.00004	0.000042	0.0066	0.0040	6.1	0.00000132	0.00000132	0.00011	0.00022	0.0170	0.0058	0.0036	0.0029	0.0022694	0.0022694	7.4	0.00000	0.00000	0.000000	0.000000	11.87	4E-11	4E-11	3E-11	4E-11	1E-10	0.0049
		1st Quartile	0.00015	0.000132	0.0175	0.0121	25.8	<0.0000050	<0.0000050	0.00057	0.00060	0.0399	0.0217	0.0041	0.0022	<0.0020	<0.0020	28.3	<0.0010	<0.0010	<0.00020	<0.00020	12.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.0071
		Median	0.00016	0.000160	0.0226	0.0154	28.2	0.00000375	0.00000375	0.00062	0.00065	0.0442	0.0252	0.0068	0.0031	<0.0020	<0.0020	29.4	<0.0010	<0.0010	<0.00020	<0.00020	19.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.0078
		3rd Quartile	0.0002	0.000170	0.0246	0.0166	32.8	<0.00001	<0.000010	0.00068	0.00081	0.0506	0.0301	0.0083	0.0054	<0.010	<0.010	35.7	<0.001	<0.0010	<0.0002	<0.00020	29.1	<0.005	<0.0050	<0.0050	<0.0050	<0.020	0.0088

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 49
2016-2017 Annual Report

2012-13 Statistics Stn.Code																												
EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
7SSD	Settling Pond at 7S- Discharge to		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E292069		Average	0.00067	0.0004	0.841	0.0105	128.5	0.000035	0.00002579	0.00337	0.00075	1.094	0.0111	0.3773	0.3791	0.00267196	0.00242934	172	0.0018	0.00094	0.000226	0.0001	74	0.0069	0.0025				
		Count	7	7	7	7	5	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7				
		Minimum	0.00046	0.00030	0.263	0.0063	80.5	<0.000010	<0.0000050	0.00153	0.00061	0.330	<0.0050	0.0973	0.0790	<0.0000020	<0.0000020	146	0.0012	<0.0010	<0.00020	<0.00020	14.5	<0.0050	<0.0050				
		Maximum	0.00149	0.00096	2.95	0.0133	215	0.000077	0.000069	0.00724	0.00084	3.24	0.0453	0.782	0.772	<0.010	<0.010	218	0.0029	0.0016	0.00043	<0.00020	112	0.0198	<0.0050				
		Geometric Mean	0.00061	0.00039	0.574	0.0101	118.0	0.00002100	0.00001373	0.00304	0.00074	0.792	0.00669	0.3180	0.3146	0.00036784	0.00034225	170.6	0.0017	0.00084	0.000180	0.000100	59.2	0.00478	0.00250				
		Count <DL	0	0	0	0	0	2	3	0	0	0	2	0	0	5	6	0	0	3	4	7	0	4	7				
		Standard Deviation	0.00037	0.00012	0.963	0.0029	61.0	0.00002961	0.00002632	0.00183	0.00009	1.024	0.01524	0.2262	0.2230	0.00235636	0.00243885	24.3	0.0006	0.00047	0.000158	0.000000	40.0	0.00682	0.00000				
		1st Quartile	0.00046	0.00035	0.318	0.0085	85.4	0.00000650	<0.000010	0.00262	0.00069	0.362	0.00405	0.2635	0.2720	0.00050135	0.00050220	158.0	0.0014	<0.0010	<0.00020	<0.00020	48.2	<0.0050	<0.0050				
		Median	0.00052	0.00039	0.399	0.0111	90.5	0.000036	0.000011	0.00269	0.00076	0.991	0.0062	0.276	0.310	0.0027	<0.0020	160	0.0015	0.0010	<0.00020	<0.00020	87.0	<0.0050	<0.0050				
		3rd Quartile	0.00066	0.00039	0.820	0.0130	171	0.0000570	0.0000440	0.00344	0.00082	1.185	0.0078	0.4795	0.4745	<0.010	<0.010	182.0	0.0020	0.00125	0.000375	<0.00020	104	0.00925	<0.0050				
7S		Average	0.000140	0.000118	0.1211	0.0457	15.5	0.00001112	0.00004733	0.00055	0.00050	0.1040	0.04022	0.00108	0.00093	0.00258498	0.00258458	15.5	0.00050	0.00050	0.000100	0.000100	1.610	0.00250	0.00250	0.00792	0.00313	0.0738	0.01598
E292109		Count	12	12	12	12	24	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	25	12	12	4	6	4	4
		Minimum	<0.00010	<0.00010	0.0236	0.0189	10.5	<0.0000050	<0.0000050	0.00027	0.00025	0.0078	<0.0050	<0.0010	<0.0010	0.0000024	<0.0000020	11.6	<0.001	<0.0010	<0.0002	<0.00020	<0.50	<0.005	<0.0050	<0.0050	<0.0050	<0.020	<0.0050
		Maximum	0.0006	0.00028	1.01	0.238	24.5	0.0000480	0.000517	0.0022	0.00155	1.03	0.390	0.006	0.0032	<0.010	<0.010	21.7	<0.001	<0.0010	<0.0002	<0.00020	7.80	<0.005	<0.0050	0.0210	0.0063	0.191	0.036
		Geometric Mean	0.000105	0.000101	0.0487	0.0324	15.0	0.00000784	0.00000666	0.00045	0.00043	0.0224	0.00992	0.00072	0.00068	0.00021996	0.00018457	15.2	0.00050	0.00050	0.000100	0.000100	1.104	0.00250	0.00250	0.00523	0.00292	0.0356	0.01065
		Count <DL	4	4	0	0	0	7	10	0	0	0	1	9	10	9	10	0	12	12	12	12	2	12	12	2	5	2	1
		Standard Deviation	0.000150	0.000070	0.2806	0.0613	4.1	0.00001244	0.00014791	0.00053	0.00036	0.2920	0.11033	0.00158	0.00099	0.00253726	0.00253770	3.2	0.00000	0.00000	0.000000	0.000000	1.863	1E-10	1E-10	0.00885	0.00155	0.0856	0.01462
		1st Quartile	<0.00010	<0.00010	0.0299	0.0224	12.5	<0.000010	<0.000010	0.00035	0.00030	0.0101	0.00602	<0.0010	<0.0010	0.00000470	0.00000425	13.2	<0.0010	<0.0010	<0.00020	<0.00020	0.73	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.00692
		Median	0.00011	0.000115	0.0343	0.0268	13.8	<0.000010	<0.000010	0.00040	0.00040	0.0138	0.00675	<0.0010	<0.0010	0.00300000	0.00300000	14.0	<0.0010	<0.0010	<0.00020	<0.00020	0.94	<0.0050	<0.0050	0.00410	<0.0050	0.0470	0.01270
		3rd Quartile	0.000142	0.000142	0.0445	0.0320	18.5	0.000013	<0.000010	0.00048	0.00048	0.0313	0.0087	0.00065	<0.0010	<0.010	<0.010	17.6	<0.001	<0.0010	<0.0002	<0.00020	1.37	<0.005	<0.0050	0.00952	<0.0050	0.1108	0.02175
QU0813A		Average	0.548	0.531	0.0454	0.0018	153.0	0.0000050	0.0000085	0.000490	0.000100	0.261	0.212	0.0692	0.0655	0.0000050	0.0000050	119.5	0.000250	0.000250	0.0000250	0.0000250	10.4	0.00260	0.00050	0.0310	0.0250		0.143
		Count	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2
		Minimum	0.540	0.525	0.0365	0.0014	153	<0.000010	<0.000010	<0.00050	<0.00020	0.247	0.198	0.0594	0.0560	<0.000010	<0.000010	116	<0.00050	<0.00050	<0.000050	<0.000050	10.2	<0.0030	<0.0010	0.0271	<0.050		0.135
		Maximum	0.555	0.537	0.0543	0.0022	153	<0.000010	0.000012	0.00073	<0.00020	0.275	0.226	0.0789	0.0750	<0.000010	<0.000010	123	<0.00050	<0.00050	<0.000050	<0.000050	10.6	0.0037	<0.0010	0.0348	<0.050		0.150
	Ex-situ 7-South groundwater well down gradient of the CCR backfill towards QR (No. 4 Seam)	Geometric Mean	0.547	0.531	0.0445	0.0018	153.0	0.0000050	0.0000077	0.000427	0.000100	0.261	0.212	0.0685	0.0648	0.0000050	0.0000050	119.4	0.000250	0.000250	0.0000250	0.0000250	10.4	0.00236	0.00050	0.0307	0.0250		0.142
		Count <DL	0	0	0	0	0	2	1	1	2	0	0	0	0	2	2	0	2	2	2	2	0	1	2	0	2		0
		Standard Deviation	0.011	0.008	0.0126	0.0006	0.0	0.0000000	0.0000049	0.000339	0.000000	0.020	0.020	0.0138	0.0134	0.0000000	0.0000000	4.9	0.000000	0.000000	0.0000000	0.0000000	0.3	0.00156	0.00000	0.0054	0.0000		0.011
		1st Quartile	0.544	0.528	0.0410	0.0016	153	<0.000010	0.0000068	0.000370	<0.00020	0.254	0.205	0.0643	0.0608	<0.000010	<0.000010	117.8	<0.00050	<0.00050	<0.000050	<0.000050	10.3	0.00205	<0.0010	0.0290	<0.050		0.139
		Median	0.548	0.531	0.0454	0.0018	153	<0.000010	0.0000085	0.000490	<0.00020	0.261	0.212	0.0692	0.0655	<0.000010	<0.000010	119.5	<0.00050	<0.00050	<0.000050	<0.000050	10.4	0.00260	<0.0010	0.0310	<0.050		0.143
		3rd Quartile	0.551	0.534	0.0498	0.0020	153	<0.000010	0.0000102	0.000610	<0.00020	0.268	0.219	0.0740	0.0702	<0.000010	<0.000010	121.2	<0.00050	<0.00050	<0.000050	<0.000050	10.5	0.00315	<0.0010	0.0329	<0.050		0.146
QU0813B		Average	0.512	0.509	1.01	0.0057		0.0000050	0.0000050	0.00328	0.000100	1.22	0.059	0.110	0.0896	0.0000050	0.0000050	73.2	0.00107	0.000250	0.000154	0.0000250	10.4	0.0035	0.00050	0.0578	0.0250		0.109
		Count	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1
		Minimum	0.512	0.509	1.01	0.0057		<0.000010	<0.000010	0.00328	<0.00020	1.22	0.059	0.110	0.0896	<0.000010	<0.000010	73.2	0.00107	<0.00050	0.000154	<0.000050	10.4	0.0035	<0.0010	0.0578	<0.050		0.109
	Ex-situ 7-South groundwater well down gradient of the CCR backfill towards QR (Till & SST contact)	Maximum	0.512	0.509	1.01	0.0057		<0.000010	<0.000010	0.00328	<0.00020	1.22	0.059	0.110	0.0896	<0.000010	<0.000010	73.2	0.00107	<0.00050	0.000154	<0.000050	10.4	0.0035	<0.0010	0.0578	<0.050		0.109
		Geometric Mean	0.512	0.509	1.01	0.0057		0.0000050	0.0000050	0.00328	0.000100	1.22	0.059	0.110	0.0896	0.0000050	0.0000050	73.2	0.00107	0.000250	0.000154	0.0000250	10.4	0.0035	0.00050	0.0578	0.0250		0.109
		Count <DL	0	0	0	0		1	1	0	1	0	0	0	0	1	1	0	0	1	0	1	0	0	1	0	1		0
		Standard Deviation	0.000	0.000	0.00	0.0000		0.0000000	0.0000000	0.00000	0.000000	0.00	0.000	0.000	0.0000	0.0000000	0.0000000	0.0	0.00000	0.000000	0.000000	0.0000000	0.0	0.0000	0.00000	0.0000	0.0000		0.000
		1st Quartile	0.512	0.509	1.01	0.0057		<0.000010	<0.000010	0.00328	<0.00020	1.22	0.059	0.110	0.0896	<0.000010	<0.000010	73.2	0.00107	<0.00050	0.000154	<0.000050	10.4	0.0035	<0.0010	0.0578	<0.050		0.109
		Median	0.512	0.509	1.01	0.0057		<0.000010	<0.000010	0.00328	<0.00020	1.22	0.059	0.110	0.0896	<0.000010	<0.000010	73.2	0.00107	<0.00050	0.000154	<0.000050	10.4	0.0035	<0.0010	0.0578	<0.050		0.109
		3rd Quartile	0.512	0.509	1.01	0.0057		<0.000010	<0.000010	0.00328	<0.00020	1.22	0.059	0.110	0.0896	<0.000010	<0.000010	73.2	0.00107	<0.00050	0.000154	<0.000050	10.4	0.0035	<0.0010	0.0578	<0.050		0.109
QU0821GD		Average	0.262	0.200	0.11300	0.00425	214.0	0.0000175	0.0000175	0.00180	0.000725	1.63	0.972	0.310	0.318	0.0000050	0.0000050	301	0.00088	0.00088	0.000235	0.000088	11.40	0.00525	0.00425	0.0516	0.0875		0.416
		Count	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2
		Minimum	0.245	0.198	<0.0060	<0.0020	214	<0.000020	<0.000020	<0.0010	<0.00040	1.49	0.863	0.222	0.242	<0.000010	<0.000010	248	<0.0010	<0.0010	<0.00020	<0.00010	<10	<0.0060	<0.0020	0.0339	<0.050		0.397
	Ex-situ 2-North groundwater well down gradient of u/g tailings disposal, measures water quality & hydraulic gradients downstream of Forjan Fault (No. 4 Seam)	Maximum	0.278	0.202	0.223	<0.015	214	<0.000050	<0.000050	0.0031	<0.0025	1.77	1.08	0.398	0.393	<0.000010	<0.000010	355	<0.0025	<0.0025	0.00042	<0.00025	17.8	<0.015	<0.015	0.0694	<0.30		0.436
		Geometric Mean	0.261	0.200	0.02587	0.00274	214.0	0.0000158	0.0000158	0.00124	0.000500	1.62	0.965	0.297	0.308	0.0000050	0.0000050	296	0.00079	0.00079	0.000145	0.000079	9.43	0.00474	0.00274	0.0485	0.0612		0.416
		Count <DL	0	0	1	2	0	2	2	1	2	0	0	0	0	2	2	0	2	2	1	2	1	2	2	0	2		0
		Standard Deviation	0.023	0.003	0.15556	0.00460	0.0	0.0000106	0.0000106	0.00184	0.000742	0.20	0.153	0.124	0.107	0.0000000	0.0000000	75	0.00053	0.00053	0.000262	0.000053	9.05	0.00318	0.00460	0.0251	0.0884		0.028
		1st Quartile	0.253	0.199	0.05800	0.00262	214	0.0000138	0.0000138	0.00115	0.000462	1.56	0.917	0.266	0.280	<0.000010	<0.000010	274	0.00069	0.00069	0.000142	0.000069	8.20	0.00412	0.00262	0.0428	0.0562		0.407
		Median	0.262	0.200	0.11300	0.00425	214	0.0000175	0.0000175	0.00180	0.000725	1.63	0.972	0.310	0.318	<0.000010	<0.000010	301	0.00088	0.00088	0.000235	0.000088	11.40	0.00525	0.00425	0.0516	0.0875		0.416
		3rd Quartile	0.270	0.201	0.16800	0.00588	214	0.0000213	0.0000213	0.00245	0.000988	1.70	1.026	0.354	0.355	<0.000010	<0.000010	328	0.00106	0.00106	0.000328	0.000106	14.60	0.00638	0.00588	0.0605	0.1188		0.426
QU0821GS		Average	0.240	0.221	0.2709	0.0062	200.0	0.0000050	0.0000050	0.000725	0.000175	0.590	0.358	0.0949	0.0915	0.0000050	0.0000050	48.3	0.000250	0.000250	0.0001235	0.0000250	0.72	0.00340	0.00100	0.1018	0.0875		0.176
		Count	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2
		Minimum	0.214	0.211	0.227	0.0054	200	<0.000010	<0.000010	<0.00050	<0.00020	0.588	0.341	0.0718	0.0700	<0.000010	<0.000010	47.8	<0.00050	<0.00050	<0.000050	<0.000050	0.60	<0.0030	<0.0010	0.0787	<0.050		0.173
	Ex-situ 2-North groundwater well down gradient of u/g tailings disposal, measures water quality & hydraulic gradients downstream of Forjan Fault (No. 1 Seam)	Maximum	0.267	0.231	0.519	0.0070	200	<0.000010	<0.000010	0.00120	<0.00050	0.592	0.375	0.118	0.113	<0.000010	<0.000010	48.8	<0.00050	<0.00050	0.000222	<0.000050	0.84	0.0053	<0.0030	0.125	<0.30		0.180
		Geometric Mean	0.239	0.221	0.1085	0.0061	200.0	0.0000050	0.0000050	0.000548	0.000158	0.590	0.358	0.0920	0.0889	0.0000050	0.0000050	48.3	0.000250	0.000250	0.0000745	0.0000250	0.71	0.00282	0.00087	0.0992	0.0612		0.176
		Count <DL	0	0	0	0	0	2	2	1	2	0	0	0	0	2	2	0	2	2	1	2	0	1	2	0	2		0
		Standard Deviation	0.037	0.014	0.3509	0.0011	0.0	0.0000000	0.0000000	0.000672	0.000106	0.003	0.024	0.0327	0.0304	0.0000000	0.0000000	0.7	0.000000	0.000000	0.0001393	0.0000000	0.17	0.00269	0.00071	0.0327	0.0884		0.005
		1st Quartile	0.227	0.216	0.1468	0.0058	200	<0.000010	<0.000010	0.000488	0.000138	0.589	0.350	0.0834	0.0808	<0.000010	<0.000010	48.0	<0.00050	<0.00050	0.0000742	<0.000050	0.66	0.00245	0.00075	0.0903	0.0562		0.175
		Median	0.240	0.221	0.2709	0.0062	200	<0.000010	<0.000010	0.000725	0.000175	0.590	0.358	0.0949	0.0915	<0.000010	<0.000010	48.3	<0.00050	<0.00050	0.0001235	<0.000050	0.72	0.00340	0.00100	0.1018	0.0875		0.176
		3rd Quartile	0.254	0.226	0.3949	0.0066	200	<0.000010	<0.000010	0.000962	0.000213	0.591	0.366	0.1064	0.1023	<0.000010	<0.000010	48.6	<0.00050	<0.00050	0.0001728	<0.000050	0.78	0.00435	0.00125	0.1134	0.1188		0.178

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 50
2016-2017 Annual Report

2012-13 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
QU1010D			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
		Average	0.0227	0.0218	3.93	0.0150		0.000050	0.000050	0.0080	0.00250	13.0	10.9	1.10	1.06	0.0000050	0.0000050	1510.0	0.00250	0.00250	0.00162	0.000250	12.5	0.0150	0.0150	0.111	0.00050		0.783
		Count	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1
	Ex-situ 2-North deep groundwater well. Down gradient of u/g tailings disposal, measures water quality & hydraulic head downstream of 2-North workings. (No. 1 Seam / Mudstone).	Minimum	0.0227	0.0218	3.93	<0.030		<0.00010	<0.00010	0.0080	<0.0050	13.0	10.9	1.10	1.06	<0.000010	<0.000010	1510	<0.0050	<0.0050	0.00162	<0.00050	<25	<0.030	<0.030	0.111	<0.0010		0.783
		Maximum	0.0227	0.0218	3.93	<0.030		<0.00010	<0.00010	0.0080	<0.0050	13.0	10.9	1.10	1.06	<0.000010	<0.000010	1510	<0.0050	<0.0050	0.00162	<0.00050	<25	<0.030	<0.030	0.111	<0.0010		0.783
		Geometric Mean	0.0227	0.0218	3.93	0.0150		0.000050	0.000050	0.0080	0.00250	13.0	10.9	1.10	1.06	0.0000050	0.0000050	1510.0	0.00250	0.00250	0.00162	0.000250	12.5	0.0150	0.0150	0.111	0.00050		0.783
		Count <DL	0	0	0	1		1	1	0	1	0	0	0	0	1	1	1	1	1	0	1	1	1	1	0	1		0
		Standard Deviation	0.0000	0.0000	0.00	0.0000		0.000000	0.000000	0.0000	0.00000	0.0	0.0	0.00	0.00	0.0000000	0.0000000	0.0	0.00000	0.00000	0.00000	0.000000	0.0	0.0000	0.0000	0.000	0.00000		0.000
		1st Quartile	0.0227	0.0218	3.93	<0.030		<0.00010	<0.00010	0.0080	<0.0050	13.0	10.9	1.10	1.06	<0.000010	<0.000010	1510	<0.0050	<0.0050	0.00162	<0.00050	<25	<0.030	<0.030	0.111	<0.0010		0.783
		Median	0.0227	0.0218	3.93	<0.030		<0.00010	<0.00010	0.0080	<0.0050	13.0	10.9	1.10	1.06	<0.000010	<0.000010	1510	<0.0050	<0.0050	0.00162	<0.00050	<25	<0.030	<0.030	0.111	<0.0010		0.783
		3rd Quartile	0.0227	0.0218	3.93	<0.030		<0.00010	<0.00010	0.0080	<0.0050	13.0	10.9	1.10	1.06	<0.000010	<0.000010	1510	<0.0050	<0.0050	0.00162	<0.00050	<25	<0.030	<0.030	0.111	<0.0010		0.783
QU1010S		Average	0.134	0.134	1.164	0.00195	142.0	0.0000080	0.0000050	0.00296	0.000175	0.994	0.259	0.0776	0.0696	0.0000050	0.0000050	64.2	0.000410	0.000250	0.000563	0.0000250	14.4	0.00150	0.00100	0.0366	0.0875		0.191
		Count	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2
	Ex-situ 2-North shallow groundwater well. Down gradient of u/g tailings disposal, measures water quality & hydraulic head downstream of 2-North workings. (No. 1 Seam / Sandstone).	Minimum	0.131	0.132	0.728	<0.0030	142	<0.000010	<0.000010	0.00263	<0.00020	0.958	0.235	0.0532	0.0479	<0.000010	<0.000010	62.0	<0.00050	<0.00050	0.000440	<0.000050	13.8	<0.0030	<0.0010	0.0321	<0.050		0.190
		Maximum	0.136	0.135	1.60	0.0024	142	0.000011	<0.000010	0.00328	<0.00050	1.03	0.284	0.102	0.0913	<0.000010	<0.000010	66.3	0.00057	<0.00050	0.000686	<0.000050	14.9	<0.0030	<0.0030	0.0410	<0.30		0.192
		Geometric Mean	0.133	0.133	1.079	0.00190	142.0	0.0000074	0.0000050	0.00294	0.000158	0.993	0.258	0.0737	0.0661	0.0000050	0.0000050	64.1	0.000377	0.000250	0.000549	0.0000250	14.3	0.00150	0.00087	0.0363	0.0612		0.191
		Count <DL	0	0	0	1	0	1	2	0	2	0	0	0	0	2	2	0	1	2	0	2	0	2	2	0	2		0
		Standard Deviation	0.004	0.002	0.617	0.00064	0.0	0.0000042	0.0000000	0.00046	0.000106	0.051	0.035	0.0345	0.0307	0.0000000	0.0000000	3.0	0.000226	0.000000	0.000174	0.0000000	0.8	0.00000	0.00071	0.0063	0.0884		0.001
		1st Quartile	0.132	0.133	0.946	0.00172	142	0.0000065	<0.000010	0.00279	0.000138	0.976	0.247	0.0654	0.0588	<0.000010	<0.000010	63.1	0.000330	<0.00050	0.000502	<0.000050	14.1	<0.0030	0.00075	0.0343	0.0562		0.190
		Median	0.134	0.134	1.164	0.00195	142	0.0000080	<0.000010	0.00296	0.000175	0.994	0.259	0.0776	0.0696	<0.000010	<0.000010	64.2	0.000410	<0.00050	0.000563	<0.000050	14.4	<0.0030	0.00100	0.0366	0.0875		0.191
		3rd Quartile	0.135	0.134	1.382	0.00217	142	0.0000095	<0.000010	0.00312	0.000213	1.012	0.272	0.0898	0.0805	<0.000010	<0.000010	65.2	0.000490	<0.00050	0.000624	<0.000050	14.6	<0.0030	0.00125	0.0388	0.1188		0.192
QU1011D		Average	0.00907	0.00458	39.8	0.0075		0.000165	0.0000250	0.0239	0.00125	16.4	3.37	0.715	0.526	0.0000250	0.0000050	305.0	0.0079	0.00125	0.0273	0.000125	5.0	0.054	0.0075	0.192	0.150		0.288
		Count	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1
		Minimum	0.00907	0.00458	39.8	<0.015		0.000165	<0.000050	0.0239	<0.0025	16.4	3.37	0.715	0.526	<0.000050	<0.000010	305	0.0079	<0.0025	0.0273	<0.00025	<10	0.054	<0.015	0.192	<0.30		0.288
		Maximum	0.00907	0.00458	39.8	<0.015		0.000165	<0.000050	0.0239	<0.0025	16.4	3.37	0.715	0.526	<0.000050	<0.000010	305	0.0079	<0.0025	0.0273	<0.00025	<10	0.054	<0.015	0.192	<0.30		0.288
	Ex-situ 2-North deep groundwater well. Measures water quality & hydraulic gradient in Forjian Fault (Fractured sandstone).	Geometric Mean	0.00907	0.00458	39.8	0.0075		0.000165	0.0000250	0.0239	0.00125	16.4	3.37	0.715	0.526	0.0000250	0.0000050	305.0	0.0079	0.00125	0.0273	0.000125	5.0	0.054	0.0075	0.192	0.150		0.288
		Count <DL	0	0	0	1		0	1	0	1	0	0	0	0	1	1	0	0	1	0	1	1	0	1	0	1		0
		Standard Deviation	0.00000	0.00000	0.0	0.0000		0.000000	0.0000000	0.0000	0.00000	0.0	0.00	0.000	0.000	0.0000000	0.0000000	0.0	0.0000	0.00000	0.0000	0.000000	0.0	0.000	0.0000	0.000	0.000		0.000
		1st Quartile	0.00907	0.00458	39.8	<0.015		0.000165	<0.000050	0.0239	<0.0025	16.4	3.37	0.715	0.526	<0.000050	<0.000010	305	0.0079	<0.0025	0.0273	<0.00025	<10	0.054	<0.015	0.192	<0.30		0.288
		Median	0.00907	0.00458	39.8	<0.015		0.000165	<0.000050	0.0239	<0.0025	16.4	3.37	0.715	0.526	<0.000050	<0.000010	305	0.0079	<0.0025	0.0273	<0.00025	<10	0.054	<0.015	0.192	<0.30		0.288
		3rd Quartile	0.00907	0.00458	39.8	<0.015		0.000165	<0.000050	0.0239	<0.0025	16.4	3.37	0.715	0.526	<0.000050	<0.000010	305	0.0079	<0.0025	0.0273	<0.00025	<10	0.054	<0.015	0.192	<0.30		0.288
QU1011S		Average	0.00268	0.00150	0.328	0.0089		0.0000050	0.0000050	0.001570	0.000175	0.561	0.176	0.0698	0.0646	0.0000050	0.0000050	69.5	0.00102	0.00076	0.0000605	0.0000250	5.52	0.00150	0.00100	0.0106	0.0875		0.0082
		Count	2	2	2	2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2
		Minimum	0.00179	0.00141	0.122	0.0028		<0.000010	<0.000010	<0.00050	<0.00020	0.320	0.166	0.0662	0.0587	<0.000010	<0.000010	67.8	0.00081	0.00072	<0.000050	<0.000050	4.71	<0.0030	<0.0010	0.0073	<0.050		0.0067
		Maximum	0.00356	0.00158	0.533	0.0150		<0.000010	<0.000010	0.00289	<0.00050	0.802	0.185	0.0735	0.0704	<0.000010	<0.000010	71.2	0.00124	0.00079	0.000096	<0.000050	6.32	<0.0030	<0.0030	0.0138	<0.30		0.0097
	Ex-situ 2-North shallow groundwater well. Measures water quality & hydraulic gradient in Forjian Fault (Fractured sandstone).	Geometric Mean	0.00252	0.00149	0.255	0.0065		0.0000050	0.0000050	0.000850	0.000158	0.507	0.175	0.0698	0.0643	0.0000050	0.0000050	69.5	0.00100	0.00075	0.0000490	0.0000250	5.46	0.00150	0.00087	0.0100	0.0612		0.0081
		Count <DL	0	0	0	0		2	2	1	2	0	0	0	0	2	2	0	0	0	1	2	0	2	2	0	2		0
		Standard Deviation	0.00125	0.00012	0.291	0.0086		0.0000000	0.0000000	0.001867	0.000106	0.341	0.013	0.0052	0.0083	0.0000000	0.0000000	2.4	0.00030	0.00005	0.0000502	0.0000000	1.14	0.00000	0.00071	0.0046	0.0884		0.0021
		1st Quartile	0.00223	0.00145	0.225	0.0058		<0.000010	<0.000010	0.000910	0.000138	0.440	0.171	0.0680	0.0616	<0.000010	<0.000010	68.6	0.00092	0.00074	0.0000428	<0.000050	5.11	<0.0030	0.00075	0.0089	0.0562		0.0074
		Median	0.00268	0.00150	0.328	0.0089		<0.000010	<0.000010	0.001570	0.000175	0.561	0.176	0.0698	0.0646	<0.000010	<0.000010	69.5	0.00102	0.00076	0.0000605	<0.000050	5.52	<0.0030	0.00100	0.0106	0.0875		0.0082
		3rd Quartile	0.00312	0.00154	0.430	0.0119		<0.000010	<0.000010	0.002230	0.000213	0.682	0.180	0.0717	0.0675	<0.000010	<0.000010	70.4	0.00113	0.00077	0.0000782	<0.000050	5.92	<0.0030	0.00125	0.0122	0.1188		0.0090
QU1105S		Average	0.0923	0.0914	0.347	0.00150		0.0000050	0.0000050	0.00057	0.000250	0.400	0.206	0.0472	0.0439	0.0000050	0.0000050	54.9	0.000250	0.000250	0.000183	0.0000250	49.8	0.00150	0.00150	0.0233	0.150		0.115
		Count	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1
		Minimum	0.0923	0.0914	0.347	<0.0030		<0.000010	<0.000010	0.00057	<0.00050	0.400	0.206	0.0472	0.0439	<0.000010	<0.000010	54.9	<0.00050	<0.00050	0.000183	<0.000050	49.8	<0.0030	<0.0030	0.0233	<0.30		0.115
		Maximum	0.0923	0.0914	0.347	<0.0030		<0.000010	<0.000010	0.00057	<0.00050	0.400	0.206	0.0472	0.0439	<0.000010	<0.000010	54.9	<0.00050	<0.00050	0.000183	<0.000050	49.8	<0.0030	<0.0030	0.0233	<0.30		0.115
	Ex-situ River Barrier Pillar (RBP) shallow groundwater well. Monitors water quality & gradients above the RBP & 2-North Mine. (Sandstone)	Geometric Mean	0.0923	0.0914	0.347	0.00150		0.0000050	0.0000050	0.00057	0.000250	0.400	0.206	0.0472	0.0439	0.0000050	0.0000050	54.9	0.000250	0.000250	0.000183	0.0000250	49.8	0.00150	0.00150	0.0233	0.150		0.115
		Count <DL	0	0	0	1		1	1	0	1	0	0	0	0	1	1	0	1	1	0	1	1	1	1	0	1		0
		Standard Deviation	0.0000	0.0000	0.000	0.00000		0.0000000	0.0000000	0.00000	0.000000	0.000	0.000	0.0000	0.0000	0.0000000	0.0000000	0.0	0.000000	0.000000	0.000000	0.0000000	0.0	0.00000	0.00000	0.0000	0.000		0.000
		1st Quartile	0.0923	0.0914	0.347	<0.0030		<0.000010	<0.000010	0.00057	<0.00050	0.400	0.206	0.0472	0.0439	<0.000010	<0.000010	54.9	<0.00050	<0.00050	0.000183	<0.000050	49.8	<0.0030	<0.0030	0.0233	<0.30		0.115
		Median	0.0923	0.0914	0.347	<0.0030		<0.000010	<0.000010	0.00057	<0.00050	0.400	0.206	0.0472	0.0439	<0.000010	<0.000010	54.9	<0.00050	<0.00050	0.000183	<0.000050	49.8	<0.0030	<0.0030	0.0233	<0.30		0.115
		3rd Quartile	0.0923	0.0914	0.347	<0.0030		<0.000010	<0.000010	0.00057	<0.00050	0.400	0.206	0.0472	0.0439	<0.000010	<0.000010	54.9	<0.00050	<0.00050	0.000183	<0.000050	49.8	<0.0030	<0.0030	0.0233	<0.30		0.115
QU1109S		Average	0.154	0.130	100.0	0.0075		0.000465	0.0000250	0.0465	0.00125	34.6	0.0150	1.05	0.00199	0.00022	0.0000050	2.08	0.0166	0.00125	0.109	0.000125	37.6	0.137	0.0075	0.181	0.150		0.113
		Count	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1
		Minimum	0.154	0.130	100	<0.015		0.000465	<0.000050	0.0465	<0.0025	34.6	<0.030	1.05	0.00199	0.00022	<0.000010	2.08	0.0166	<0.0025	0.109	<0.00025	37.6	0.137	<0.015	0.181	<0.30		0.113
		Maximum	0.154	0.130	100	<0.015		0.000465	<0.000050	0.0465	<0.0025	34.6	<0.030	1.05	0.00199	0.00022	<0.000010	2.08	0.0166	<0.0025	0.109	<0.00025	37.6	0.137	<0.015	0.181	<0.30		0.113
	Ex-situ River Barrier Pillar (RBP) shallow groundwater well. Monitors water quality & gradients above the RBP & 2-North Mine. (Sandstone)	Geometric Mean	0.154	0.130	100.0	0.0075		0.000465	0.0000250	0.0465	0.00125	34.6	0.0150	1.05	0.00199	0.00022	0.0000050	2.08	0.0166	0.00125	0.109	0.000125	37.6	0.137	0.0075	0.181	0.150		0.113
		Count <DL	0	0	0	1		0	1	0	1	0	1	0	0	0	1	0	0	1	0	1	0	0	1	0	1		0
		Standard Deviation	0.000	0.000	0.0	0.0000		0.000000	0.0000000	0.0000	0.00000	0.0	0.0000	0.00	0.00000	0.00000	0.0000000	0.00	0.0000	0.00000	0.000	0.000000	0.0	0.000	0.0000	0.000	0.000		0.000
		1st Quartile	0.154	0.130	100	<0.015		0.000465	<0.000050	0.0465	<0.0025	34.6	<0.030	1.05	0.00199	0.00022	<0.000010	2.08	0.0166	<0.0025	0.109	<0.00025	37.6	0.137	<0.015	0.181	<0.30		0.113
		Median	0.154	0.130	100	<0.015		0.000465	<0.000050	0.0465	<0.0025	34.6	<0.030	1.05	0.00199	0.00022	<0.000010	2.08	0.0166	<0.0025	0.109	<0.00025	37.6	0.137	<0.015	0.181	<0.30		0.113
		3rd Quartile	0.154	0.130	100	<0.015		0.000465	<0.000050	0.0465	<0.0025	34.6	<0.030	1.05	0.00199	0.00022	<0.000010	2.08	0.0166	<0.0025	0.109	<0.00025	37.6	0.137	<0.015	0.181	<0.30		0.113
7SQR		Average	0.00023	0.00021	0.0602	0.0177	27.9	0.00000561	0.00000606	0.00079	0.00066	0.1404	0.0530	0.0073	0.0034	0.0030011	0.0030011	28.8	0.00050	0.00050	0.000100	0.000100	18.36	0.00341	0.00298	0.00250	0.00250	0.0158	0.0146
E292113		Count	9	9	9	9	10	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	10	9	9	8	9	8	8
		Minimum	0.00011	0.00017	0.0113	0.0052	23.4	<0.0000050	<0.000005	0.00060	0.00039	0.0701	0.0394	0.0049	0.0017	<0.000010	<0.000010	22.7	<0.001	<0.0010	<0.0002	<0.00020	9.07	<0.005	<0.0050	<0.0050	<0.0050	<0.020	0.0069
		Maximum	0.00030	0.00026	0.142	0.0489	32.9	0.000018	0.000014	0.00110	0.00085	0.282	0.0684	0.0115	0.0065	<0.010	<0.010	33.5	<0.001	<0.0010	<0.0002	<0.00020	29.5	0.0107	0.0068	<0.0050	<0.0050	0.031	0.026
	7-South Quinsam River downstream of 7-South Mining Operation	Geometric Mean	0.00023	0.00021	0.0439	0.0149	27.8	0.00000458	0.00000495	0.00077	0.00065	0.1248	0.0518	0.0070	0.0031	0.0007533	0.0007533	28.6	0.00050	0.00050	0.000100	0.000100	16.88	0.00294	0.00279	0.00250	0.00250	0.0141	0.0136
		Count <DL	0	0	0	0	0	8	7	0	0	0	0	0	0	9	9	0	9	9	9	9	0	8	8	8	9	5	0
		Standard Deviation	0.00006	0.00003	0.0493	0.0126	3.1	0.00000480	0.00000438	0.00019	0.00014	0.0731	0.0118	0.0020	0.0016	0.0023964	0.0023964	3.3	0.00000	0.00000	0.000000	0.000000	7.75	0.00273	0.00143	3E-11	4E-11	0.0084	0.0058
		1st Quartile	0.00021	0.00020	0.0254	0.0119	26.5	<0.0000050	<0.0000050	0.00063	0.00062	0.0771	0.0422	0.0057	0.0022	<0.0020	<0.0020	27.6	<0.0010	<0.0010	<0.00020	<0.00020	12.68	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.0106
		Median	0.00023	0.00020	0.0397	0.0153	27.3	<0.000010	<0.000010	0.0007	0.00064	0.114	0.0519	0.007	0.0035	<0.010	<0.010	28.7	<0.0010	<0.0010	<0.00020	<0.00020	15.45	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.015
		3rd Quartile	0.00029	0.00023	0.0712	0.0164	30.5	<0.00001	<0.000010	0.00094	0.00072	0.183	0.0619	0.0081	0.0043	<0.010	<0.010	30.4	<0.001	<0.0010	<0.0002	<0.00020	25.70	<0.0050	<0.0050	<0.0050	<0.0050	0.0222	0.0162

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 51
2016-2017 Annual Report

2013 -14 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
WA			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E0126402		Average	0.000135	0.000111	0.0308	0.0159	20.1	0.0000047	0.000003	0.00169	0.00061	0.0331	0.01203	0.00242	0.00061	0.0005342	0.0005342	20.7	0.0005	0.00050	0.000100	0.000100	1.53	0.00378	0.0025				
		Count	15	15	15	15	13	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15				
		Minimum	<0.00010	<0.00010	0.0135	0.0097	15.9	<0.0000050	<0.0000050	0.00055	0.00048	0.0136	<0.0050	<0.0010	<0.0010	<0.0000020	<0.0000020	18.4	<0.0010	<0.0010	<0.00020	<0.00020	0.56	<0.0050	<0.0050				
	Middle Quinsam Lake Inlet - Quinsam River at Argonaut Road upstream of mining operation.	Maximum	0.00032	0.00024	0.0797	0.0368	21.6	0.000011	0.000005	0.0142	0.00104	0.0725	0.0321	0.0083	0.0016	<0.010	<0.010	23.7	<0.0010	<0.0010	<0.00020	<0.00020	5.65	0.0217	<0.0050				
		Geometric Mean	0.000117	0.000098	0.027	0.0151	20	0.00000408	0.00000287	0.00093	0.00059	0.0281	0.01011	0.00177	0.00057	0.00000754	0.00000749	20.7	0.0005	0.00050	0.000100	0.000100	1.33	0.00289	0.0025				
		Count <DL	4	5	0	0	0	12	13	0	0	0	1	3	13	14	14	0	15	15	15	15	0	14	15				
		Standard Deviation	0.000071	0.000054	0.0184	0.0063	1.8	0.00000277	0.00000104	0.00347	0.00015	0.0201	0.0074	0.00203	0.0003	0.00130164	0.00130164	1.5	0	0.00000	0.000000	0.000000	1.18	0.00496	4E-11				
		1st Quartile	0.00008	<0.00010	0.019	0.014	20.4	<0.0000050	<0.0000050	0.00066	0.0005	0.0155	0.0071	0.00105	<0.0010	<0.0000020	<0.0000020	19.8	<0.0010	<0.0010	<0.00020	<0.00020	1.12	<0.0050	<0.0050				
		Median	0.00015	0.00012	0.0226	0.0146	20.5	<0.000010	<0.0000050	0.00068	0.00056	0.03	0.0101	0.0019	<0.0010	<0.0000020	<0.0000020	20.5	<0.0010	<0.0010	<0.00020	<0.00020	1.25	<0.0050	<0.0050				
		3rd Quartile	0.00011	0.000108	0.0295	0.0208	20.3	<0.00001	<0.000010	0.00092	0.00075	0.0258	0.0155	0.0019	0.00088	0.0040000	0.0040000	20.1	<0.001	<0.0010	<0.0002	<0.00020	1.725	<0.005	<0.0050	<0.0050	<0.0050	<0.020	0.01030
WD		Average	0.00316	0.00202	0.0369	0.00395	346.7	0.0000281	0.00001204	0.001	0.00054	0.394	0.01036	0.0575	0.04731	0.00055644	0.0005009	348	0.0016	0.00142	0.000114	0.000100	607	0.00250	0.00300	0.0053		0.01	0.0396
E207409		Count	10	10	10	10	12	10	10	10	10	10	10	10	9	10	10	10	10	10	10	10	54	10	10	1		1	1
		Minimum	0.00162	0.00125	0.0131	<0.0030	296	<0.000010	<0.0000050	0.00052	0.00028	0.152	<0.0050	0.0276	<0.0010	<0.0000020	<0.0000020	277	0.0012	<0.0010	<0.00020	<0.00020	325	<0.0050	<0.0050	0.0053		<0.020	0.0396
		Maximum	0.00474	0.00279	0.111	0.009	382	0.000071	0.000035	0.00177	0.00135	0.606	0.0220	0.126	0.113	<0.010	<0.010	601	0.0024	0.0023	0.00024	<0.00020	969	<0.0050	0.0075	0.0053		<0.020	0.0396
	Settling Pond #4	Geometric Mean	0.00291	0.00195	0.0308	0.00332	345.6	0.00001823	0.0000099	0.00092	0.00047	0.345	0.00844	0.0512	0.03018	0.00000258	0.00000234	340	0.0016	0.0013	0.000109	0.000100	595	0.00250	0.00279	0.0053		0.01	0.0396
		Count <DL	0	0	0	3	0	4	3	0	0	0	1	0	1	9	10	0	0	1	9	10	0	10	9	0		1	0
		Standard Deviation	0.00126	0.00056	0.0282	0.0024	28.4	0.00002668	0.0000087	0.00042	0.00034	0.196	0.00686	0.0308	0.02997	0.00166633	0.0015808	91	0.0004	0.00053	0.000044	0.000000	121	4E-11	0.00158	0		0.0000	0
		1st Quartile	0.00186	0.00162	0.0211	0.00188	325.5	0.00001138	0.0000075	0.00065	0.00034	0.228	0.0057	0.0322	0.0298	<0.0000020	<0.0000020	307	0.0014	0.00105	<0.00020	<0.00020	536	<0.0050	<0.0050	0.0053		<0.020	0.03960
		Median	0.00324	0.00188	0.0274	0.0034	352	0.00001375	0.0000011	0.00086	0.00038	0.409	0.007	0.055	0.04505	<0.0000020	<0.0000020	324	0.0014	0.0014	<0.00020	<0.00020	620	<0.0050	<0.0050	0.0053		<0.020	0.040
		3rd Quartile	0.00433	0.00256	0.0402	0.00518	369	0.000052	<0.000025	0.00125	0.00068	0.575	0.01428	0.0623	0.05425	<0.0000020	<0.0000020	347	0.002	0.00182	<0.00020	<0.00020	660	<0.0050	<0.0050	0.0053		<0.020	0.03960
MW001D		Average	0.0189	0.0194	2.31	0.0335	94.8	0.000029	0.000005	0.0108	0.00308	2.46	0.0050	0.0564	0.000857	0.0000160	0.0000050	21.8	0.00247	0.00025	0.000464	0.000025	29.2	0.0075	0.0005	0.173	0.142		0.0112
		Count	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		3
		Minimum	0.0186	0.0192	1.54	0.0322	93.1	0.000022	<0.000010	0.008	0.00282	1.68	<0.010	0.0399	0.000541	<0.000010	<0.000010	21.5	0.00188	<0.00050	0.00037	<0.000050	29	0.0058	<0.0010	0.169	0.139		0.0094
		Maximum	0.0195	0.0197	2.69	0.0341	96.5	0.000032	<0.000010	0.0122	0.00321	2.85	<0.010	0.065	0.00149	0.000038	<0.000010	22.4	0.00277	<0.00050	0.00051	<0.000050	29.5	0.0083	<0.0010	0.18	0.147		0.0149
	Exsitu 2-North deep groundwater well below the coal wash plant (Till)	Geometric Mean	0.0189	0.0194	2.23	0.0335	94.8	0.000028	0.000005	0.0106	0.00307	2.39	0.005	0.0551	0.000758	0.0000098	0.0000050	21.8	0.00243	0.00025	0.000459	0.000025	29.2	0.0074	0.0005	0.173	0.142		0.011
		Count <DL	0	0	0	0	0	0	3	0	0	0	3	0	0	2	3	0	0	3	0	3	0	0	3	0	0		0
		Standard Deviation	0.0005	0.0003	0.66	0.0011	2.4	0.000006	0	0.00242	0.00023	0.68	1E-10	0.0143	0.000548	0.0000191	0.0000000	0.5	0.00051	0	0.000081	0	0.3	0.0014	0	0.006	0.005		0.0032
		1st Quartile	0.0186	0.0192	2.12	0.0332	93.9	0.000027	<0.000010	0.01010	0.00302	2.26	<0.010	0.0523	0.000541	<0.000010	<0.000010	21.5	0.00232	<0.00050	0.00044	<0.000050	29	0.007	<0.0010	0.169	0.139		0.0094
		Median	0.0186	0.0192	2.69	0.0341	94.8	0.000032	<0.000010	0.0122	0.00321	2.85	<0.010	0.0647	0.000541	<0.000010	<0.000010	21.5	0.00277	<0.00050	0.000511	<0.000050	29	0.0083	<0.0010	0.169	0.139		0.0094
		3rd Quartile	0.019	0.0194	2.69	0.0341	95.6	0.000032	<0.000010	0.0122	0.00321	2.85	<0.010	0.0647	0.001015	0.0000215	<0.000010	22	0.00277	<0.00050	0.000511	<0.000050	29.2	0.0083	<0.0010	0.174	0.143		0.0122
MW001S		Average	0.00025	0.00017	0.01330	0.0026	365.7	0.000069	0.000053	0.00067	0.00061	0.1940	0.184	1.121	1.078	0.0000050	0.0000050	1086.7	0.00099	0.00129	0.0000417	0.0000417	972	0.02093	0.00083	0.01553	0.02500		0.0234
		Count	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		3
		Minimum	0.00024	<0.00010	0.0078	0.0014	348	0.00006	0.000025	<0.0010	0.00032	0.167	0.027	0.662	0.413	<0.000010	<0.000010	1060	0.00098	0.00067	<0.000050	<0.000050	932	<0.0060	<0.0010	<0.0020	<0.050		0.0107
		Maximum	0.00025	0.00023	0.0244	0.0032	401	0.000086	0.000067	<0.0020	0.00075	0.248	0.262	1.350	1.41	<0.000010	<0.000010	1100	0.001	0.0016	<0.00010	<0.00010	992	0.0568	<0.0020	0.0446	<0.050		0.0297
	Exsitu 2-North shallow groundwater well below the coal wash plant (Till)	Geometric Mean	0.00025	0.00014	0.0114	0.0024	364.8	0.000068	0.000048	0.000630	0.00056	0.191	0.123	1.065	0.936	0.0000050	0.0000050	1086.5	0.00099	0.0012	0.0000397	0.0000397	971.6	0.008	0.00079	0.00355	0.025		0.0211
		Count <DL	0	1	0	0	0	0	0	3	0	0	0	0	0	3	3	0	0	0	3	3	0	2	3	2	3		0
		Standard Deviation	0.00001	0.000104	0.0096	0.001	30.6	0.000015	0.000024	0.00029	0.00025	0.047	0.136	0.397	0.576	0.0000000	0.0000000	23.1	0.00001	0.00054	0.0000144	0.0000144	34.6	0.03106	0.00029	0.02517	0.00000		0.0110
		1st Quartile	0.00024	0.00014	0.0078	0.0023	348	0.00006	0.000046	<0.0010	0.00054	0.1670	0.145	1.006	0.912	<0.000010	<0.000010	1080	0.00099	0.00114	0.0000375	0.0000375	962	<0.0060	0.00075	<0.0020	<0.050		0.0202
		Median	0.00025	0.00023	0.00780	0.0032	348	0.00006	0.000067	<0.0010	0.00075	0.1670	0.262	1.35	1.41	<0.000010	<0.000010	1100	0.001	0.0016	<0.00010	<0.00010	992	<0.0060	<0.0020	<0.0020	<0.050		0.0297
		3rd Quartile	0.00025	0.00023	0.01610	0.0032	374.5	0.000073	0.000067	0.00075	0.00075	0.2080	0.262	1.35	1.41	<0.000010	<0.000010	1100	0.001	0.0016	<0.00010	<0.00010	992	0.0299	<0.0020	0.02280	<0.050		0.0297
MW006D		Average	0.0284	0.0282	0.0367	0.0176	82.8	0.0000050	0.0000050	0.0008	0.00063	0.022	0.0050	0.00205	0.00076	0.0000050	0.0000050	48	0.000250	0.000250	0.0000375	0.0000250	12.3	0.01305	0.00050	0.157	0.16		0.0161
		Count	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2
		Minimum	0.0278	0.028	0.0233	0.0165	80.5	<0.000010	<0.000010	<0.0015	0.00061	<0.010	<0.010	0.00122	0.00072	<0.000010	<0.000010	47.5	<0.00050	<0.00050	<0.000050	<0.000050	12.2	<0.0030	<0.0010	0.156	0.157		0.016
		Maximum	0.0289	0.0283	0.0501	0.0187	85.2	<0.000010	<0.000010	0.00085	0.00066	0.039	<0.010	0.00288	0.000799	<0.000010	<0.000010	48.4	<0.00050	<0.00050	0.000050	<0.000050	12.4	0.0246	<0.0010	0.158	0.163		0.0161
	Exsitu 2-North deep groundwater well below the coal wash plant (Till)	Geometric Mean	0.0283	0.0281	0.0342	0.0176	82.8	0.000005	0.0000050	0.000798	0.00063	0.014	0.005	0.00187	0.000758	0.0000050	0.0000050	47.9	0.000250	0.000250	0.0000354	0.0000250	12.3	0.00607	0.0005	0.157	0.16		0.016
		Count <DL	0	0	0	0	0	2	2	1	0	1	2	0	0	2	2	0	2	2	1	2	0	1	2	0	0		0
		Standard Deviation	0.0008	0.0002	0.0190	0.0016	3.3	0	0.0000000	0.000071	0.00004	0.024	0	0.00117	0.000056	0.0000000	0.0000000	0.6	0.000000	0.000000	0.000018	0.0000000	0.1	0.01633	0	0.001	0.004		0.0001
		1st Quartile	0.0281	0.0281	0.03	0.0171	81.7	<0.000010	<0.000010	0.000775	0.00062	0.0135	<0.010	0.00164	0.00074	<0.000010	<0.000010	47.7	<0.00050	<0.00050	0.0000312	<0.000050	12.2	0.00728	<0.0010	0.156	0.158		0.016
		Median	0.0284	0.0282	0.0367	0.0176	82.8	<0.000010	<0.000010	0.0008	0.00063	0.022	<0.010	0.00205	0.00076	<0.000010	<0.000010	48	<0.00050	<0.00050	0.0000375	<0.000050	12.3	0.01305	<0.0010	0.157	0.16		0.0161
		3rd Quartile	0.0286	0.0282	0.0434	0.0182	84	<0.000010	<0.000010	0.000825	0.00065	0.031	<0.010	0.00247	0.000779	<0.000010	<0.000010	48.2	<0.00050	<0.00050	0.0000438	<0.000050	12.4	0.01883	<0.0010	0.158	0.162		0.0161
MW006S		Average	0.00142	0.00129	0.0435	0.00360	231.2	0.000032	0.000028	0.00159	0.00127	0.084	0.0072	0.0176	0.01052	0.0000050	0.0000050	552.8	0.00112	0.000578	0.0000438	0.0000438	741.2	0.00262	0.00103	0.0619	0.06		0.00535
		Count	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		4
		Minimum	0.00138	0.00125	0.0138	0.003	228	0.000025	0.000022	<0.0015	0.00105	0.044	<0.010	0.0105	0.00591	<0.000010	<0.000010	518	0.00098	<0.0010	<0.000050	<0.000050	736	<0.0030	<0.0020	0.0593	0.056		<0.0050
		Maximum	0.00152	0.00134	0.0641	0.0046	237	0.000035	0.000033	0.002	0.00144	0.107	0.014	0.0359	0.0216	<0.000010	<0.000010	593	0.0012	0.00081	<0.00010	<0.00010	743	<0.0060	0.0011	0.0644	0.064		0.0139
	Exsitu 2-North shallow groundwater well below the coal wash plant (Till)	Geometric Mean	0.00142	0.00129	0.0378	0.0036	231.2	0.000032	0.000028	0.00148	0.00126	0.08	0.0065	0.0152	0.00907	0.0000050	0.0000050	552.1	0.00112	0.00056	0.0000042	0.0000420	741.2	0.00252	0.00102	0.0619	0.06		0.00384
		Count <DL	0	0	0	0	0	0	0	1	0	0	3	0	0	4	4	0	0	3	4	4	0	4	3	0	0		3
		Standard Deviation	0.00007	0.00005	0.0212	0.0007	3.9	0.000005	0.000006	0.00059	0.000200	0.03	0.0045	0.0123	0.00742	0.0000000	0.0000000	30.8	0.0001	0.000155	0.0000125	0.0000125	3.5	0.00075	0.00005	0.0029	0.004		0.0057
		1st Quartile	0.00138	0.00125	0.0395	0.00340	229.5	0.000032	0.000024	0.00139	0.00112	0.071	<0.010	0.0116	0.0069	<0.000010	<0.000010	542	0.00107	<0.0010	0.0000438	0.0000438	741.2	0.00262	<0.0020	0.0595	0.056		<0.0050
		Median	0.00138	0.00128	0.0481	0.00350	230	0.000034	0.000029	0.0018	0.0013	0.094	<0.010	0.0119	0.00728	<0.000010	<0.000010	550	0.00115	<0.0010	<0.00010	<0.00010	743.0	<0.0060	<0.0020	0.0620	0.06		<0.0050
		3rd Quartile	0.00142	0.00132	0.0521	0.00380	231.8	0.000035	0.000033	0.002	0.00144	0.107	0.0072	0.0179	0.01086	<0.000010	<0.000010	560.8	0.0012	0.000578	<0.00010	<0.00010	743	<0.0060	0.00103	0.0644	0.063		0.00535
WC		Average	0.00134	0.00111	0.0163	0.0055	318.5	0.0000073	0.00000602	0.0005	0.00047	0.115	0.00999	0.0161	0.0048	0.00062666	0.00055706	306	0.00066	0.00058	0.000100	0.000100	547	0.00250	0.00250				
E207411		Count	9	9	9	2	9	8	9	9	9	9	8	9	9	9	9	9	9	9	9	9	19	9	9				
		Minimum	0.00075	0.00068	0.0073	0.0039	303	<0.000010	<0.0000050	<0.00050	0.00024	0.0518	<0.0050	0.0096	<0.0010	<0.0000020	<0.0000020	247	<0.0010	<0.0010	<0.00020	<0.00020	323	<0.0050	<0.0050				
		Maximum	0.00176	0.00154	0.0279	0.0129	334	<0.000025	<0.000025	0.00077	0.00136	0.199	0.0141	0.0227	0.0091	<0.010	<0.010	388	0.0019	0.0012	<0.00020	<0.00020	690	<0.0050	<0.0050				
	2-North Pit Culvert discharge into Middle Quinsam Lake	Geometric Mean	0.0013	0.00108	0.0142	0.0051	318.1	0.0000067	0.00000504	0.00047	0.00041	0.1036	0.00892	0.0154	0.00335	0.00000412	0.00000341	303	0.00058	0.00055	0.000100	0.000100	539	0.00250	0.0025				
		Count <DL	0	0	0	0	0	8	7	1	0	0	1	0	2	7	8	0	8	8	9	9	0	9	9				
		Standard Deviation	0.00034	0.00027	0.0088	0.0029	21.9	0.0000035	0.0000039	0.000183	0.00035	0.0547	0.00415	0.0049	0.00299	0.0017671	0.0016661	50	0.00047	0.00023	0.000000	0.000000	94	4E-11	4E-11				
		1st Quartile	0.00111	0.00097	0.01	0.0042	310.8	<0.000010	<0.0000050	0.00036	0.000290	0.0818	0.00730	0.0122	0.004	<0.0000020	<0.0000020	264	<0.0010	<0.0010	<0.00020	<0.00020	484	<0.0050	<0.0050				
		Median	0.00131	0.00106	0.0104	0.0042	318.5	<0.000010	<0.000010	0.00056	0.00037	0.0879	0.0116	0.0152	0.0049	<0.0000020	<0.0000020	295	<0.0010	<0.0010	<0.00020	<0.00020	542	<0.0050	<0.0050				
		3rd Quartile	0.00167	0.00132	0.0258	0.005	326.2	0.000011	0.0000059	0.0006	0.000460	0.1530	0.014	0.0207	0.0057	0.00000373	0.0000025	322	<0.0010	<0.0010	<0.00020	<0.00020	618	<0.0050	<0.0050				
MQL1		Average	0.000163	0.0001600	0.0154	0.0101	31.6	0.00000333	0.0000025	0.00069	0.00048	0.0529	0.0206	0.0088	0.00169	0.0000013	0.00000141	32	0.00054	0.0005	0.0001	0.0001	20.2	0.0025	0.0025	0.00312		0.0155	
E206618		Count	15	15	15	15	8	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	4		2	
		Minimum	<0.00010	0.00011	0.0101	0.0058	26.4	<0.0000050	<0.0000050	0.00045	0.00041	0.025	0.0102	0.0032	<0.0010	<0.0000020	<0.0000020	27	<0.0010	<0.0010	<0.00020	<0.00020	14.6	<0.0050	<0.0050	<0.0050		<0.020	
		Maximum	0.00025	0.00023	0.0206	0.0142	41.9	<0.000010	<0.0000050	0.00211	0.00068	0.0819	0.0295	0.0155	0.006	0.0000043	0.0000029	38.3	0.0011	<0.0010	<0.00020	<0.00020	31.6	<0.0050	<0.0050	0.005		0.021	
	Middle Quinsam Lake 1 metre below surface	Geometric Mean	0.000149	0.00016	0.015	0.0098	31.3	0.00000315	0.0000025	0.00063	0.00048	0.0506	0.0196	0.008	0.00120	0.00000116	0.00000128	31.8	0.00053	0.0005	0.0001	0.00010000	19.7	0.0025	0.0025	0.00297		0.0145	
		Count <DL	2	0	0	0	0	15	15	0	0	0	0	0	6	13	11	0	14	15	15	15	0	15	15	3		1	
		Standard Deviation	0.000061	0.00003	0.0035	0.0025	4.5	0.00000122	1E-13	0.0004	0.00008	0.015	0.006	0.0035	0.00155	0.00000089	0.00000071	3.6	0.00015	0	0	0	4.7	4E-11	4E-11	0.00125		0.0078	
		1st Quartile	0.00014	0.00014	0.0124	0.0085	29.6	<0.0000050	<0.0000050	0.00055	0.000440	0.0434	0.0178	0.0068	<0.0010	<0.0000020	<0.0000020	28.8	<0.0010	<0.0010	<0.00020	<0.00020	15.6	<0.0050	<0.0050	<0.0050		0.0128	
		Median	0.00016	0.0001600	0.0152	0.0103	30.8	<0.0000050	<0.0000050	0.000600	0.00046	0.0568	0.0223	0.0089	0.00130	<0.0000020	<0.0000020	32.6	<0.0010	<0.0010	<0.00020	<0.00020	20.40	<0.0050	<0.0050	<0.0050		0.0155	
		3rd Quartile	0.00021	0.00019	0.018	0.0118	31.7	<0.000010	<0.0000050	0.00064	0.00048	0.0614	0.0243	0.0107	0.00210	<0.0000020	0.0000016	34.3	<0.0010	<0.0010	<0.00020	<0.00020	22.6	<0.0050	<0.0050	0.00312		0.0183	
MQL8		Average	0.000122	0.000117	0.0075	0.00325	48.4	0.00000333	0.0000025	0.00052	0.00043	0.0387	0.0074	0.1248	0.1108	0.00000143	0.00000109	131.5	0.0005	0.0005	0.0001	0.0001	138.3	0.002500	0.0025	0.00250		0.0100	
E206618		Count	15	15	15	15	8	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	4		2	
		Minimum	<0.00010	<0.00010	0.0037	<0.0030	31.7	<0.0000050	<0.0000050	0.00028	0.0003	0.0210	<0.0050	0.0069	0.0024	<0.0000020	<0.0000020	35.2	<0.0010	<0.0010	<0.00020	<0.00020	24	<0.0050	<0.0050	<0.0050		<0.020	
		Maximum	0.00021	0.00017	0.0144	0.0074	54.9	<0.000010	<0.0000050	0.00071	0.00077	0.106	0.0266	0.707	0.622	0.0000037	0.0000024	216	<0.0010	<0.0010	<0.00020	<0.00020	258	<0.0050	<0.0050	<0.0050		<0.020	
	Middle Quinsam Lake 1 metre from bottom	Geometric Mean	0.000112	0.000113	0.007	0.00269	47.9	0.00000315	0.0000025	0.00051	0.000420	0.0338	0.00599	0.0456	0.0345	0.00000125	0.00000106	124.2	0.0005	0.0005	0.0001	0.0001	126.6	0.0025	0.0025	0.00250		0.01	
		Count <DL	3	1	0	7	0	15	15	0	0	0	4	0	0	12	14	0	15	15	15	15	0	15	15	4		2	
		Standard Deviation	0.000046	0.000026	0.0032	0.00212	7	0.00000122	1E-13	0.00011	0.00011	0.0249	0.00584	0.2061	0.1877	0.00000096	0.00000036	39.2	0	0	0	0.00000000	49.7	4E-11	4E-11	0.00000		0	
		1st Quartile	0.00011	0.00011	0.0054	<0.0030	49.1	<0.0000050	<0.0000050	0.00047	0.00038	0.0242	0.0042	0.0185	0.013	<0.0000020	<0.0000020	122.5	<0.0010	<0.0010	<0.00020	<0.00020	126	<0.0050	<0.0050	<0.0050		<0.020	
		Median	0.00013	0.0001100	0.0064	0.003	50.4	<0.0000050	<0.0000050	0.00050	0.000420	0.0287	0.0066	0.031	0.0228	<0.0000020	<0.0000020	126.0	<0.0010	<0.0010	<0.00020	<0.00020	128	<0.0050	<0.0050	<0.0050		<0.020	
		3rd Quartile	0.00014	0.00013	0.0088	0.00415	51	<0.000010	<0.0000050	0.00060	0.00044	0.0352	0.00795	0.1118	0.0952	<0.0000020	<0.0000020	137	<0.0010	<0.0010	<0.00020	<0.00020	141.5	<0.0050	<0.0050	<0.0050		<0.020	

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 52
2016-2017 Annual Report

2013 -14 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
NNL1			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E217018		Average	0.00047	0.000420	0.0289	0.0205	15.2	0.000005	0.0000028	0.000760	0.00054	0.1304	0.0787	0.0065	0.00252	0.000001	0.00000108	17.8	0.00063	0.0005	0.0001	0.0001	1.65	0.0025	0.0025	0.0025		0.01	
		Count	15	15	15	15	8	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	4		1	
		Minimum	0.00022	0.0002	0.0227	0.015	13.1	<0.0000050	<0.0000050	0.00042	0.00036	0.0561	0.0375	0.0039	<0.0010	<0.0000020	<0.0000020	13.7	<0.0010	<0.0010	<0.00020	<0.00020	0.75	<0.0050	<0.0050	<0.0050		<0.020	
		Maximum	0.00068	0.00059	0.0362	0.0258	17.1	0.000022	0.000007	0.00133	0.0009	0.203	0.114	0.0118	0.0044	<0.0000020	0.0000022	20.8	0.0024	<0.0010	<0.00020	<0.00020	2.86	<0.0050	<0.0050	<0.0050		<0.020	
	No Name Lake 1 metre below surface	Geometric Mean	0.00044	0.0004	0.0286	0.0203	15.1	0.00000393	0.00000268	0.00071	0.00052	0.1188	0.0748	0.00610	0.00226	0.00000100	0.00000105	17.6	0.00056	0.0005	0.0001	0.0001	1.53	0.0025	0.0025	0.00250		0.01	
		Count <DL	0	0	0	0	0	13	14	0	0	0	0	0	1	15	14	0	14	15	15	15	0	15	15	4		1	
		Standard Deviation	0.000160	0.00012	0.0041	0.0032	1.7	0.00000499	0.00000116	0.00031	0.00017	0.0529	0.0244	0.0024	0.00104	0.00000000	0.00000031	2.5	0.00049	0	0.00000000	0	0.62	4E-11	4E-11	0		0	
		1st Quartile	0.00038	0.00035	0.0263	0.0188	13.5	<0.0000050	<0.0000050	0.00055	0.00044	0.0784	0.0610	0.0046	0.00185	<0.0000020	<0.0000020	15	<0.0010	<0.0010	<0.00020	<0.00020	1.17	<0.0050	<0.0050	<0.0050		<0.020	
		Median	0.00044	0.000440	0.0279	0.0204	15.7	<0.0000050	<0.0000050	0.00064	0.00045	0.135	0.0813	0.00510	0.00230	<0.0000020	<0.0000020	19.1	<0.0010	<0.0010	<0.00020	<0.00020	1.72	<0.0050	<0.0050	<0.0050		<0.020	
		3rd Quartile	0.0006	0.00052	0.0318	0.0225	16.5	<0.000010	<0.0000050	0.00096	0.00062	0.1715	0.0933	0.0082	0.00335	<0.0000020	<0.0000020	19.5	<0.0010	<0.0010	<0.00020	<0.00020	2.04	<0.0050	<0.0050	<0.0050		<0.020	
NNLB		Average	0.00029	0.00022	0.034	0.0228	13	0.00000333	0.0000025	0.000733	0.00042	0.212	0.0804	0.0151	0.00491	0.000001	0.00000125	17.4	0.0005	0.0005	0.0001	0.0001	4.58	0.0025	0.002500	0.00393		0.056	
E217018		Count	15	15	15	15	8	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	4		1	
		Minimum	0.00021	0.00016	0.0243	0.0165	11.9	<0.0000050	<0.0000050	<0.00020	0.00035	0.103	0.0504	0.005	<0.0010	<0.0000020	<0.0000020	15.1	<0.0010	<0.0010	<0.00020	<0.00020	0.78	<0.0050	<0.0050	<0.0050		0.056	
		Maximum	0.00045	0.00038	0.0455	0.0275	13.8	<0.000010	<0.0000050	0.00397	0.00052	0.32	0.129	0.032	0.0172	<0.0000020	0.0000037	20.8	<0.0010	<0.0010	<0.00020	<0.00020	6.71	<0.0050	<0.0050	0.0056		0.056	
	No Name Lake 1 metre from bottom	Geometric Mean	0.00028	0.000210	0.0336	0.0225	12.9	0.00000315	0.0000025	0.000537	0.00042	0.202	0.0783	0.0128	0.00299	0.00000100	0.00000114	17.3	0.0005000	0.0005	0.0001	0.0001	4.25	0.0025	0.0025	0.00366		0.056	
		Count <DL	0	0	0	0	0	15	15	1	0	0	0	0	2	15	13	0	15	15	15	15	0	15	15	2		0	
		Standard Deviation	0.00006	0.00006	0.0055	0.0037	0.8	0.00000122	1E-13	0.000907	0.00005	0.064	0.0196	0.0088	0.00508	0.00000000	0.00000073	1.4	0	0.0000000	0	0	1.28	4E-11	0.000000	0.00166		0	
		1st Quartile	0.00024	0.00018	0.0299	0.0198	12.2	<0.0000050	<0.0000050	0.000465	0.00038	0.173	0.0687	0.0078	0.0015	<0.0000020	<0.0000020	16.4	<0.0010	<0.0010	<0.00020	<0.00020	4.33	<0.0050	<0.0050	<0.0050		0.056	
		Median	0.00028	0.0002	0.035	0.0230	13.3	<0.0000050	<0.0000050	0.000520	0.00041	0.225	0.0765	0.0119	0.0034	<0.0000020	<0.0000020	17.2	<0.0010	<0.0010	<0.00020	<0.00020	4.59	<0.0050	<0.0050	0.0038		0.056	
		3rd Quartile	0.0003	0.00024	0.0368	0.0262	13.5	<0.000010	<0.0000050	0.000610	0.00044	0.250	0.0922	0.0198	0.00515	<0.0000020	<0.0000020	18.2	<0.0010	<0.0010	<0.00020	<0.00020	4.86	<0.0050	<0.0050	0.00522		0.056	
NNO		Average	0.0005	0.00043	0.0311	0.0212	15.5	0.00000663	0.000004	0.00068	0.00062	0.1269	0.0713	0.0073	0.00315	0.0002886	0.0001886	17	0.0005	0.00050	0.000100	0.000100	2.07	0.0025	0.0025	0.00445	0.0025	0.01	0.0146
E217017		Count	16	16	16	16	12	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	4	2	4	4
		Minimum	0.00019	0.0002	0.0153	0.0097	12.1	<0.0000050	<0.0000050	0.00032	0.00037	0.0592	0.0326	0.0043	<0.0010	<0.0000020	<0.0000020	13	<0.0010	<0.0010	<0.00020	<0.00020	0.97	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.0066
		Maximum	0.00069	0.00062	0.0529	0.0352	20.1	0.000027	0.0000120	0.00123	0.00251	0.207	0.105	0.0133	0.0064	0.0026	<0.0020	21.3	<0.0010	<0.0010	<0.00020	<0.00020	5.84	<0.0050	<0.0050	0.0103	<0.0050	<0.020	0.031
		Geometric Mean	0.00045	0.00040	0.0294	0.0199	15.3	0.00000446	0.00000332	0.00063	0.00053	0.1165	0.0657	0.0069	0.00243	0.00000429	0.00000404	16.8	0.0005	0.00050	0.000100	0.000100	1.81	0.0025	0.0025	0.00356	0.0025	0.01	0.0121
	No Name Lake Outlet	Count <DL	0	0	0	0	0	13	14	0	0	0	0	0	3	15	16	0	16	16	16	16	0	16	16	3	2	4	0
		Standard Deviation	0.00019	0.00014	0.0108	0.0071	2.7	0.00000808	0.00000324	0.00028	0.00053	0.0507	0.027	0.0025	0.00186	0.00070369	0.00040259	2.5	0	0.00000	0.000000	0.000000	1.26	4E-11	4E-11	0.0039	0	0	0.0112
		1st Quartile	0.00027	0.00026	0.024	0.0179	12.9	<0.0000050	<0.0000050	0.00048	0.00042	0.0704	0.0403	0.0057	0.00188	<0.0000020	<0.0000020	14.4	<0.0010	<0.0010	<0.00020	<0.00020	1.27	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.0081
		Median	0.00058	0.00048	0.0317	0.0226	16.5	0.00000375	<0.0000050	0.00055	0.00044	0.128	0.0756	0.0068	0.0032	<0.0000020	<0.0000020	17.6	<0.0010	<0.0010	<0.00020	<0.00020	1.62	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	0.0103
		3rd Quartile	0.00064	0.00051	0.0353	0.0247	17.2	<0.000010	0.00000312	0.0008	0.00051	0.1638	0.0942	0.0084	0.0038	0.000002	0.000002	18.2	<0.0010	<0.0010	<0.00020	<0.00020	2.46	<0.0050	<0.0050	0.00445	<0.0050	<0.020	0.017
LLS		Average	0.00847	0.00235	0.1228	0.0063	226.2	0.00000825	0.00000757	0.001468	0.000428	2.97	0.00573	0.451	0.413	0.0000017	0.0000017	564	0.00386	0.0037	0.000218	0.0001	544	0.00639	0.00407				
E292131		Count	12	12	12	12	10	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12				
		Minimum	0.00339	0.00132	<0.0030	<0.0030	178	<0.0000050	<0.0000050	<0.00020	<0.00020	1.74	<0.0050	0.337	0.299	<0.0000020	<0.0000020	437	<0.0010	0.0014	<0.00020	<0.00020	388	<0.0050	<0.0050				
		Maximum	0.0123	0.00349	0.772	0.0229	244	0.00002	0.000013	0.0085	0.00148	4.9	0.0204	0.763	0.568	<0.000010	<0.000010	661	0.0174	0.0162	0.00152	<0.00020	669	0.0226	0.0165				
	Small Seep into Long Lake	Geometric Mean	0.00797	0.00224	0.02115	0.00364	224.9	0.00000674	0.00000608	0.000508	0.0003	2.83	0.00407	0.44	0.408	0.00000131	0.00000131	560	0.00247	0.0026	0.000125	0.0001	537	0.00405	0.0032				
		Count <DL	0	0	1	6	0	9	8	2	3	0	8	0	0	12	12	0	1	0	11	12	0	9	10				
		Standard Deviation	0.00282	0.00073	0.25122	0.00748	24.6	0.00000542	0.00000459	0.002667	0.00041	0.99	0.00587	0.115	0.068	0.00000156	0.00000156	70	0.00482	0.0044	0.000410	0.000000	91	0.00752	0.00415				
		1st Quartile	0.00708	0.00173	0.007	<0.0030	229	<0.000010	<0.0000050	0.000248	0.000175	2.280	<0.0050	0.382	0.369	<0.0000020	<0.0000020	510	0.00158	0.0015	<0.00020	<0.00020	490	<0.0050	<0.0050				
		Median	0.00844	0.00243	0.0133	0.0025	238	<0.000010	0.0000075	0.00043	0.000305	2.74	<0.0050	0.435	0.412	<0.0000020	<0.0000020	577	0.0023	0.0021	<0.00020	<0.00020	566	<0.0050	<0.0050				
		3rd Quartile	0.01023	0.00281	0.03997	0.00722	239	<0.000025	<0.000025	0.000592	0.000455	3.52	0.00622	0.47	0.44	<0.0000020	<0.0000020	616	0.0027	0.0026	<0.00020	<0.00020	597	0.00462	<0.0050				
LLSM		Average	0.00218	0.00108	0.0745	0.01117	176.7	0.00000525	0.00000509	0.00201	0.00064	0.964	0.00398	0.1719	0.176	0.0000018	0.0000018	441	0.00285	0.00281	0.0001	0.0001	400	0.00396	0.00378				
E292131		Count	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10				
		Minimum	0.00032	0.00012	0.0048	<0.0030	140	<0.0000050	<0.0000050	0.00039	0.00026	0.173	<0.0050	0.0025	0.0012	<0.0000020	<0.0000020	375	<0.0010	<0.0010	<0.00020	<0.00020	274	<0.0050	<0.0050				
		Maximum	0.00436	0.00182	0.498	0.0269	216	0.0000150	0.000010	0.00887	0.00142	2.37	0.0107	0.281	0.282	<0.000010	<0.000010	545	0.0125	0.0131	<0.00020	<0.00020	561	0.0171	0.0153				
	Long Lake Middle Seep	Geometric Mean	0.00175	0.00088	0.023	0.00754	174.7	0.00000453	0.00000446	0.00111	0.00053	0.774	0.00329	0.1144	0.1079	0.00000138	0.00000138	438	0.00174	0.00165	0.000100	0.0001	393	0.00303	0.00300				
		Count <DL	0	0	0	1	0	9	5	0	0	0	8	0	0	10	10	0	3	3	10	10	0	9	9				
		Standard Deviation	0.00127	0.00055	0.15170	0.00955	27.5	0.00000362	0.00000274	0.002790	0.00043	0.618	0.00314	0.0926	0.096	0.0000017	0.0000017	51	0.00355	0.00376	0	0	79	0.00462	0.00405				
		1st Quartile	0.00106	0.00068	0.0088	0.00382	149.8	0.00000312	<0.0000050	0.00052	0.00034	0.516	<0.0050	0.1050	0.1010	<0.0000020	<0.0000020	397	0.00078	0.00068	<0.00020	<0.00020	365	<0.0050	<0.0050				
		Median	0.00233	0.00117	0.0136	0.0072	179	<0.000010	<0.000010	0.00094	0.00046	0.976	<0.0050	0.2035	0.2245	<0.0000020	<0.0000020	443	0.00215	0.00195	<0.00020	<0.00020	390	<0.0050	<0.0050				
		3rd Quartile	0.00299	0.00148	0.06660	0.01868	199.5	<0.000010	0.00000598	0.001220	0.00072	1.145	<0.0050	0.2328	0.2402	<0.0000020	<0.0000020	471	0.00247	0.00235	<0.00020	<0.00020	412	<0.0050	<0.0050				

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 53
2016-2017 Annual Report

2013 -14 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW002	Ex-situ 2-3 South shallow groundwater well beside 3-South Pit (1 Seam)	Average	0.00044	0.00038	0.00300	0.0015	229.7	0.0000100	0.0000100	0.00050	0.000200	1.54	1.52	2.97	2.9	0.0000050	0.0000050	1241	0.0036	0.0034	0.000050	0.000050	1228.3	0.00300	0.001	0.00400	0.02500		0.1038
		Count	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6		6
		Minimum	0.00034	0.00031	<0.0060	<0.0020	222	<0.000020	<0.000020	<0.0010	<0.00040	1.26	1.26	2.76	2.66	<0.000010	<0.000010	1190	0.0033	0.0031	<0.00010	<0.00010	1190	<0.0060	<0.0020	<0.0020	<0.050		0.0879
		Maximum	0.00061	0.00044	<0.0060	0.004	237	<0.000020	<0.000020	<0.0010	<0.00040	1.7	1.75	3.19	3.13	<0.000010	<0.000010	1320	0.0037	0.0035	<0.00010	<0.00010	1250	<0.0060	<0.0020	<0.020	<0.050		0.127
		Geometric Mean	0.00043	0.00037	0.00300	0.00126	229.6	0.0000100	0.0000100	0.00050	0.0002	1.52	1.51	2.97	2.9	0.0000050	0.0000050	1241	0.0036	0.0034	0.000050	0.000050	1228.2	0.00300	0.001	0.00215	0.025		0.103
		Count <DL	0	0	6	5	0	6	6	6	6	0	0	0	0	6	6	0	0	0	6	6	0	6	6	6	6		0
		Standard Deviation	0.00010	0.00005	0.00000	0.00122	6.3	0.0000000	0.0000000	0.00000	0	0.22	0.21	0.20	0.22	0.0000000	0.0000000	42	0.0002	0.0002	0.000000	0.000000	22.3	0.00000	0	0.00465	0.000000001		0.0146
		1st Quartile	0.00036	0.00033	<0.0060	<0.0020	224.2	<0.000020	<0.000020	<0.0010	<0.00040	1.36	1.35	2.8	2.7	<0.000010	<0.000010	1230	0.0034	0.0035	<0.00010	<0.00010	1222.5	<0.0060	<0.0020	<0.0020	<0.050		0.0924
		Median	0.00044	0.0004	<0.0060	<0.0020	232	<0.000020	<0.000020	<0.0010	<0.00040	1.66	1.62	2.97	2.92	<0.000010	<0.000010	1235	0.0037	0.0035	<0.00010	<0.00010	1230	<0.0060	<0.0020	<0.0020	<0.050		0.1065
		3rd Quartile	0.00047	0.0004	<0.0060	<0.0020	233	<0.000020	<0.000020	<0.0010	<0.00040	1.68	1.63	3.15	3.11	<0.000010	<0.000010	1240	0.0037	0.0035	<0.00010	<0.00010	1245	<0.0060	<0.0020	0.00775	<0.050		0.107
QU1009D	Ex-situ 4-South deep groundwater well. Down gradient of 4-South Mine. Base of Dunsmuir Member. Assesses vertical gradients & water quality down gradient of the 4-South Mine workings. Just outside of mine pool. (Below 3 Seam)	Average	0.123	0.121	0.00610	0.00050	191.3	0.0000050	0.0000050	0.000250	0.000100	0.188	0.179	0.0192	0.0189	0.0000050	0.0000050	155.7	0.000250	0.000250	0.0000250	0.0000250	97.7	0.00350	0.00050	0.0073	0.0250		0.146
		Count	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		3
		Minimum	0.122	0.118	0.0042	<0.0010	191	<0.000010	<0.000010	<0.00050	<0.00020	0.183	0.178	0.0191	0.0187	<0.000010	<0.000010	154	<0.00050	<0.00050	<0.000050	<0.000050	96.1	<0.0030	<0.0010	0.0072	<0.050		0.138
		Maximum	0.124	0.123	0.007	<0.0010	192	<0.000010	<0.000010	<0.00050	<0.00020	0.19	0.179	0.0195	0.0194	<0.000010	<0.000010	159	<0.00050	<0.00050	<0.000050	<0.000050	98.5	0.0075	<0.0010	0.0074	<0.050		0.163
		Geometric Mean	0.123	0.121	0.0059	0.0005	191.3	0.0000050	0.0000050	0.000250	0.000100	0.188	0.179	0.0192	0.0189	0.0000050	0.0000050	155.6	0.000250	0.000250	0.0000250	0.0000250	97.7	0.00256	0.00050	0.0073	0.0250		0.146
		Count <DL	0	0	0	3	0	3	3	3	3	0	0	0	0	3	3	0	3	3	3	3	0	2	3	0	3		0
		Standard Deviation	0.001	0.003	0.0016	0	0.6	0.0000000	0.0000000	0.000000	0.000000	0.004	0.001	0.0002	0.0004	0.0000000	0.0000000	2.9	0.000000	0.000000	0.0000000	0.0000000	1.4	0.00346	0.00000	0.0001	0.0000		0.014
		1st Quartile	0.123	0.12	0.00560	<0.0010	191	<0.000010	<0.000010	<0.00050	<0.00020	0.186	0.178	0.0191	0.0187	<0.000010	<0.000010	154	<0.00050	<0.00050	<0.000050	<0.000050	97.3	<0.0030	<0.0010	0.0072	<0.050		0.138
		Median	0.124	0.123	0.00700	<0.0010	191	<0.000010	<0.000010	<0.00050	<0.00020	0.19	0.179	0.0191	0.0187	<0.000010	<0.000010	154	<0.00050	<0.00050	<0.000050	<0.000050	98.5	<0.0030	<0.0010	0.0072	<0.050		0.138
		3rd Quartile	0.124	0.123	0.00700	<0.0010	191.5	<0.000010	<0.000010	<0.00050	<0.00020	0.19	0.179	0.0193	0.019	<0.000010	<0.000010	156.5	<0.00050	<0.00050	<0.000050	<0.000050	98.5	0.0045	<0.0010	0.0073	<0.050		0.151
QU1009S	Ex-situ 4-South shallow groundwater well. Fracture zone 10 m below till. Assesses vertical gradients & water quality down gradient of the 4-South Mine workings. Just outside of mine pool. (Below 3 Seam)	Average	0.0812	0.0822	4.9	0.00420	145	0.0000350	0.0000050	0.002660	0.000100	7.87	6.21	0.443	0.439	0.0000050	0.0000050	241.5	0.00172	0.000405	0.004008	0.0000250	109.0	0.00865	0.00050	0.0444	0.0250		0.0424
		Count	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2
		Minimum	0.0798	0.0821	0.171	0.0015	136	<0.000010	<0.000010	0.00083	<0.00020	6.28	5.7	0.438	0.421	<0.000010	<0.000010	228	0.00063	<0.00050	0.000177	<0.000050	104	<0.0030	<0.0010	0.0149	<0.050		0.0379
		Maximum	0.0827	0.0824	9.63	0.0068	154	0.000065	<0.000010	0.00448	<0.00020	9.46	6.72	0.448	0.457	<0.000010	<0.000010	255	0.0028	0.00056	0.00784	<0.000050	114	0.0158	<0.0010	0.0740	<0.050		0.0468
		Geometric Mean	0.0812	0.0822	1.283	0.0032	144.7	0.0000180	0.0000050	0.001930	0.000100	7.71	6.19	0.443	0.439	0.0000050	0.0000050	241.1	0.00133	0.000374	0.001178	0.0000250	108.9	0.00487	0.00050	0.0332	0.0250		0.0421
		Count <DL	0	0	0	0	0	1	2	0	2	0	0	0	0	2	2	0	0	1	0	2	0	1	2	0	2		0
		Standard Deviation	0.0021	0.0002	6.689	0.0037	12.7	0.0000424	0.0000000	0.002580	0.000000	2.25	0.72	0.007	0.025	0.0000000	0.0000000	19.1	0.00153	0.000219	0.005419	0.0000000	7.1	0.01011	0.00000	0.0418	0.0000		0.0063
		1st Quartile	0.0805	0.0822	2.536	0.0028	140.5	0.00002	<0.000010	0.00174	<0.00020	7.08	5.96	0.44	0.43	<0.000010	<0.000010	234.8	0.00117	0.000328	0.002093	<0.000050	106.5	0.00508	<0.0010	0.0297	<0.050		0.0401
		Median	0.0812	0.0822	4.901	0.00410	145	0.000035	<0.000010	0.00266	<0.00020	7.87	6.21	0.443	0.439	<0.000010	<0.000010	241.5	0.00172	0.000405	0.004008	<0.000050	109	0.00865	<0.0010	0.0445	<0.050		0.0424
		3rd Quartile	0.082	0.0823	7.265	0.0055	149.5	0.00005	<0.000010	0.00357	<0.00020	8.67	6.46	0.446	0.448	<0.000010	<0.000010	248.2	0.00226	0.000482	0.005924	<0.000050	111.5	0.01223	<0.0010	0.0592	<0.050		0.0446
SPD			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E218582	Settling Pond # 1	Average	0.00122	0.00093	0.0457	0.01548	55.40	0.00002968	0.00001807	0.00105	0.00075	0.313	0.1289	0.0648	0.03768	0.00010119	0.00010162	268.8	0.00122	0.00102	0.0001	0.000105	215.7	0.00440	0.00316	0.0109	0.00569	0.0112	0.02054
		Count	20	20	20	20	19	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	51	20	20	18	8	16	19
		Minimum	0.00064	0.0005	0.0093	<0.0030	12.40	<0.0000050	<0.0000050	0.0005	0.00044	0.17	0.0186	0.0171	<0.0010	<0.000002	<0.000002	15.8	<0.0010	<0.0010	<0.00020	<0.00020	3.93	<0.0050	<0.0050	0.0059	<0.0050	<0.020	<0.0050
		Maximum	0.00201	0.00191	0.129	0.0785	92.8	0.000207	0.000108	0.00198	0.00191	1.03	0.731	0.210	0.211	<0.0020	<0.0020	433	0.002	0.002	<0.00020	<0.00040	364	0.0269	0.0132	0.0206	0.0097	0.029	0.037
		Geometric Mean	0.00116	0.00088	0.0344	0.0077	49.6	0.00001084	0.00000988	0.00098	0.00069	0.275	0.0797	0.0523	0.00671	0.0000023	0.0000028	210.1	0.00114	0.00092	0.0001	0.000104	155.54	0.0032	0.00281	0.0103	0.00493	0.0107	0.01811
		Count <DL	0	0	0	5	0	8	5	0	0	0	0	0	7	19	17	0	3	8	20	20	0	17	19	0	3	15	1
		Standard Deviation	0.00040	0.00035	0.0345	0.0204	21.7	0.0000575	0.00002474	0.00039	0.00038	0.207	0.1663	0.051	0.06167	0.0003074	0.00030724	119.5	0.00043	0.00044	0.000000	0.000022	102.4	0.00577	0.00243	0.004	0.00298	0.0048	0.00857
		1st Quartile	0.00093	0.00073	0.0159	0.00338	44.2	<0.00001	<0.000010	0.00078	0.0005	0.201	0.0466	0.0359	<0.0010	<0.0000020	<0.0000020	240	0.00108	<0.0010	<0.00020	<0.00020	172.5	<0.0050	<0.0050	0.008	<0.0050	<0.020	0.016
		Median	0.00106	0.00084	0.0389	0.00625	61.3	0.0000090	0.0000075	0.00096	0.00066	0.242	0.067	0.0494	0.0063	<0.0000020	<0.0000020	318	0.0012	0.00115	<0.00020	<0.00020	254.00	<0.0050	<0.0050	0.0096	0.0057	<0.020	0.02000
		3rd Quartile	0.0016	0.00108	0.0625	0.01495	65	0.000017	0.00002700	0.00126	0.00086	0.298	0.1105	0.0654	0.04272	<0.0000020	0.00000308	340	0.0014	0.00122	<0.00020	<0.00020	289	<0.0050	<0.0050	0.01400	0.00827	<0.020	0.02500
LLE	Long Lake Entrance (LLE)	Average	0.00213	0.00128	0.1824	0.02302	56.5	0.00000658	0.00000422	0.00132	0.000508	2.258	0.4591	0.2018	0.1868	0.00002234	0.0000021	179.9	0.00061	0.0005	0.000119	0.000100	156	0.00361	0.00250				
E292130		Count	12	12	12	12	10	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	53	12	12				
		Minimum	0.00119	0.00077	0.0322	<0.0030	37.6	<0.0000050	<0.0000050	0.00045	<0.00020	0.475	0.0255	0.0681	0.056	<0.0000020	<0.0000020	87.8	<0.0010	<0.0010	<0.00020	<0.00020	59.6	<0.0050	<0.0050				
		Maximum	0.0036	0.0026	0.755	0.0521	102	0.0000180	0.000009	0.00664	0.00087	8.27	0.996	0.661	0.692	<0.000010	<0.000010	422	0.0018	<0.0010	0.00033	<0.00020	399	0.0083	<0.0050				
		Geometric Mean	0.00201	0.0012	0.1165	0.01652	54.2	0.00000558	0.0000037	0.00093	0.000458	1.48	0.3346	0.1496	0.1302	0.00000199	0.00000166	159.7	0.00056	0.0005	0.00011	0.000100	138.2	0.00322	0.00250				
		Count <DL	0	0	0	1	0	8	9	0	1	0	0	0	0	6	9	0	11	12	11	12	0	9	12				
		Standard Deviation	0.0008	0.00055	0.2094	0.01583	18.6	0.00000452	0.00000239	0.00171	0.000195	2.452	0.2974	0.1848	0.196	0.00000142	0.00000159	104.4	0.00038	0	0.000066	0.000000	85.3	0.00207	0.00000				
		1st Quartile	0.00158	0.00091	0.0616	0.01365	44.2	<0.000010	<0.0000050	0.00064	0.000412	0.802	0.239	0.0828	0.075	<0.0000020	<0.0000020	116.5	<0.0010	<0.0010	<0.00020	<0.00020	98.9	<0.0050	<0.0050				
		Median	0.00194	0.00115	0.0986	0.0212	53.2	<0.000010	<0.0000050	0.00080	0.000515	1.165	0.444	0.1123	0.1006	0.00000215	<0.0000020	141.5	<0.0010	<0.0010	<0.00020	<0.00020	134	<0.0050	<0.0050				
		3rd Quartile	0.00276	0.00136	0.1955	0.02818	59.2	0.0000058	0.00000525	0.0011	0.000575	2.398	0.6842	0.241	0.191	0.00000252	0.00000278	182.8	<0.0010	<0.0010	<0.00020	<0.00020	172	0.0034	<0.0050				
LLM1	Long Lake Middle 1 metre below Surface	Average	0.00071	0.00064	0.0253	0.0109	30.4	0.00000359	0.0000025	0.00052	0.00039	0.1396	0.0603	0.0138	0.00548	0.00006378	0.00006365	65.1	0.00050	0.00050	0.000100	0.000100	45.4	0.00250	0.00250	0.00448		0.0160	
E206619		Count	16	16	16	16	7	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	4		3	
		Minimum	0.00043	0.00043	0.0094	0.007	25.5	<0.0000050	<0.0000050	0.00032	0.00031	0.0951	0.0358	0.0047	<0.0010	<0.0000020	<0.0000020	47.5	<0.0010	<0.0010	<0.00020	<0.00020	32.3	<0.0050	<0.0050	<0.0050		<0.020	
		Maximum	0.00107	0.00091	0.0529	0.0224	34.4	0.000005	<0.0000050	0.00068	0.00059	0.306	0.105	0.0237	0.0158	<0.0020	<0.0020	85.3	<0.0010	<0.0010	<0.00020	<0.00020	57.3	<0.0050	<0.0050	0.0079		0.028	
		Geometric Mean	0.00068	0.00062	0.0229	0.0104	30.1	0.00000339	0.0000025	0.00051	0.00039	0.1334	0.0577	0.0126	0.00219	0.0000018	0.00000174	64.1	0.00050	0.00050	0.000100	0.000100	44.8	0.0025	0.00250	0.00396		0.0141	
		Count <DL	0	0	0	0	0	15	16	0	0	0	0	0	7	14	14	0	16	16	16	16	0	16	16	2		2	
		Standard Deviation	0.00021	0.00017	0.0118	0.0038	4.2	0.00000128	1E-13	0.0001	0.00007	0.0509	0.0187	0.0054	0.00602	0.00024966	0.00024969	11.8	0.00000	0.00000	0.000000	0.000000	7.3	4E-11	0.00000	0.00257		0.0104	
		1st Quartile	0.00052	0.0005	0.0189	0.0081	26.2	<0.0000050	<0.0000050	0.00046	0.00035	0.1122	0.0504	0.0105	<0.0010	<0.0000020	<0.0000020	55.7	<0.0010	<0.0010	<0.00020	<0.00020	40.6	<0.0050	<0.0050	<0.0050		<0.020	
		Median	0.00066	0.00062	0.023	0.0105	32.8	<0.0000050	<0.0000050	0.00052	0.00038	0.1265	0.0586	0.0146	0.0013	<0.0000020	<0.0000020	68.3	<0.0010	<0.0010	<0.00020	<0.00020	46.2	<0.0050	<0.0050	0.00375		<0.020	
		3rd Quartile	0.0009	0.00084	0.0292	0.0118	33.8	<0.000010	<0.0000050	0.0006	0.00042	0.1415	0.0677	0.0174	0.01108	<0.0000020	<0.0000020	74.4	<0.0010	<0.0010	<0.00020	<0.00020	50	<0.0050	<0.0050	0.00572		0.019	

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 54
2016-2017 Annual Report

2013 -14 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LLMB	Long Lake Middle 1 metre From Bottom	Average	0.00027	0.00022	0.0108	0.00388	54.1	0.00000494	0.00000334	0.00044	0.00035	0.0708	0.01002	1.444	1.1778	0.00006373	0.00006361	132.6	0.00050	0.00050	0.000100	0.000100	124.6	0.00250	0.00286	0.00358		0.093	
E206619		Count	16	16	16	16	7	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	4		3	
		Minimum	0.00021	0.00016	0.0057	<0.0030	51	<0.0000050	<0.0000050	0.00035	0.00028	0.0309	<0.0050	0.211	0.0109	<0.0000020	<0.0000020	121	<0.0010	<0.0010	<0.00020	<0.00020	113	<0.0050	<0.0050	<0.0050		0.080	
		Maximum	0.00035	0.00033	0.0165	0.0081	56.4	0.000024	0.000008	0.00061	0.00045	0.123	0.0295	3.74	3.21	<0.0020	<0.0020	146	<0.0010	<0.0010	<0.00020	<0.00020	135	<0.0050	0.0083	0.0068		0.106	
		Geometric Mean	0.00027	0.00021	0.0102	0.0033	54.0	0.0000039	0.00000303	0.00043	0.00035	0.0643	0.00628	0.95	0.5827	0.00000177	0.00000171	132.4	0.00050	0.00050	0.000100	0.000100	124.4	0.00250	0.00269	0.00321		0.092	
		Count <DL	0	0	0	5	0	14	13	0	0	0	7	0	0	14	14	0	16	16	16	16	0	16	15	3		0	
		Standard Deviation	0.00005	0.00005	0.0035	0.00216	2.4	0.00000523	0.00000185	0.00008	0.00005	0.0309	0.01014	1.321	1.1531	0.00024967	0.0002497	7.3	0.00000	0.00000	0.000000	0.000000	5.5	4E-11	0.00145	0.00215		0.013	
		1st Quartile	0.00023	0.00019	0.0081	<0.0030	51.9	<0.0000050	<0.0000050	0.0004	0.00032	0.0437	<0.0050	0.544	0.42	<0.0000020	<0.0000020	127.8	<0.0010	<0.0010	<0.00020	<0.00020	120	<0.0050	<0.0050	<0.0050		0.086	
		Median	0.00024	0.00021	0.0096	0.0035	55.5	0.00000375	<0.0000050	0.00042	0.00034	0.0655	0.00580	0.786	0.5585	<0.0000020	<0.0000020	130	<0.0010	<0.0010	<0.00020	<0.00020	126.0	<0.0050	<0.0050	<0.0050		0.092	
		3rd Quartile	0.00032	0.00024	0.0144	0.00515	55.9	<0.000010	<0.0000050	0.00046	0.00039	0.0956	0.01395	2.618	2.225	<0.0000020	<0.0000020	137.5	<0.0010	<0.0010	<0.00020	<0.00020	128	<0.0050	<0.0050	0.00358		0.099	
LLO	Long Lake Outlet	Average	0.00069	0.00058	0.0313	0.0125	28.7	0.00000425	0.00000266	0.0006	0.00048	0.1551	0.0679	0.0196	0.00337	0.00012619	0.00018869	58.7	0.0005	0.00058	0.000100	0.000100	32.5	0.00266	0.00250				
E219412		Count	16	16	16	16	13	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	44	16	16				
		Minimum	0.00040	0.00035	0.0146	0.0064	24.2	<0.0000050	<0.0000050	0.00038	0.00034	0.0962	0.0201	0.0071	<0.0010	<0.0000020	<0.0000020	40.9	<0.0010	<0.0010	<0.00020	<0.00020	14.4	<0.0050	<0.0050				
		Maximum	0.00098	0.00072	0.0571	0.0306	34.9	0.000008	<0.000010	0.0009	0.00071	0.223	0.118	0.0419	0.0118	<0.0020	<0.0020	82	<0.0010	0.0017	<0.00020	<0.00020	63.6	0.0051	<0.0050				
		Geometric Mean	0.00067	0.00056	0.0298	0.0114	28.5	0.00000397	0.00000261	0.00058	0.00046	0.1488	0.0613	0.0172	0.00155	0.0000027	0.0000043	57.5	0.0005	0.00054	0.000100	0.000100	30.8	0.00261	0.00250				
		Count <DL	0	0	0	0	0	12	16	0	0	0	0	0	9	15	15	0	16	15	16	16	0	15	16				
		Standard Deviation	0.00018	0.00014	0.0102	0.0061	3.3	0.00000158	0.00000063	0.00014	0.00011	0.0451	0.0298	0.0103	0.00374	0.0003411	0.00040253	12.8	0	0.00030	0.000000	0.000000	10.7	0.00065	4E-11				
		1st Quartile	0.0005	0.00043	0.0283	0.008	26.5	<0.0000050	<0.0000050	0.00049	0.0004	0.118	0.0461	0.0123	<0.0010	<0.0000020	<0.0000020	50.2	<0.0010	<0.0010	<0.00020	<0.00020	24.3	<0.0050	<0.0050				
		Median	0.00075	0.0006	0.0298	0.0108	27.9	<0.000010	<0.0000050	0.00058	0.00044	0.145	0.0624	0.0185	<0.0010	<0.0000020	<0.0000020	54.2	<0.0010	<0.0010	<0.00020	<0.00020	30.5	<0.0050	<0.0050				
		3rd Quartile	0.00082	0.00071	0.033	0.0153	30	<0.000010	<0.0000050	0.00071	0.00053	0.201	0.0968	0.0218	0.0061	0.00000125	0.0000035	68.5	<0.0010	<0.0010	<0.00020	<0.00020	38.5	<0.0050	<0.0050				
WB	Middle Quinsam Lake Outlet	Average	0.00022	0.000189	0.0230	0.0119	34	0.00002447	0.00000419	0.0008	0.00053	0.0677	0.0242	0.0092	0.00163	0.0001886	0.0001887	34.7	0.00050	0.00050	0.000100	0.000100	23.9	0.00250	0.00250				
E0900504		Count	16	16	16	16	13	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16				
		Minimum	0.00011	<0.00010	0.0146	0.0065	26.7	<0.0000050	<0.0000050	0.00054	0.00039	0.0295	0.0107	0.0029	<0.0010	<0.0000020	<0.0000020	27.1	<0.0010	<0.0010	<0.00020	<0.00020	13.4	<0.0050	<0.0050				
		Maximum	0.00032	0.00029	0.0396	0.0154	43.2	0.000339	0.00002	0.00297	0.00088	0.151	0.0419	0.0217	0.0034	<0.0020	<0.0020	44.7	<0.0010	<0.0010	<0.00020	<0.00020	32.9	<0.0050	<0.0050				
		Geometric Mean	0.00021	0.000178	0.0222	0.0114	33.5	0.00000441	0.00000331	0.00071	0.00052	0.0611	0.0222	0.0078	0.00135	0.00000404	0.00000433	34.4	0.00050	0.00050	0.000100	0.000100	23.1	0.00250	0.00250				
		Count <DL	0	1	0	0	0	15	13	0	0	0	0	0	4	16	15	0	16	16	16	16	0	16	16				
		Standard Deviation	0.00006	0.000055	0.0069	0.0031	6.1	0.00008388	0.00000442	0.00059	0.00011	0.0322	0.0101	0.0049	0.00093	0.00040259	0.00040253	4.4	0.00000	0.00000	0.000000	0.000000	6.2	4E-11	4E-11				
		1st Quartile	0.00017	0.000165	0.0186	0.0099	27.9	<0.0000050	<0.0000050	0.00059	0.00047	0.0393	0.0145	0.0043	0.00088	<0.0000020	<0.0000020	31.6	<0.0010	<0.0010	<0.00020	<0.00020	19.8	<0.0050	<0.0050				
		Median	0.00024	0.000200	0.0218	0.0125	33.2	<0.0000050	<0.0000050	0.00064	0.0005	0.0665	0.0226	0.0102	0.00155	<0.0000020	<0.0000020	35	<0.0010	<0.0010	<0.00020	<0.00020	24.6	<0.0050	<0.0050				
		3rd Quartile	0.00026	0.000213	0.0243	0.0144	39.7	<0.000010	0.00000312	0.00075	0.00058	0.0806	0.0338	0.0113	0.00205	0.000002	0.0000035	37.5	<0.0010	<0.0010	<0.00020	<0.00020	29.0	<0.0050	<0.0050				
7SSD	Settling Pond at 7S- Discharge to Stream 1 -7S		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E292069		Average	0.00101	0.00057	0.30748	0.0081789	104.7	0.00001585	0.00001166	0.00227	0.00108	0.802	0.01959	0.2565	0.22188	0.00027197	0.0004554	260	0.00242	0.002	0.00011	0.0001	169.8	0.00429	0.00304	0.0133			
		Count	48	48	48	48	37	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	1			
		Minimum	0.00033	0.00021	0.0124	0.000189	59.6	<0.0000050	<0.0000050	0.00061	0.00052	0.100	<0.0050	0.0064	<0.0010	<0.0000020	<0.0000020	149	<0.0010	<0.0010	<0.00020	<0.00020	60.8	<0.0050	<0.0050	0.0133			
		Maximum	0.00597	0.00196	2.75	0.0254	141	0.00013	0.000094	0.0105	0.0042	7.23	0.216	0.961	0.854	<0.010	0.0054	524	0.0379	0.0304	0.00043	<0.00020	493	0.0436	0.025	0.0133			
		Geometric Mean	0.00082	0.00049	0.13166	0.0061235	102.5	0.00001024	0.00000783	0.00185	0.00097	0.525	0.00956	0.1739	0.07806	0.00000245	0.00000269	249	0.00129	0.00108	0.000105	0.000100	154	0.00327	0.00267	0.0133			
		Count <DL	0	0	1	4	0	13	17	0	0	0	11	0	6	45	42	0	18	23	46	48	0	37	46	0			
		Standard Deviation	0.00093	0.00036	0.4961	0.0057673	21.0	0.00002037	0.00001386	0.00179	0.00066	1.088	0.036	0.1922	0.1983	0.00102573	0.00145401	83	0.00544	0.00439	0.000051	0.000000	82.6	0.00612	0.00327	0			
		1st Quartile	0.0006	0.00032	0.04965	0.00405	93.5	<0.00001	<0.0000050	0.00133	0.00079	0.26	0.00582	0.1028	0.0713	<0.0000020	<0.0000020	205.0	<0.0010	<0.0010	<0.00020	<0.00020	109.8	<0.0050	<0.0050	0.0133			
		Median	0.00076	0.0005	0.165	0.0061	105	0.000011	0.0000085	0.00159	0.00088	0.6	0.0087	0.2225	0.176	<0.0000020	<0.0000020	242	0.0013	0.0010	<0.00020	<0.00020	159.0	<0.0050	<0.0050	0.0133			
		3rd Quartile	0.00102	0.00071	0.281	0.0116	121	0.0000190	0.0000163	0.00268	0.0012	0.784	0.0149	0.3998	0.37125	<0.0000020	<0.0000020	278.0	0.0021	0.0022	<0.00020	<0.00020	196.5	<0.0050	<0.0050	0.0133			
7S	Stream 1-7S discharge to LWO	Average	0.000177	0.000076	0.0685	0.016	18.412	0.0000093	0.00000722	0.000546	0.00043	0.0522	0.00372	0.0023	0.0005	0.00018712	0.00025688	55.1	0.00053	0.00061	0.000100	0.000100	40.190	0.00273	0.00250	0.0025			0.0058
E292109		Count	43	43	43	43	36	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	2			1
		Minimum	<0.00010	<0.00010	0.0127	0.0049	<0.50	<0.0000050	<0.0000050	<0.00020	0.0002	<0.0050	<0.0050	<0.0010	<0.0010	<0.0000020	<0.0000020	16.9	<0.0010	<0.0010	<0.00020	<0.00020	4.3	<0.0050	<0.0050	<0.0050			0.0058
		Maximum	0.00181	0.00019	1.05	0.0396	31.1	0.0000630	0.000067	0.00222	0.00093	0.912	0.017	0.0327	<0.0010	<0.010	<0.010	106	0.0012	0.0054	<0.00020	<0.00020	102.00	0.0078	<0.0050	<0.0050			0.0058
		Geometric Mean	0.000117	0.000068	0.0322	0.0147	16.4	0.00000612	0.00000427	0.000459	0.0004	0.01784	0.00315	0.00089	0.0005	0.00000214	0.0000022	49.4	0.00052	0.00053	0.000100	0.000100	30.6	0.00263	0.00250	0.0025			0.0058
		Count <DL	13	29	0	0	1	28	28	7	0	2	35	28	43	41	42	0	41	42	43	43	0	41	43	2			0
		Standard Deviation	0.000281	0.000041	0.1737	0.0072	5.113	0.00001176	0.00001173	0.000377	0.00018	0.1513	0.00294	0.0059	0	0.00079424	0.00092147	23.9	0.00014	0.00075	0.000000	0.000000	25.39	0.00108	0	0			0
		1st Quartile	<0.00010	<0.0001	0.0205	0.0114	15.85	<0.000010	<0.000005	0.000305	0.00031	0.009	<0.0050	<0.0010	<0.0010	<0.0000020	<0.0000020	43	<0.0010	<0.0010	<0.00020	<0.00020	24.35	<0.0050	<0.0050	<0.0050			0.0058
		Median	0.00012	<0.00010	0.0257	0.0144	17.35	<0.000010	<0.0000050	0.00042	0.00037	0.016	<0.0050	<0.001	<0.0010	<0.0000020	<0.0000020	53.7	<0.0010	<0.0010	<0.00020	<0.00020	36.6	<0.0050	<0.0050	<0.0050			0.00580
		3rd Quartile	0.00015	0.000105	0.0354	0.0183	21.85	0.0000085	0.0000063	0.00066	0.00053	0.02965	<0.0050	0.00145	<0.0010	<0.0000020	<0.0000020	69.2	<0.0010	<0.0010	<0.00020	<0.00020	49.2	<0.0050	<0.0050	<0.0050			0.0058
QU0813A	Ex-situ 7-South groundwater well down gradient of the CCR backfill towards QR (No. 4 Seam)	Average	0.429	0.435	0.0289	0.0021	183.0	0.0000050	0.000005	0.000250	0.000100	0.265	0.216	0.0545	0.0537	0.0000050	0.0000050	114.3	0.000250	0.000250	0.0000783	0.0000250	12.9	0.00150	0.00050	0.0234	0.0250		0.145
		Count	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		3
		Minimum	0.428	0.424	0.0251	0.0014	181	<0.000010	<0.000010	<0.00050	<0.00020	0.23	0.195	0.0479	0.0462	<0.000010	<0.000010	113	<0.00050	<0.00050	<0.000050	<0.000050	12.5	<0.0030	<0.0010	0.0234	<0.050		0.144
		Maximum	0.431	0.44	0.0308	0.0025	187	<0.000010	<0.000010	<0.00050	<0.00020	0.336	0.257	0.0578	0.0574	<0.000010	<0.000010	117	<0.00050	<0.00050	0.000105	<0.000050	13.6	<0.0030	<0.0010	0.0235	<0.050		0.148
		Geometric Mean	0.429	0.435	0.0288	0.0021	183.0	0.0000050	0.000005	0.00025	0.000100	0.261	0.214	0.0543	0.0534	0.0000050	0.0000050	114.3	0.000250	0.000250	0.0000651	0.0000250	12.9	0.0015	0.00050	0.0234	0.0250		0.145
		Count <DL	0	0	0	0	0	3	3	3	3	0	0	0	0	3	3	0	3	3	1	3	0	3	3	0	3		0
		Standard Deviation	0.002	0.009	0.0033	0.0006	3.5	0.0000000	0	0	0.000000	0.061	0.036	0.0057	0.0065	0.0000000	0.0000000	2.3	0.000000	0.000000	0.0000462	0.0000000	0.6	0	0.00000	0.0001	0.0000		0.002
		1st Quartile	0.428	0.432	0.0280	0.002	181	<0.000010	<0.000010	<0.00050	<0.00020	0.23	0.195	0.0528	0.0518	<0.000010	<0.000010	113	<0.00050	<0.00050	0.000065	<0.000050	12.5	<0.0030	<0.0010	0.0234	<0.050		0.144
		Median	0.428	0.44	0.0308	0.0025	181	<0.000010	<0.000010	<0.00050	<0.00020	0.23	0.195	0.0578	0.0574	<0.000010	<0.000010	113	<0.00050	<0.00050	0.000105	<0.000050	12.5	<0.0030	<0.0010	0.0234	<0.050		0.144
		3rd Quartile	0.43	0.44	0.0308	0.0025	184	<0.000010	<0.000010	<0.00050	<0.00020	0.283	0.226	0.0578	0.0574	<0.000010	<0.000010	115	<0.00050	<0.00050	0.000105	<0.000050	13	<0.0030	<0.0010	0.0234	<0.050		0.146
QU0813B	Ex-situ 7-South groundwater well down gradient of the CCR backfill towards QR (Till & SST contact)	Average	0.49	0.484	4.42	0.0054	140.5	0.0000290	0.0000083	0.01174	0.000167	5.8	0.072	0.187	0.0807	0.0000050	0.0000050	72.5	0.00508	0.000417	0.000514	0.0000417	10.4	0.0107	0.00083	0.2162	0.0250		0.0941
		Count	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		3
		Minimum	0.461	0.463	1.41	0.0052	137	0.000028	<0.000010	0.00302	<0.00020	1.86	0.068	0.123	0.0778	<0.000010	<0.000010	70.2	0.00145	<0.00050	0.000181	<0.000050	10.3	0.0047	<0.0010	0.0547	<0.050		0.0891
		Maximum	0.504	0.495	5.92	0.0055	144	0.00003	<0.000020	0.0161	<0.00040	7.77	0.074	0.219	0.0865	<0.000010	<0.000010	73.6	0.0069	<0.0010	0.00068	<0.00010	10.5	0.0137	<0.0020	0.297	<0.050		0.104
		Geometric Mean	0.489	0.484	3.67	0.0054	140.5	0.0000290	0.0000079	0.00922	0.000159	4.82	0.072	0.181	0.0806	0.0000050	0.0000050	72.4	0.0041	0.000397	0.000437	0.0000397	10.4	0.0096	0.00079	0.169	0.0250		0.0938
		Count <DL	0	0	0	0	0	0	3	0	3	0	0	0	0	3	3	0	0	3	0	3	0	0	3	0	3		0
		Standard Deviation	0.025	0.018	2.60	0.0002	4.9	0.0000010	0.0000029	0.00755	0.000058	3.41	0.003	0.055	0.0050	0.0000000	0.0000000	2.0	0.00315	0.000144	0.000288	0.0000144	0.1	0.0052	0.00029	0.1399	0.0000		0.009
		1st Quartile	0.483	0.479	3.66	0.0054	138.8	0.000028	0.0000075	0.00956	0.00015	4.81	0.071	0.171	0.0778	<0.000010	<0.000010	71.9	0.00418	0.000375	0.000431	0.0000375	10.4	0.0092	0.00075	0.1758	<0.050		0.0891
		Median	0.504	0.495	5.92	0.0055	140.5	0.000028	<0.000020	0.0161	<0.00040	7.77	0.074	0.219	0.0778	<0.000010	<0.000010	73.6	0.0069	<0.0010	0.00068	<0.00010	10.5	0.0137	<0.0020	0.297	<0.050		0.0891
		3rd Quartile	0.504	0.495	5.92	0.0055	142.2	0.000029	<0.000020	0.0161	<0.00040	7.77	0.074	0.219	0.0822	<0.000010	<0.000010	73.6	0.0069	<0.0010	0.00068	<0.00010	10.5	0.0137	<0.0020	0.297	<0.050		0.0966

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 55
2016-2017 Annual Report

2013 -14 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
QU0821GD	Ex-situ 2-North groundwater well down gradient of u/g tailings disposal, measures water quality & hydraulic gradients downstream of Forjan Fault (No. 4 Seam)	Average	0.33	0.262	0.00590	0.0013	227.0	0.000005	0.000005	0.00025	0.0001	0.56	0.242	0.084	0.0788	0.0000050	0.0000050	115	0.00025	0.00025	0.00639	0.000025	5.80	0.0091	0.0005	0.0215	0.025		0.232
		Count	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1
		Minimum	0.33	0.262	0.0059	0.0013	227	<0.000010	<0.000010	<0.00050	<0.00020	0.56	0.242	0.0838	0.0788	<0.000010	<0.000010	115	<0.00050	<0.00050	0.00639	<0.000050	5.8	0.0091	<0.0010	0.0215	<0.050		0.232
		Maximum	0.33	0.262	0.0059	0.0013	227	<0.000010	<0.000010	<0.00050	<0.00020	0.56	0.242	0.0838	0.0788	<0.000010	<0.000010	115	<0.00050	<0.00050	0.00639	<0.000050	5.8	0.0091	<0.0010	0.0215	<0.050		0.232
		Geometric Mean	0.33	0.262	0.0059	0.0013	227.0	0.000005	0.000005	0.00025	0.000100	0.56	0.242	0.0838	0.0788	0.0000050	0.0000050	115	0.00025	0.00025	0.00639	0.000025	5.8	0.0091	0.0005	0.0215	0.025		0.232
		Count <DL	0	0	0	0	0	1	1	1	1	0	0	0	0	1	1	0	1	1	0	1	0	0	1	0	1		0
		Standard Deviation	0	0	0	0.00000	0.0	0	0	0	0	0.00	0	0	0	0.0000000	0.0000000	0	0	0	0	0	0	0	0.00000	0	0		0
		1st Quartile	0.33	0.262	0.00590	0.0013	227	<0.000010	<0.000010	<0.00050	<0.00020	0.56	0.242	0.0838	0.079	<0.000010	<0.000010	115	<0.00050	<0.00050	0.00639	<0.000050	5.80	0.0091	<0.0010	0.0215	<0.050		0.232
		Median	0.33	0.262	0.00590	0.0013	227	<0.000010	<0.000010	<0.00050	<0.00020	0.56	0.242	0.084	0.0788	<0.000010	<0.000010	115	<0.00050	<0.00050	0.00639	<0.000050	5.80	0.0091	<0.0010	0.0215	<0.050		0.232
		3rd Quartile	0.330	0.262	0.00590	0.0013	227	<0.000010	<0.000010	<0.00050	<0.00020	0.56	0.242	0.0838	0.0788	<0.000010	<0.000010	115	<0.00050	<0.00050	0.00639	<0.000050	5.80	0.0091	<0.0010	0.0215	<0.050		0.232
QU0821GS	Ex-situ 2-North groundwater well down gradient of u/g tailings disposal, measures water quality & hydraulic gradients downstream of Forjan Fault (No. 1 Seam)	Average	0.270	0.225	0.0315	0.0039	218.0	0.0000050	0.0000050	0.00025	0.0001	1.030	0.434	0.141	0.132	0.0000050	0.0000050	50.4	0.000250	0.000250	0.00395	0.0000250	0.54	0.00150	0.00050	0.113	0.087		0.205
		Count	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1
		Minimum	0.27	0.225	0.0315	0.0039	218	<0.000010	<0.000010	<0.00050	<0.00020	1.03	0.434	0.141	0.1320	<0.000010	<0.000010	50.4	<0.00050	<0.00050	0.00395	<0.000050	0.54	<0.0030	<0.0010	0.113	0.087		0.205
		Maximum	0.27	0.225	0.0315	0.0039	218	<0.000010	<0.000010	<0.00050	<0.00020	1.03	0.434	0.141	0.132	<0.000010	<0.000010	50.4	<0.00050	<0.00050	0.00395	<0.000050	0.54	<0.0030	<0.0010	0.113	0.087		0.205
		Geometric Mean	0.27	0.225	0.0315	0.0039	218.0	0.0000050	0.0000050	0.00025	0.0001	1.030	0.434	0.1410	0.132	0.0000050	0.0000050	50.4	0.000250	0.000250	0.00395	0.0000250	0.54	0.0015	0.0005	0.113	0.087		0.205
		Count <DL	0	0	0	0	0	1	1	1	1	0	0	0	0	1	1	0	1	1	0	1	0	1	1	0	0		0
		Standard Deviation	0	0	0	0	0.0	0.0000000	0.0000000	0	0	0	0	0	0	0.0000000	0.0000000	0	0.000000	0.000000	0	0.0000000	0	0	0	0	0		0
		1st Quartile	0.27	0.225	0.0315	0.0039	218	<0.000010	<0.000010	<0.00050	<0.00020	1.03	0.434	0.141	0.132	<0.000010	<0.000010	50.4	<0.00050	<0.00050	0.00395	<0.000050	0.54	<0.0030	<0.0010	0.113	0.087		0.205
		Median	0.270	0.225	0.0315	0.0039	218	<0.000010	<0.000010	<0.00050	<0.00020	1.030	0.434	0.141	0.132	<0.000010	<0.000010	50.4	<0.00050	<0.00050	0.00395	<0.000050	0.54	<0.0030	<0.0010	0.113	0.087		0.205
		3rd Quartile	0.27	0.225	0.0315	0.0039	218	<0.000010	<0.000010	<0.00050	<0.00020	1.03	0.434	0.141	0.132	<0.000010	<0.000010	50.4	<0.00050	<0.00050	0.00395	<0.000050	0.54	<0.0030	<0.0010	0.113	0.087		0.205
QU1010D	Ex-situ 2-North deep groundwater well. Down gradient of u/g tailings disposal, measures water quality & hydraulic head downstream of 2-North workings. (No. 1 Seam / Mudstone).	Average	**ND - High levels of methane made well dangerous to sample**																										
		Count																											
		Minimum																											
		Maximum																											
		Geometric Mean																											
		Count <DL																											
		Standard Deviation																											
		1st Quartile																											
		Median																											
		3rd Quartile																											
QU1010S	Ex-situ 2-North shallow groundwater well. Down gradient of u/g tailings disposal, measures water quality & hydraulic head downstream of 2-North workings. (No. 1 Seam / Sandstone).	Average	0.148	0.135	9.38	0.0036	143.0	0.0000820	0.0000075	0.0176	0.00015	7.08	0.286	0.169	0.0768	0.0000050	0.0000050	76.4	0.006100	0.000375	0.00468	0.0000375	15.4	0.02150	0.00110	0.1132	0.025		0.19
		Count	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2
		Minimum	0.137	0.134	5.45	0.0036	137	0.000065	<0.000010	0.0087	<0.00020	4.59	0.281	0.15	0.0614	<0.000010	<0.000010	72.6	0.0037	<0.00050	0.002980	<0.000050	14.2	0.0137	<0.0020	0.0883	<0.050		0.173
		Maximum	0.159	0.136	13.30	0.0037	149	0.000099	<0.000020	0.0264	<0.00040	9.56	0.291	0.188	0.0921	<0.000010	<0.000010	80.1	0.0085	<0.0010	0.00638	<0.00010	16.6	0.0293	0.0012	0.1380	<0.050		0.208
		Geometric Mean	0.148	0.135	8.51	0.00360	142.9	0.00008	0.0000071	0.0152	0.000141	6.62	0.286	0.168	0.0752	0.0000050	0.0000050	76.3	0.00561	0.000354	0.00436	0.0000354	15.4	0.02000	0.0011	0.1104	0.025		0.19
		Count <DL	0	0	0	0	0	0	2	0	2	0	0	0	0	2	2	0	0	2	0	2	0	0	1	0	2		0
		Standard Deviation	0.016	0.001	5.55	0.0001	8.5	0.000024	0.0000035	0.0125	0.000071	3.51	0.007	0.027	0.0217	0.0000000	0.0000000	5.3	0.00339	0.000177	0.0024	0.0000177	1.7	0.01100	0.00014	0.0351	0		0.025
		1st Quartile	0.143	0.134	7.41	0.0036	140	0.000074	0.0000062	0.0131	0.000125	5.83	0.284	0.16	0.0691	<0.000010	<0.000010	74.5	0.004900	0.000312	0.00383	0.0000312	14.8	0.0176	0.00105	0.1007	<0.050		0.182
		Median	0.148	0.135	9.38	0.0036	143	0.0000820	0.0000075	0.0176	0.00015	7.08	0.286	0.169	0.0768	<0.000010	<0.000010	76.4	0.006100	0.000375	0.00468	0.0000375	15.4	0.0215	0.00110	0.1132	<0.050		0.19
		3rd Quartile	0.154	0.136	11.34	0.0037	146	0.00009	0.0000088	0.022	0.000175	8.32	0.288	0.178	0.0844	<0.000010	<0.000010	78.2	0.007300	0.000438	0.00553	0.0000438	16	0.0254	0.00115	0.1256	<0.050		0.199
QU1011D	Ex-situ 2-North deep groundwater well. Measures water quality & hydraulic gradient in Forjian Fault (Fractured sandstone).	Average	0.0317	0.00678	159.6	0.00417	360	0.000931	0.0000417	0.1267	0.00083	57.9	3.94	2.23	0.873	0.0000903	0.0000050	349.3	0.0381	0.00208	0.1609	0.000208	5.0	0.227	0.00417	11.192	0.045		0.419
		Count	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		3
		Minimum	0.0159	0.00594	60.8	<0.0050	336	0.000353	<0.000050	0.05	<0.0010	22.8	3.66	1.19	0.645	<0.000050	<0.000010	336	0.0146	<0.0025	0.0568	<0.00025	<10	0.095	<0.0050	0.375	<0.050		0.31
		Maximum	0.0396	0.0072	209	<0.010	372	0.00122	<0.00010	0.165	<0.0020	75.5	4.08	2.75	0.987	0.000123	<0.000010	356	0.0499	<0.0050	0.213	<0.00050	<10	0.293	<0.010	16.6	0.085		0.473
		Geometric Mean	0.0292	0.00675	138.5	0.00397	359.6	0.000807	0.0000397	0.1108	0.00079	50.7	3.93	2.08	0.857	0.0000723	0.0000050	349.2	0.0331	0.00198	0.1371	0.000198	5.0	0.201	0.00397	4.693	0.038		0.411
		Count <DL	0	0	0	3	0	0	3	0	3	0	0	0	0	1	3	0	0	3	0	3	3	0	3	0	2		0
		Standard Deviation	0.01370	0.00073	85.6	0.0014	20.8	0.000501	0.0000144	0.0664	0.00029	30.4	0.24	0.900	0.197	0.0000566	0.0000000	11.5	0.0204	0.00072	0.0902	0.000072	0.0	0.114	0.0014	9.368	0.035		0.094
		1st Quartile	0.0278	0.00657	134.9	0.00375	354	0.000786	0.0000375	0.1075	0.00075	49.2	3.87	1.97	0.816	0.000074	<0.000010	346	0.0322	0.00188	0.1349	0.000188	<10	0.194	0.00375	8.488	<0.050		0.391
		Median	0.0396	0.0072	209	<0.010	372	0.00122	<0.00010	0.165	<0.0020	75.5	4.08	2.75	0.987	0.000123	<0.000010	356	0.0499	<0.0050	0.213	<0.00050	<10	0.293	<0.010	16.6	<0.050		0.473
		3rd Quartile	0.0396	0.0072	209	<0.010	372	0.00122	<0.00010	0.165	<0.0020	75.5	4.08	2.75	0.987	0.000123	<0.000010	356	0.0499	<0.0050	0.213	<0.00050	<10	0.293	<0.010	16.6	0.055		0.473
QU1011S	Ex-situ 2-North shallow groundwater well. Measures water quality & hydraulic gradient in Forjian Fault (Fractured sandstone).	Average	**ND - Statistical summary for monitoring year was outside of sampling date. Sample was collected March 2013.**																										
		Count																											
		Minimum																											
		Maximum																											
		Geometric Mean																											
		Count <DL																											
		Standard Deviation																											
		1st Quartile																											
		Median																											
		3rd Quartile																											

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 56
2016-2017 Annual Report

2013 -14 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
QU1105S	Ex-situ River Barrier Pillar (RBP) shallow groundwater well. Monitors water quality & gradients above the RBP & 2-North Mine. (Sandstone)	Average	0.0574	0.0499	0.0394	0.00210	107.5	0.0000050	0.0000050	0.00025	0.000395	0.513	0.473	0.1216	0.1135	0.0000050	0.0000050	84.2	0.000250	0.000250	0.0000385	0.0000250	62.2	0.00150	0.00050	0.0092	0.025		0.0751
		Count	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2
		Minimum	0.0332	0.0306	0.0257	0.0019	95	<0.000010	<0.000010	<0.00050	<0.00020	0.348	0.294	0.0621	0.051	<0.000010	<0.000010	54.4	<0.00050	<0.00050	<0.000050	<0.000050	33.1	<0.0030	<0.0010	0.0066	<0.050		0.0572
		Maximum	0.0815	0.0692	0.0532	0.0023	120	<0.000010	<0.000010	<0.00050	0.00069	0.678	0.652	0.181	0.176	<0.000010	<0.000010	114	<0.00050	<0.00050	0.000052	<0.000050	91.3	<0.0030	<0.0010	0.0118	<0.050		0.093
		Geometric Mean	0.052	0.046	0.037	0.00210	106.8	0.0000050	0.0000050	0.00025	0.000263	0.486	0.438	0.106	0.0947	0.0000050	0.0000050	78.8	0.000250	0.000250	0.0000361	0.0000250	55	0.00150	0.00050	0.0088	0.025		0.0729
		Count <DL	0	0	0	0	0	2	2	2	1	0	0	0	0	2	2	0	2	2	1	2	0	2	2	0	2		0
		Standard Deviation	0.0342	0.0273	0.019	0.00030	17.7	0.0000000	0.0000000	0.00000	0.000417	0.233	0.253	0.0841	0.0884	0.0000000	0.0000000	42.1	0.000000	0.000000	0.000019	0.0000000	41.2	0.00000	0.00000	0.0037	0.000		0.025
		1st Quartile	0.0453	0.0402	0.0326	0.002	101.2	<0.000010	<0.000010	<0.00050	0.000248	0.430	0.384	0.0918	0.0822	<0.000010	<0.000010	69.3	<0.00050	<0.00050	0.0000318	<0.000050	47.6	<0.0030	<0.0010	0.0079	<0.050		0.0662
		Median	0.0574	0.0499	0.0394	0.0021	107.5	<0.000010	<0.000010	<0.00050	0.000395	0.513	0.473	0.1216	0.1135	<0.000010	<0.000010	84.2	<0.00050	<0.00050	0.0000385	<0.000050	62.2	<0.0030	<0.0010	0.0092	<0.050		0.0751
		3rd Quartile	0.0694	0.0595	0.0463	0.0022	113.8	<0.000010	<0.000010	<0.00050	0.000542	0.596	0.562	0.1513	0.1448	<0.000010	<0.000010	99.1	<0.00050	<0.00050	0.0000452	<0.000050	76.8	<0.0030	<0.0010	0.0105	<0.050		0.084
QU1109S	Ex-situ River Barrier Pillar (RBP) shallow groundwater well. Monitors water quality & gradients above the RBP & 2-North Mine. (Sandstone)	Average	0.157	0.137	56.0	0.30898	128	0.000335	0.0000160	0.0305	0.00046	24	0.1200	0.673	0.01093	0.0000624	0.0000050	11.23	0.0098	0.0008	0.0819	0.000369	25.3	0.0952	0.0016	0.727	0.062		0.199
		Count	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		5
		Minimum	0.141	0.114	31.9	<0.0020	117	0.000147	<0.000020	0.0156	<0.00040	13.4	0.015	0.328	0.00788	<0.000010	<0.000010	8.33	0.0053	<0.0010	0.0391	<0.00010	11.2	0.0475	<0.0020	0.38	<0.050		0.123
		Maximum	0.175	0.149	101	1.47	136	0.000757	<0.000050	0.0609	0.0012	43.4	0.488	1.38	0.0148	0.00019	<0.000010	14.1	0.0183	<0.0025	0.189	0.00157	49	0.2	<0.0050	1.58	0.078		0.309
		Geometric Mean	0.157	0.136	51.1	0.01597	127.8	0.00028	0.0000144	0.0271	0.000344	22.2	0.0450	0.569	0.01069	0.0000338	0.0000050	11.01	0.0089	0.00072	0.0691	0.00012	22.5	0.0824	0.00144	0.621	0.057		0.189
		Count <DL	0	0	0	2	0	0	5	0	4	0	0	0	0	2	5	0	0	5	0	4	0	0	5	0	1		0
		Standard Deviation	0.012	0.014	28.0	0.6496	8.5	0.000247	0.0000082	0.0181	0.00043	11.4	0.2060	0.46	0.00257	0.00007	0.0000000	2.49	0.0052	0.00041	0.061	0.000672	14.3	0.062	0.0008	0.505	0.021		0.072
		1st Quartile	0.151	0.131	37.6	<0.0050	121	0.000176	<0.000020	0.0198	<0.00040	19.8	0.016	0.358	0.00985	<0.000050	<0.000010	9.04	0.0064	<0.0010	0.0473	<0.00010	18	0.0536	<0.0020	0.432	0.064		0.154
		Median	0.159	0.143	44.8	0.0042	132	0.000267	<0.000020	0.0235	<0.00040	20.7	0.031	0.417	0.0104	0.00003	<0.000010	11.7	0.0079	<0.0010	0.0643	<0.00010	22.3	0.0731	<0.0020	0.445	0.067		0.182
		3rd Quartile	0.159	0.146	64.5	0.0672	134	0.000328	<0.000050	0.0329	<0.0010	22.5	0.049	0.88	0.0117	0.000062	<0.000010	13	0.0112	<0.0025	0.07	<0.00025	26.1	0.102	<0.0050	0.8	0.074		0.227
7SQR		Average	0.00032	0.00025	0.0464	0.0121	33.9	0.00000676	0.00000505	0.00072	0.00055	0.1552	0.0510	0.0078	0.00221	0.00033432	0.0003343	34.9	0.00053	0.00050	0.000105	0.000100	24.2	0.0025	0.0025				
E292113		Count	21	21	21	21	17	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21				
		Minimum	0.00014	0.00013	0.0206	0.0057	25.6	<0.0000050	<0.0000050	0.00044	0.00044	0.0584	0.0217	0.0031	<0.0010	<0.0000020	<0.0000020	19.1	<0.0010	<0.0010	<0.00020	<0.00020	13.4	<0.0050	<0.0050				
		Maximum	0.00044	0.00034	0.103	0.029	42.9	0.00005	0.000026	0.00099	0.00092	0.265	0.0768	0.016	0.0041	<0.010	<0.010	43.5	0.0011	<0.0010	0.00021	<0.00020	41.2	<0.0050	<0.0050				
		Geometric Mean	0.0003	0.00024	0.0413	0.0114	33.5	0.00000457	0.00000354	0.00071	0.00054	0.1449	0.0476	0.0072	0.00176	0.00000308	0.00000312	34.3	0.00052	0.00050	0.000104	0.000100	23.4	0.0025	0.0025				
		Count <DL	0	0	0	0	0	16	16	0	0	0	0	0	5	20	19	0	20	21	20	21	0	21	21				
		Standard Deviation	0.0001	0.00006	0.024	0.0047	5.8	0.00001032	0.00000609	0.00013	0.00011	0.056	0.0177	0.0033	0.00124	0.00111024	0.00111025	5.9	0.00013	0.00000	0.000024	0.000000	6.6	0	0				
		1st Quartile	0.00028	0.00022	0.0276	0.0106	28.9	<0.0000050	<0.0000050	0.00063	0.00048	0.13	0.0324	0.0054	0.0013	<0.0000020	<0.0000020	32.3	<0.0010	<0.0010	<0.00020	<0.00020	20	<0.0050	<0.0050				
		Median	0.00034	0.00027	0.0362	0.0116	32.8	<0.000010	<0.0000050	0.00069	0.00053	0.147	0.0557	0.0071	0.0025	<0.0000020	<0.0000020	36.6	<0.0010	<0.0010	<0.00020	<0.00020	23	<0.0050	<0.0050				
		3rd Quartile	0.00038	0.00029	0.0565	0.0122	40.4	<0.000010	<0.0000050	0.0008	0.00059	0.195	0.0648	0.0096	0.0029	<0.0000020	<0.0000020	38.5	<0.0010	<0.0010	<0.00020	<0.00020	29.20	<0.0050	<0.0050				
LQL1	Lower Quinsam Lake 1 metre below surface	Average	0.00060	0.00052	0.0259	0.0165	32.3	0.00000517	0.00000283	0.00080	0.00062	0.1210	0.0638	0.0137	0.00609	0.00006862	0.00006787	33.7	0.00053	0.00050	0.000107	0.000100	16.10	0.00267	0.00250	0.00340		0.0100	
E292118		Count	15	15	15	15	8	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	4		2	
		Minimum	0.00045	0.00043	0.0108	0.0066	27.1	<0.0000050	<0.0000050	0.00059	0.00040	0.0716	0.0287	0.0045	<0.0010	<0.0000020	<0.0000020	25.1	<0.0010	<0.0010	<0.00020	<0.00020	9.51	<0.0050	<0.0050	<0.0050		<0.020	
		Maximum	0.00099	0.00061	0.0455	0.0311	39.5	0.0000100	0.0000050	0.00164	0.00119	0.262	0.153	0.0440	0.0277	<0.0020	<0.0020	39.2	<0.0020	<0.0010	<0.00040	<0.00020	23.9	<0.010	<0.0050	0.0061		<0.020	
		Geometric Mean	0.00059	0.00051	0.0230	0.0145	32.1	0.00000461	0.00000274	0.00077	0.00059	0.1094	0.0580	0.0099	0.00236	0.00000206	0.00000182	33.3	0.00052	0.00050	0.000105	0.000100	15.26	0.00262	0.00250	0.00312		0.0100	
		Count <DL	0	0	0	0	0	10	13	0	0	0	0	0	5	13	13	0	15	15	15	15	0	15	15	3		2	
		Standard Deviation	0.00013	0.00006	0.0123	0.0084	3.8	0.00000253	0.00000088	0.00029	0.00020	0.0624	0.0326	0.0128	0.00890	0.00025768	0.00025787	5.3	0.00013	0.00000	0.000026	0.000000	5.34	0.00065	4E-11	0.00180		0.0000	
		1st Quartile	0.00052	0.00048	0.0138	0.0097	30.1	<0.0000050	<0.0000050	0.00063	0.00049	0.0794	0.0436	0.0050	<0.0010	<0.0000020	<0.0000020	28.0	<0.0010	<0.0010	<0.00020	<0.00020	11.15	<0.0050	<0.0050	<0.0050		<0.020	
		Median	0.00060	0.00053	0.0240	0.0138	32.0	<0.000010	<0.0000050	0.00067	0.00056	0.0874	0.0515	0.0077	0.0022	<0.0000020	<0.0000020	36.1	<0.0010	<0.0010	<0.00020	<0.00020	15.9	<0.0050	<0.0050	<0.0050		<0.020	
		3rd Quartile	0.00063	0.00054	0.0357	0.0250	33.8	0.00000650	<0.0000050	0.00081	0.00066	0.1425	0.0710	0.0199	0.00665	<0.0000020	<0.0000020	38.2	<0.0010	<0.0010	<0.00020	<0.00020	22.15	<0.0050	<0.0050	0.00340		<0.020	
LQLB	LQLB 1 metre from Bottom	Average	0.00137	0.00053	0.0352	0.0127	32.9	0.00000860	0.00000566	0.00071	0.00051	1.603	0.1752	0.4051	0.20672	0.00006807	0.00006820	32.9	0.00053	0.00050	0.000133	0.000100	11.04	0.00267	0.00250	0.00460		0.0170	
E292118		Count	15	15	15	15	8	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	4		2	
		Minimum	0.00048	0.00035	0.0174	0.0032	28.4	0.0000050	<0.0000050	0.00048	0.00036	0.125	0.0494	0.0111	<0.0010	<0.0000020	<0.0000020	27.8	<0.0010	<0.0010	<0.00020	<0.00020	7.43	<0.0050	<0.0050	<0.0050		<0.020	
		Maximum	0.00376	0.00081	0.0814	0.0294	38.4	0.000015	0.0000120	0.00104	0.00072	6.30	0.544	1.06	0.934	<0.0020	<0.0020	39.4	<0.0020	<0.0010	0.00049	<0.00020	14.4	<0.010	<0.0050	0.0068		0.024	
		Geometric Mean	0.00105	0.00052	0.0322	0.0101	32.8	0.00000786	0.00000470	0.00069	0.00050	0.720	0.1373	0.1570	0.06234	0.00000182	0.00000207	32.7	0.00052	0.00050	0.000116	0.000100	10.84	0.00262	0.00250	0.00409		0.0155	
		Count <DL	0	0	0	0	0	3	7	0	0	0	0	0	1	14	12	0	15	15	14	15	0	15	15	2		1	
		Standard Deviation	0.00111	0.00014	0.0169	0.0084	3.8	0.00000374	0.00000346	0.00014	0.00011	1.969	0.1434	0.4252	0.26156	0.00025782	0.00025778	3.7	0.00013	0.00000	0.000102	0.000000	2.13	0.00065	4E-11	0.00243		0.0099	
		1st Quartile	0.00053	0.00044	0.0250	0.0052	29.9	0.0000050	<0.0000050	0.00064	0.00042	0.208	0.0824	0.0412	0.02060	<0.0000020	<0.0000020	29.8	<0.0010	<0.0010	<0.00020	<0.00020	9.50	<0.0050	<0.0050	<0.0050		0.0135	
		Median	0.00098	0.00048	0.0319	0.0113	32.2	0.0000080	0.0000060	0.00068	0.00051	0.833	0.135	0.181	0.0515	<0.0000020	<0.0000020	33.4	<0.0010	<0.0010	<0.00020	<0.00020	11.4	<0.0050	<0.0050	0.00455		0.0170	
		3rd Quartile	0.00167	0.00062	0.0378	0.0166	36.4	0.00001150	0.00000800	0.00072	0.00056	2.245	0.1800	0.7830	0.34850	<0.0000020	0.00000205	35.7	<0.0010	<0.0010	<0.00020	<0.00020	12.35	<0.0050	<0.0050	0.00665		0.0205	

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 57
2016-2017 Annual Report

2014-15 Statistics Stn.Code / EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
WA			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E0126402	Middle Quinsam Lake Inlet - Quinsam River at Argonaut Road upstream of mining operation.	Average	0.000138	0.000146	0.0253	0.0177	21.6	0.0000074	0.0000034	0.000911	0.00079	0.024	0.01258	0.0015	0.00050	0.0000012	0.0000013	21.5	0.0005	0.00050	0.000100	0.000118	1.024	0.02818	0.00276				
		Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15				
		Minimum	<0.00010	<0.00010	0.0142	0.009	14.3	<0.000005	<0.000005	<0.00050	0.0005	0.01	<0.0050	<0.0010	<0.0010	<0.000002	<0.000002	15.5	<0.0010	<0.0010	<0.00020	<0.00020	<0.50	<0.0050	<0.0050				
		Maximum	0.00031	0.00025	0.0816	0.0592	26	0.000042	0.000008	0.00366	0.00149	0.051	0.0338	0.0054	<0.0010	0.0000028	0.0000031	27.1	<0.0010	<0.0010	<0.00020	0.00037	2.2	0.384	0.0064				
		Geometric Mean	0.00012	0.000135	0.0221	0.0157	21.5	0.00000549	0.00000307	0.000759	0.00076	0.022	0.01015	0.00114	0.0005	0.00000113	0.00000116	21.3	0.0005	0.00050	0.000100	0.000109	0.832	0.00372	0.00266				
		Count <DL	4	2	0	0	0	12	12	1	0	0	2	6	15	13	13	0	15	15	15	14	3	13	14				
		Standard Deviation	0.00007	0.000052	0.0174	0.012	2.5	0.00000966	0.0000019	0.00079	0.00025	0.011	0.00824	0.00127	0	0.00000054	0.00000072	3.2	0	0.00000	0.000000	0.000070	0.602	0.09844	0.00101				
		1st Quartile	0.00008	0.000125	0.0158	0.0126	20.8	<0.000010	<0.000005	0.000625	0.00068	0.014	0.0079	<0.0010	<0.0010	<0.000002	<0.000002	20.3	<0.0010	<0.0010	<0.00020	<0.00020	0.585	<0.0050	<0.0050				
		Median	0.00015	0.00016	0.0188	0.0137	21.7	<0.00001	<0.000005	0.00072	0.00071	0.024	0.0109	0.0016	<0.0010	<0.000002	<0.000002	21.6	<0.0010	<0.0010	<0.00020	<0.00020	0.97	<0.0050	<0.0050				
		3rd Quartile	0.00017	0.00017	0.0262	0.0186	23	<0.00001	<0.000005	0.00081	0.00086	0.03	0.01465	0.0019	<0.0010	<0.0000020	<0.000002	23.2	<0.0010	<0.0010	<0.00020	<0.00020	1.27	<0.0050	<0.0050				
WD	Settling Pond #4	Average	0.00230	0.0016	0.0206	0.00502	343	0.0000085	0.00000688	0.000921	0.00077	0.305	0.01506	0.0562	0.04518	0.00000151	0.00000136	366	0.00117	0.00106	0.000100	0.000100	603	0.05163	0.00278	0.0057		0.01	0.034
E207409		Count	10	10	10	10	17	10	10	10	10	10	10	10	10	9	9	10	10	10	10	10	54	10	10	1		1	1
		Minimum	0.00105	0.00093	0.0063	<0.0030	214	<0.00001	<0.0000050	<0.00050	0.00027	0.053	<0.0050	0.0077	<0.0010	<0.000002	<0.000002	234	<0.0010	<0.0010	<0.00020	<0.00020	320	<0.0050	<0.0050	0.0057		<0.020	0.034
		Maximum	0.00532	0.00316	0.0469	0.0112	418	0.000023	0.0000154	0.00187	0.00135	0.996	0.0286	0.158	0.159	0.0000044	0.0000042	471	0.0024	0.0022	<0.00020	<0.00020	978	0.298	0.0053	0.0057		<0.020	0.034
		Geometric Mean	0.00197	0.00149	0.0164	0.00428	340	0.0000071	0.0000057	0.000749	0.00069	0.167	0.01252	0.035	0.01146	0.00000129	0.00000117	360	0.0010	0.0009	0.000100	0.000100	587	0.00698	0.00270	0.0057		0.01	0.034
		Count <DL	0	0	0	2	0	7	3	2	0	0	1	0	2	7	8	0	3	4	10	10	0	7	9	0		1	0
		Standard Deviation	0.00144	0.00068	0.0147	0.00281	47	0.0000062	0.0000421	0.000577	0.00036	0.364	0.00823	0.0576	0.06051	0.00000115	0.0000011	66	0.00059	0.00058	0.000000	0.000000	139	0.10515	0.00089	0		0.0000	0
		1st Quartile	0.00133	0.00107	0.0098	0.00385	323	<0.000010	0.0000032	0.000585	0.0005	0.069	0.0104	0.0177	0.00318	<0.0000020	<0.0000020	340	0.00065	<0.0010	<0.00020	<0.00020	524	<0.0050	<0.0050	0.0057		<0.020	0.03400
		Median	0.00167	0.00147	0.0157	0.00495	352	<0.000010	0.0000575	0.00075	0.00068	0.112	0.01515	0.0304	0.01935	<0.000002	<0.000002	380	0.0012	0.0011	<0.00020	<0.00020	596	<0.0050	<0.0050	0.0057		<0.020	0.034
		3rd Quartile	0.00324	0.00191	0.0294	0.0056	377	0.000011	0.00000962	0.00129	0.00102	0.416	0.01778	0.0739	0.059	<0.000002	<0.000002	400	0.00145	0.00127	<0.00020	<0.00020	684	0.00648	<0.0050	0.0057		<0.020	0.03400
MW001D	Exsitu 2-North deep groundwater well below the coal wash plant (Till)	Average		0.0192		0.0322	89.8		0.0000038		0.0026		0.0038		0.00134		0.0000048	21.8		0.00051		0.0000625	28.2		0.0015		0.154		
		Count		2		2	2		2		2		2		2		2	1		2		2	2		2		2		
		Minimum		0.0189		0.0301	86.8		<0.000005		0.00255		<0.0050		0.0011		0.0000045	21.8		<0.0010		<0.000050	27.9		<0.0010		0.151		
		Maximum		0.0195		0.0342	92.8		<0.000010		0.00266		<0.010		0.00158		<0.000010	21.8		0.00052		<0.00020	28.5		<0.0050		0.156		
		Geometric Mean		0.0192		0.0321	89.7		0.0000035		0.0026		0.00354		0.00132		0.0000047	21.8		0.00051		0.00005	28.2		0.00112		0.153		
		Count <DL		0		0	0		2		0		2		0		1	0		1		2	0		2		0		
		Standard Deviation		0.0004		0.0029	4.2		0.0000018		0.00008		0.00177		0.000340		0.0000004	0		0.000014		0.000053	0.4		0.00141		0.004		
		1st Quartile		0.019		0.0311	88.3		0.0000031		0.00258		0.00312		0.00122		0.00000463	21.8		0.000505		0.0000438	28		0.001		0.152		
		Median		0.0192		0.0322	89.8		0.0000038		0.0026		0.0038		0.00134		0.00000475	21.8		0.00051		0.0000625	28.2		0.0015		0.154		
		3rd Quartile		0.0194		0.0332	91.3		0.0000044		0.00263		0.00438		0.00146		0.00000488	21.8		0.000515		0.0000813	28.4		0.002		0.155		
MW001S	Exsitu 2-North shallow groundwater well below the coal wash plant (Till)	Average	0.0001	0.000185	0.00500	0.001	337	0.000041	0.000088	0.00025	0.00044	0.2860	0.139	1.03	1.928	0.0000050	0.0000038	1100	0.00095	0.00166	0.000025	0.0000625	903	0.0015	0.00185	0.03870	0.01465		0.0306
		Count	1	2	1	2	2	1	2	1	2	1	2	1	2	1	2	1	1	2	1	2	2	1	2	1	2		1
		Minimum	0.0001	<0.00010	0.005	<0.0010	308	0.000041	0.000048	<0.00050	0.00038	0.286	0.101	1.03	0.966	<0.000010	0.0000026	1100	0.00095	0.00093	<0.000050	<0.000050	839	<0.0030	0.0012	0.0387	0.0043		0.0306
		Maximum	0.0001	0.00032	0.005	<0.0030	366	0.000041	0.000129	<0.00050	0.00049	0.286	0.177	1.030	2.89	<0.000010	<0.000010	1100	0.00095	0.0024	<0.000050	<0.00020	967	<0.0030	<0.0050	0.0387	<0.050		0.0306
		Geometric Mean	0.0001	0.00013	0.005	0.00087	335.7	0.000041	0.000079	0.000250	0.00043	0.286	0.134	1.03	1.671	0.0000050	0.0000036	1100	0.00095	0.00149	0.000025	0.0000500	900	0.0015	0.00173	0.0387	0.01037		0.0306
		Count <DL	0	1	0	2	0	0	0	1	0	0	0	0	0	1	1	0	0	0	1	2	0	1	1	0	1		0
		Standard Deviation	0	0.000191	0	0.00071	41	0	0.000057	0	0.00008	0	0.054	0	1.36	0.0000000	0.0000017	0	0	0.00104	0	0.0000530	90	0	0.00092	0	0.01464		0.0000
		1st Quartile	0.0001	0.000118	0.005	0.00075	322.5	0.000041	0.000068	<0.00050	0.00041	0.2860	0.12	1.03	1.447	<0.000010	0.0000032	1100	0.00095	0.0013	<0.000050	0.0000438	871	<0.0030	0.00152	0.03870	0.00948		0.0306
		Median	0.0001	0.000185	0.00500	0.001	337	0.000041	0.000088	<0.00050	0.00044	0.2860	0.139	1.03	1.928	<0.000010	0.0000038	1100	0.00095	0.00166	<0.000050	0.0000625	903	<0.0030	0.00185	0.03870	0.01465		0.0306
			0.0001	0.000252	0.00500	0.00125	351.5	0.000041	0.000109	<0.00050	0.00046	0.2860	0.158	1.03	2.409	<0.000010	0.0000044	1100	0.00095	0.00203	<0.000050	0.0000813	935	<0.0030	0.00217	0.03870	0.01983		0.0306
MW006D	Exsitu 2-North deep groundwater well below the coal wash plant (Till)	Average	0.0288	0.0296	0.0243	0.0186	85.9	0.0000050	0.0000105	0.00087	0.00069	0.005	0.0050	0.00077	0.000302	0.0000050	0.0000050	48.4	0.000250	0.000250	0.000097	0.0000250	12.4	0.0015	0.00125	0.159	0.172		0.0053
		Count	1	2	1	2	2	1	2	1	2	1	2	1	2	1	2	1	2	2	1	2	2	1	2	1	2		1
		Minimum	0.0288	0.0287	0.0243	0.0176	85	<0.000010	<0.000010	0.00087	0.00059	<0.010	<0.010	0.00077	0.000254	<0.000010	<0.000010	48.1	<0.00050	<0.00050	0.000097	<0.000050	12.1	<0.0030	<0.0010	0.159	0.171		0.0053
		Maximum	0.0288	0.0306	0.0243	0.0196	86.8	<0.000010	0.000016	0.00087	0.00079	<0.010	<0.010	0.00077	0.000349	<0.000010	<0.000010	48.7	<0.00050	<0.00050	0.000097	<0.000050	12.8	<0.0030	0.002	0.159	0.173		0.0053
		Geometric Mean	0.0288	0.0296	0.0243	0.0186	85.9	0.000005	0.0000089	0.00087	0.00068	0.005	0.005	0.00077	0.000298	0.0000050	0.0000050	48.4	0.000250	0.000250	0.000097	0.0000250	12.4	0.0015	0.001	0.159	0.172		0.0053
		Count <DL	0	0	0	0	0	1	1	0	0	1	2	0	0	1	2	0	1	2	0	2	0	1	1	0	0		0
		Standard Deviation	0	0.0013	0.0000	0.0014	1.3	0	0.0000078	0	0.00014	0	0	0	0.000067	0.0000000	0.0000000	0.4	0.000000	0.000000	0.000000	0.0000000	0.5	0	0.00106	0	0.001		0.0000
		1st Quartile	0.0288	0.0292	0.0243	0.0181	85.4	<0.000010	0.0000078	0.00087	0.00064	<0.010	<0.010	0.00077	0.000278	<0.000010	<0.000010	48.2	<0.00050	<0.00050	0.000097	<0.000050	12.3	<0.0030	0.00088	0.159	0.172		0.0053
		Median	0.0288	0.0296	0.0243	0.0186	85.9	<0.000010	0.0000105	0.00087	0.00069	<0.010	<0.010	0.00077	0.000302	<0.000010	<0.000010	48.4	<0.00050	<0.00050	0.000097	<0.000050	12.4	<0.0030	0.00125	0.159	0.172		0.0053
		3rd Quartile	0.0288	0.0301	0.0243	0.0191	86.4	<0.000010	0.0000132	0.00087	0.00074	<0.010	<0.010	0.00077	0.000325	<0.000010	<0.000010	48.6	<0.00050	<0.00050	0.000097	<0.000050	12.6	<0.0030	0.00163	0.159	0.172		0.0053
MW006S	Exsitu 2-North shallow groundwater well below the coal wash plant (Till)	Average	0.00204	0.00197	0.0591	0.00180	232.0	0.00003	0.000022	0.00176	0.00093	0.11	0.0050	0.0927	0.019	0.0000050	0.0000050	529	0.00113	0.00076	0.000122	0.000025	827.0	0.0031	0.00090	0.1490	0.038		0.233
		Count	1	2	1	2	2	1	2	1	2	1	2	1	2	1	2	2	1	2	1	2	2	1	2	1	2		1
		Minimum	0.00204	0.00133	0.0591	0.0015	192	0.00003	0.000018	0.00176	0.00092	0.11	<0.010	0.0927	0.0173	<0.000010	<0.000010	477	0.00113	0.00075	0.000122	<0.000050	699	0.0031	<0.0010	0.149	<0.050		0.233
		Maximum	0.00204	0.00261	0.0591	0.0021	272	0.00003	0.000027	0.00176	0.00094	0.11	<0.010	0.0927	0.0207	<0.000010	<0.000010	581	0.00113	0.00076	0.000122	<0.000050	955	0.0031	0.0013	0.149	0.051		0.2330
		Geometric Mean	0.00204	0.00186	0.0591	0.0018	228.5	0.00003	0.000022	0.00176	0.00093	0.11	0.005	0.0927	0.0189	0.0000050	0.0000050	526	0.00113	0.00075	0.000122	0.0000250	817.0	0.0031	0.00081	0.149	0.0357		0.233
		Count <DL	0	0	0	0	0	0	0	0	0	0	2	0	0	1	2	0	0	0	0	2	0	0	1	0	1		0
		Standard Deviation	0	0.00091	0	0.0004	56.6	0	0.000006	0	0.000010	0	0	0	0.0024	0.0000000	0.0000000	73	0	0.00001	0	0.0000000	181	0	0.00057	0	0.0184		0
		1st Quartile	0.00204	0.00165	0.0591	0.00160	212	0.00003	0.00002	0.00176	0.00092	0.11	<0.010	0.0927	0.0182	<0.000010	<0.000010	503	0.00113	0.00075	0.000122	<0.000050	763	0.0031	0.00070	0.149	0.0315		0.233
		Median	0.00204	0.00197	0.0591	0.00180	232	0.00003	0.000022	0.00176	0.00093	0.11	<0.010	0.0927	0.019	<0.000010	<0.000010	529	0.00113	0.00076	0.000122	<0.000050	827.0	0.0031	0.00090	0.1490	0.038		0.233
		3rd Quartile	0.00204	0.00229	0.0591	0.00200	252	0.00003	0.000025	0.00176	0.00094	0.11	<0.010	0.0927	0.0198	<0.000010	<0.000010	555	0.00113	0.00076	0.000122	<0.000050	891	0.0031	0.00110	0.149	0.0445		0.233
WC	2-North Pit Culvert discharge into Middle Quinsam Lake	Average	0.00125	0.00114	0.2207	0.0076	335	0.0000047	0.0000025	0.000524	0.00059	0.087	0.0233	0.0104	0.00489	0.00000149	0.00000141	283	0.00081	0.0005	0.000100	0.000100	558	0.00392	0.00250				
E207411		Count	8	8	8	8	5	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	13	8	8				
		Minimum	0.00079	0.00074	0.0113	<0.0030	243	<0.00005	<0.000005	<0.00050	0.00028	0.034	0.0082	0.0037	<0.0010	<0.000002	<0.000002	203	<0.0010	<0.0010	<0.00020	<0.00020	376	<0.0050	<0.0050				
		Maximum	0.00185	0.00151	1.67	0.0126	379	<0.00001	<0.000005	0.0009	0.00088	0.231	0.0567	0.0206	0.0112	0.0000049	0.0000043	354	0.0017	<0.0010	<0.00020	<0.00020	755	0.0103	<0.0050				
		Geometric Mean	0.00122	0.00111	0.0245	0.00647	331	0.0000046	0.0000025	0.00046	0.00055	0.0700	0.0186	0.0094	0.00298	0.00000122	0.0000012	278	0.00072	0.0005	0.000100	0.000100	551	0.00334	0.0025				
		Count <DL	0	0	0	1	0	8	8	3	0	0	0	0	2	7	7	0	5	8	8	8	0	6	8				
		Standard Deviation	0.00033	0.00027	0.5856	0.00382	53	0.0000009	0.0000000	0.000267	0.00023	0.068	0.0174	0.005	0.00409	0.00000138	0.00000117	55	0.00047	0	0.000000	0.000000	92	0.00287	3E-11				
		1st Quartile	0.00107	0.00098	0.0113	0.00578	344	<0.000010	<0.000005	<0.00050	0.000390	0.048	0.01080	0.0082	0.002	<0.0000020	<0.0000020	249	<0.0010	<0.0010	<0.00020	<0.00020	543	<0.0050	<0.0050				
		Median	0.00118	0.0011	0.0131	0.0071	347	<0.000010	<0.0000050	0.000515	0.0006	0.058	0.0148	0.0087	0.0038	<0.000002	<0.000002	271	<0.0010	<0.0010	<0.00020	<0.00020	563	<0.0050	<0.0050				
		3rd Quartile	0.0014	0.00129	0.0176	0.0101	364	<0.00001	<0.000005	0.000698	0.000790	0.0990	0.0342	0.0125	0.00792	<0.000002	<0.000002	327	0.00108	<0.0010	<0.00020	<0.00020	600	0.0034	<0.0050				
MQL1	Middle Quinsam Lake 1 metre below surface	Average	0.00023	0.0001810	0.01932	0.0146	35.8	0.0000035	0.00000273	0.00073	0.00074	0.045	0.0195	0.0074	0.00237	0.00000115	0.00000131	34.9	0.0005	0.0005	0.0001	0.000107	26.16	0.00536	0.0025	0.0034		0.0100	
E206618		Count	15	15	15	15	3	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	3		1	
		Minimum	0.00012	<0.00010	0.0070	0.0046	31.7	<0.0000050	<0.000005	<0.00050	0.00047	0.026	0.0051	0.0036	<0.0010	<0.0000020	<0.0000020	25.3	<0.0010	<0.0010	<0.00020	<0.00020	9.57	<0.0050	<0.0050	<0.0050		<0.020	
		Maximum	0.00051	0.0003	0.0718	0.0285	41.7	<0.00001	0.000006	0.00245	0.0012	0.097	0.0299	0.0193	0.0101	0.0000033	0.0000038	42.2	<0.0010	<0.0010	<0.00020	0.00021	41.8	0.0454	<0.0050	0.0051		<0.020	
		Geometric Mean	0.0002	0.000169	0.01648	0.0135	35.6	0.0000033	0.00000265	0.000632	0.00072	0.042	0.0181	0.0066	0.00139	0.00000108	0.00000117	34.5	0.0005	0.0005	0.0001	0.00010500	23.24	0.00303	0.0025	0.00321		0.01	
		Count <DL	0	1	1	0	0	15	14	2	0	0	0	0	7	14	13	0	15	15	15	14	0	14	15	1		1	
		Standard Deviation	0.00011	0.00006	0.0153	0.0057	5.2	0.00000127	0.0000009	0.000507	0.00019	0.018	0.0065	0.004	0.00265	0.00000059	0.00000084	5.1	0	0	0	0.000028	11.34	0.01108	4E-11	0.00147		0	
		1st Quartile	0.00014	0.00015	0.01245	0.0108	32.9	<0.000005	<0.000005	0.00057	0.000620	0.032	0.0154	0.0046	<0.0010	<0.000002	<0.000002	32	<0.0010	<0.0010	<0.00020	<0.00020	17.65	<0.0050	<0.0050	0.00255		<0.020	
		Median	0.00022	0.0001700	0.0148	0.0144	34.1	<0.000005	<0.000005	0.000620	0.00074	0.043	0.0206	0.0069	0.00180	<0.000002	<0.000002	36.5	<0.0010	<0.0010	<0.00020	<0.00020	28.60	<0.0050	<0.0050	0.0026		<0.020	
		3rd Quartile	0.00024	0.000225	0.01995	0.0176	37.9	<0.00001	<0.000005	0.00072	0.00086	0.052	0.0242	0.0084	0.00310	<0.000002	<0.0000020	38	<0.0010	<0.0010	<0.00020	<0.00020	32.55	<0.0050	<0.0050	0.00385		<0.020	
MQLB	Middle Quinsam Lake 1 metre from bottom	Average	0.000128	0.000151	0.0099	0.00773	42	0.00000517	0.0000025	0.000769	0.00062	0.047	0.0127	0.0745	0.05463	0.00000129	0.00000126	109.3	0.0005	0.0005	0.000124	0.0001	112.1	0.002500	0.0025	0.00293		0.0290	
E206618		Count	15	15	15	15	3	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	3		1	
		Minimum	<0.00010	<0.00010	0.0035	<0.0030	30.5	<0.000005	<0.0000050	<0.00050	0.00041	0.0210	<0.0050	0.0056	<0.0010	<0.0000020	<0.0000020	25.4	<0.0010	<0.0010	<0.00020	<0.00020	10	<0.0050	<0.0050	<0.0050		0.029	
		Maximum	0.00019	0.00039	0.0252	0.0198	48.2	0.000025	<0.0000050	0.00524	0.00118	0.081	0.0316	0.234	0.219	0.0000034	0.0000032	192	<0.0010	<0.0010	0.00046	<0.00020	195	<0.0050	<0.0050	0.0036		0.029	
		Geometric Mean	0.00012	0.000137	0.0079	0.00571	41.1	0.00000403	0.0000025	0.000476	0.000600	0.044	0.00945	0.0338	0.01611	0.00000116	0.00000115	85.9	0.0005	0.0005	0.000111	0.0001	69.8	0.0025	0.0025	0.00290		0.029	
		Count <DL	2	1	0	2	0	14	15	7	0	0	3	0	2	13	13	0	15	15	14	15	0	15	15	1		0	
		Standard Deviation	0.00004	0.000076	0.0076	0.00624	9.9	0.00000563	1E-13	0.001255	0.00018	0.017	0.00949	0.0881	0.07345	0.00000076	0.00000069	62.9	0	0	0.000093	0.00000000	74.9	4E-11	4E-11	0.00059		0	
		1st Quartile	0.000115	0.00012	0.0046	0.00410	38.8	<0.000005	<0.000005	<0.00050	0.00048	0.032	0.0072	0.015	0.0047	<0.000002	<0.000002	34	<0.0010	<0.0010	<0.00020	<0.00020	21	<0.0050	<0.0050	0.0026		0.029	
		Median	0.00013	0.0001300	0.0064	0.0047	47.2	<0.000010	<0.000005	0.00051	0.000590	0.048	0.0098	0.024	0.0209	<0.000002	<0.000002	128.0	<0.0010	<0.0010	<0.00020	<0.00020	140	<0.0050	<0.0050	0.0027		0.029	
		3rd Quartile	0.00015	0.00016	0.0132	0.0112	47.7	<0.00001	<0.0000050	0.00068	0.00068	0.057	0.0188	0.1445	0.0804	<0.0000020	<0.0000020	164.5	<0.0010	<0.0010	<0.00020	<0.00020	179.5	<0.0050	<0.0050	0.00315		0.029	

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 58
2016-2017 Annual Report

2014-15 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
NNL1			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E217018		Average	0.00032	0.000290	0.0321	0.0244	13.44	0.0000045	0.00000267	0.000850	0.00064	0.078	0.0389	0.0077	0.00355	0.00000113	0.00000145	15.7	0.00055	0.0005	0.0001	0.0001	1.657	0.00267	0.0025	0.00715		0.029	
		Count	15	15	15	15	5	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	4		1	
		Minimum	0.0002	0.00017	0.0089	0.0057	9.89	<0.000005	<0.0000050	<0.00050	0.00033	0.04	0.0202	0.0041	<0.0010	<0.0000020	<0.0000020	12.8	<0.0010	<0.0010	<0.00020	<0.00020	<0.50	<0.0050	<0.0050	<0.0050		0.029	
		Maximum	0.00041	0.00038	0.0661	0.0581	17.5	<0.000010	0.000005	0.00322	0.00098	0.217	0.0923	0.0325	0.0269	0.0000029	0.000005	18.3	0.0013	<0.0010	<0.00020	<0.00020	3.01	0.0051	<0.0050	0.0185		0.029	
	No Name Lake 1 metre below surface	Geometric Mean	0.00031	0.00028	0.0257	0.0197	13.14	0.00000435	0.00000262	0.00064	0.00061	0.071	0.0358	0.00650	0.00159	0.00000107	0.00000125	15.6	0.00053	0.0005	0.0001	0.0001	1.313	0.00262	0.0025	0.00504		0.029	
		Count <DL	0	0	0	0	0	15	14	4	0	0	0	0	6	14	12	0	14	15	15	15	2	14	15	1		0	
		Standard Deviation	0.000060	0.00007	0.0207	0.0169	3.2	0.00000104	0.00000065	0.000765	0.00017	0.044	0.0187	0.007	0.00664	0.00000049	0.00000109	2	0.00021	0	0.00000000	0	0.878	0.00067	4E-11	0.00761		0	
		1st Quartile	0.00028	0.00024	0.0126	0.0122	10.6	<0.00001	<0.000005	0.000375	0.00054	0.054	0.0278	0.0052	<0.0010	<0.000002	<0.000002	13.9	<0.0010	<0.0010	<0.00020	<0.00020	0.96	<0.0050	<0.0050	0.00295		0.029	
		Median	0.00033	0.000300	0.0282	0.0187	14.5	<0.000010	<0.000005	0.00061	0.00064	0.069	0.0327	0.00570	0.00160	<0.000002	<0.000002	15	<0.0010	<0.0010	<0.00020	<0.00020	1.94	<0.0050	<0.0050	0.0038		0.029	
		3rd Quartile	0.00036	0.00032	0.0468	0.0325	14.7	<0.00001	<0.000005	0.000995	0.00073	0.084	0.0448	0.0068	0.00315	<0.0000020	<0.000002	17.4	<0.0010	<0.0010	<0.00020	<0.00020	2.23	<0.0050	<0.0050	0.008		0.029	
NNLB		Average	0.00027	0.00022	0.0319	0.0226	14.3	0.00000433	0.0000025	0.00082	0.00063	0.151	0.069	0.0302	0.0204	0.00000138	0.000001	19.8	0.0005	0.0005	0.0001	0.0001	5.66	0.0025	0.002500	0.00425		0.057	
E217018		Count	15	15	15	15	5	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	4		1	
		Minimum	0.00022	0.00014	0.0208	0.0118	13.6	<0.000005	<0.0000050	<0.00050	0.00039	0.087	0.0376	0.0084	0.0027	<0.0000020	<0.0000020	13.8	<0.0010	<0.0010	<0.00020	<0.00020	0.61	<0.0050	<0.0050	<0.0050		0.057	
		Maximum	0.00034	0.0005	0.0635	0.0535	15.3	<0.000010	<0.0000050	0.00366	0.00096	0.265	0.106	0.0976	0.0836	0.0000055	<0.0000020	22.4	<0.0010	<0.0010	<0.00020	<0.00020	9.01	<0.0050	<0.0050	0.0057		0.057	
	No Name Lake 1 metre from bottom	Geometric Mean	0.00026	0.000210	0.0299	0.0208	14.3	0.00000416	0.0000025	0.000602	0.00061	0.143	0.0657	0.0231	0.0111	0.00000118	0.00000100	19.6	0.0005000	0.0005	0.0001	0.0001	4.41	0.0025	0.0025	0.00407		0.057	
		Count <DL	0	0	0	0	0	15	15	4	0	0	0	0	0	13	15	0	15	15	15	15	0	15	15	1		0	
		Standard Deviation	0.00003	0.00009	0.0134	0.0111	0.6	0.00000114	1E-13	0.000867	0.00017	0.054	0.0219	0.0272	0.0259	0.00000118	0.00000000	2.5	0	0.0000000	0	0	2.71	4E-11	0.000000	0.00133		0	
		1st Quartile	0.00024	0.00019	0.0238	0.0167	14	0.00000375	<0.000005	0.00038	0.00048	0.112	0.0524	0.0156	0.005	<0.000002	<0.000002	19	<0.0010	<0.0010	<0.00020	<0.00020	4.91	<0.0050	<0.0050	0.00377		0.057	
		Median	0.00026	0.0002	0.0268	0.0192	14.1	<0.000010	<0.0000050	0.000590	0.00063	0.147	0.0634	0.0191	0.0075	<0.000002	<0.0000020	20.7	<0.0010	<0.0010	<0.00020	<0.00020	6.73	<0.0050	<0.0050	0.0044		0.057	
		3rd Quartile	0.00028	0.00022	0.0307	0.023	14.5	<0.000010	<0.0000050	0.000770	0.00072	0.161	0.0862	0.024	0.0166	<0.000002	<0.0000020	21.4	<0.0010	<0.0010	<0.00020	<0.00020	7.25	<0.0050	<0.0050	0.00488		0.057	
NNO		Average	0.00031	0.00029	0.0388	0.0257	13.64	0.0000048	0.00000341	0.000625	0.0007	0.085	0.0448	0.0097	0.00368	0.0000017	0.0000017	15.6	0.0005	0.00050	0.000107	0.000107	2.07	0.0193	0.0025	0.00456	0.0049	0.029	0.0117
E217017		Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	8	8	8	8
		Minimum	0.00014	0.00017	0.0115	0.0075	9.85	<0.000005	<0.000005	<0.00050	0.00045	0.043	0.0179	0.0038	<0.0010	<0.000002	<0.000002	11.7	<0.0010	<0.0010	<0.00020	<0.00020	0.76	<0.0050	<0.0050	<0.0050	<0.0050	0.022	0.0061
		Maximum	0.00047	0.0005	0.08	0.0524	20.8	0.000010	0.0000078	0.00106	0.00129	0.214	0.0892	0.0286	0.0215	0.0000061	0.0000053	18.1	<0.0010	<0.0010	0.00021	0.00021	3.68	0.14	<0.0050	0.0071	0.0087	0.033	0.019
	No Name Lake Outlet	Geometric Mean	0.00029	0.00028	0.031	0.0210	13.31	0.0000046	0.00000307	0.000553	0.00067	0.078	0.0408	0.008	0.00171	0.00000136	0.00000136	15.4	0.0005	0.00050	0.000105	0.000105	1.91	0.00423	0.0025	0.00426	0.00426	0.029	0.011
		Count <DL	0	0	0	0	0	14	12	4	0	0	0	0	7	12	12	0	15	15	14	14	0	13	15	2	4	0	0
		Standard Deviation	0.0001	0.00009	0.0254	0.0163	3.36	0.0000018	0.00000192	0.000291	0.00021	0.0410	0.0201	0.0069	0.00541	0.0000016	0.00000154	2.4	0	0.00000	0.000028	0.000028	0.8	0.04455	4E-11	0.00171	0.00264	0.004	0.0043
		1st Quartile	0.00023	0.0002	0.0161	0.0128	11.4	<0.000010	<0.0000050	0.000375	0.00058	0.062	0.0306	0.005	<0.0010	<0.000002	<0.000002	13.6	<0.0010	<0.0010	<0.00020	<0.00020	1.5	<0.0050	<0.0050	0.00295	<0.0050	0.026	0.0079
		Median	0.00034	0.0003	0.0325	0.0204	12.5	<0.000010	<0.000005	0.00063	0.00067	0.079	0.0379	0.0067	0.0024	<0.000002	<0.000002	16.9	<0.0010	<0.0010	<0.00020	<0.00020	2.17	<0.0050	<0.0050	0.005	0.00455	0.032	0.0120
		3rd Quartile	0.00038	0.00036	0.0633	0.0386	15.1	<0.00001	<0.000005	0.00085	0.00078	0.088	0.0588	0.0114	0.0041	<0.000002	<0.000002	17.5	<0.0010	<0.0010	<0.00020	<0.00020	2.52	<0.0050	<0.0050	0.00538	0.00692	0.032	0.014
LLS		Average	0.00319	0.00163	0.0194	0.01219	210	0.00000540	0.00000448	0.000535	0.000402	1.018	0.04735	0.341	0.3277	0.0000012	0.0000011	549	0.00324	0.00305	0.000100	0.0001	518	0.00445	0.0025				
E292131		Count	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11				
		Minimum	0.00036	0.00031	<0.0030	<0.0030	104	<0.000005	<0.0000050	<0.00050	<0.00020	0.128	<0.0050	0.109	0.0948	<0.000002	<0.000002	306	<0.0010	<0.0010	<0.00020	<0.00020	251	<0.0050	<0.0050				
		Maximum	0.00978	0.00335	0.0746	0.0827	256	0.000014	0.0000143	0.00138	0.00137	3.72	0.472	0.638	0.634	0.0000028	0.0000024	780	0.0067	0.0063	<0.00020	<0.00020	755	0.021	<0.0050				
	Small Seep into Long Lake	Geometric Mean	0.00213	0.00135	0.0097	0.00414	204	0.0000048	0.00000368	0.000413	0.000303	0.653	0.00642	0.296	0.2749	0.0000011	0.00000108	524	0.00235	0.00226	0.000100	0.0001	486	0.00325	0.0025				
		Count <DL	0	0	1	5	0	10	7	7	2	0	5	0	0	10	10	0	2	2	11	11	0	9	11				
		Standard Deviation	0.00288	0.00095	0.02404	0.02437	44	0.000003	0.00000363	0.000435	0.00036	1.053	0.14087	0.182	0.1889	0.00000054	0.00000042	169	0.00221	0.002	0.000000	0.000000	179	0.00556	1E-10				
		1st Quartile	0.00108	0.00092	0.00385	<0.0030	194	<0.000010	<0.000005	<0.00050	0.00021	0.355	<0.0050	0.196	0.186	<0.000002	<0.0000020	416	0.00135	0.00125	<0.00020	<0.00020	367	<0.0050	<0.0050				
		Median	0.00217	0.0013	0.0078	0.0032	220	<0.000010	<0.0000050	<0.00050	0.000310	0.474	0.0051	0.306	0.287	<0.000002	<0.000002	517	0.0026	0.0031	<0.00020	<0.00020	531	<0.0050	<0.0050				
		3rd Quartile	0.00511	0.00226	0.0272	0.00605	238	<0.000010	0.00000525	0.00076	0.000485	1.51	0.00675	0.501	0.489	<0.000002	<0.000002	716	0.0051	0.0045	<0.00020	<0.00020	675	<0.0050	<0.0050				
LLSM		Average	0.00106	0.00075	0.0156	0.01019	177.5	0.0000067	0.00000669	0.001799	0.00056	0.397	0.00954	0.1863	0.1822	0.00000149	0.000001	494	0.00359	0.00319	0.0001	0.0001	450	0.0029	0.0025				
E292131		Count	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9				
		Minimum	0.0002	0.00023	0.0045	<0.0030	96.3	<0.00001	<0.0000050	<0.00050	0.00032	0.104	<0.0050	0.0458	0.0434	<0.000002	<0.000002	336	<0.0010	<0.0010	<0.00020	<0.00020	275	<0.0050	<0.0050				
		Maximum	0.00226	0.00145	0.0541	0.0335	216	0.0000140	0.000018	0.0116	0.00096	0.853	0.0408	0.35	0.346	0.0000054	<0.000002	643	0.007	0.0061	<0.00020	<0.00020	566	0.0061	<0.0050				
	Long Lake Middle Seep	Geometric Mean	0.00083	0.00062	0.0103	0.00676	171.6	0.0000061	0.00000535	0.000693	0.00052	0.320	0.00576	0.153	0.1488	0.00000121	0.000001	481	0.0026	0.00236	0.000100	0.0001	436	0.00276	0.00250				
		Count <DL	0	0	0	1	0	7	3	3	0	0	4	0	0	8	9	0	2	2	9	9	0	8	9				
		Standard Deviation	0.00068	0.00045	0.01760	0.01059	44	0.0000034	0.00000503	0.003691	0.00024	0.25	0.01242	0.1127	0.1121	0.0000015	0.0000000	118	0.00234	0.00205	0	0	113	0.0012	4E-11				
		1st Quartile	0.00048	0.00035	0.0063	0.0039	157	<0.000010	<0.000005	<0.00050	0.00042	0.154	<0.0050	0.0832	0.0818	<0.0000020	<0.0000020	385	0.0024	0.002	<0.00020	<0.00020	368	<0.0050	<0.0050				
		Median	0.00101	0.00089	0.0076	0.0057	201	<0.00001	0.0000052	0.00064	0.00044	0.406	0.00630	0.165	0.1560	<0.000002	<0.000002	529	0.0034	0.0028	<0.00020	<0.00020	468	<0.0050	<0.0050				
		3rd Quartile	0.00137	0.00095	0.01100	0.0104	211	<0.000010	0.000008	0.000690	0.00061	0.488	0.007	0.2620	0.242	<0.000002	<0.000002	589	0.0057	0.0051	<0.00020	<0.00020	550	<0.0050	<0.0050				

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 59
2016-2017 Annual Report

2014-15 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW002	Ex-situ 2-3 South shallow groundwater well beside 3-South Pit (1 Seam)	Average	0.00085	0.00042	0.00300	0.0018	211.8	0.0000680	0.0000258	0.00050	0.000308	3.26	1.97	3.01	2.91	0.0000050	0.0000043	1220	0.0032	0.0032	0.000050	0.000062	1167	0.01020	0.00352	0.00100	0.01938		0.109
		Count	1	4	1	4	4	1	4	1	4	1	4	1	4	1	4	3	1	4	1	4	4	1	4	1	4		1
		Minimum	0.00085	0.00034	<0.0060	<0.0020	194	0.000068	<0.000020	<0.0010	<0.00040	3.26	1.46	3.01	2.58	<0.000010	0.0000023	1200	0.0032	0.0029	<0.00010	<0.00010	1110	0.0102	<0.0020	<0.0020	0.0025		0.109
		Maximum	0.00085	0.00052	<0.0060	0.0042	225	0.000068	0.000073	<0.0010	0.00062	3.26	2.28	3.01	3.22	<0.000010	<0.000010	1240	0.0032	0.0036	<0.00010	<0.00020	1240	0.0102	0.0096	<0.0020	<0.050		0.109
		Geometric Mean	0.00085	0.00041	0.00300	0.00143	211.4	0.0000680	0.0000164	0.00050	0.000269	3.26	1.95	3.01	2.9	0.0000050	0.0000041	1219.9	0.0032	0.0032	0.000050	0.000059	1166	0.01020	0.00221	0.001	0.01406		0.109
		Count <DL	0	0	1	3	0	0	2	1	2	0	0	0	0	1	3	0	0	0	1	4	0	0	3	1	3		0
		Standard Deviation	0.00000	0.00008	0.00000	0.0016	12.9	0.0000000	0.0000315	0.00000	0.000208	0	0.36	0.00	0.26	0.0000000	0.0000014	20	0	0.0003	0.000000	0.000025	54	0.00000	0.00411	0.00000	0.01125		0
		1st Quartile	0.00085	0.00036	<0.0060	<0.0020	208.2	0.000068	<0.000020	<0.0010	<0.00040	3.26	1.91	3.01	2.81	<0.000010	0.00000432	1210	0.0032	0.003	<0.00010	<0.00010	1140	0.0102	<0.0020	<0.0020	0.01938		0.109
		Median	0.00085	0.00041	<0.0060	<0.0020	214	0.000068	<0.000020	<0.0010	0.000205	3.26	2.08	3.01	2.92	<0.000010	<0.000010	1220	0.0032	0.0031	<0.00010	<0.00010	1160	0.0102	0.00175	<0.0020	<0.050		0.109
		3rd Quartile	0.00085	0.00048	<0.0060	0.0018	217.5	0.000068	0.00002575	<0.0010	0.000312	3.26	2.14	3.01	3.01	<0.000010	<0.000010	1230	0.0032	0.0032	<0.00010	0.000062	1187	0.0102	0.00427	<0.0020	<0.050		0.109
QU1009D	Ex-situ 4-South deep groundwater well. Down gradient of 4-South Mine. Base of Dunsmuir Member. Assesses vertical gradients & water quality down gradient of the 4-South Mine workings. Just outside of mine pool. (Below 3 Seam)	Average		0.132		0.00100	190		0.0000038		0.000245		0.190		0.0201		0.0000030	152		0.000375		0.0000625	85.4		0.00150		0.0180		
		Count		2		2	2		2		2		2		2		2	1		2		2	2		2		2		
		Minimum		0.131		<0.0010	187		<0.000005		<0.00020		0.178		0.0143		<0.000002	152		<0.00050		<0.000050	85		<0.0010		0.011		
		Maximum		0.133		<0.0030	193		<0.000010		0.00039		0.203		0.0259		<0.000010	152		<0.0010		<0.00020	85.9		<0.0050		<0.050		
		Geometric Mean		0.132		0.00087	190		0.0000035		0.000197		0.19		0.0192		0.0000022	152		0.000354		0.0000500	85.4		0.00112		0.0166		
		Count <DL		0		2	0		2		1		0		0		2	0		2		2	0		2		1		
		Standard Deviation		0.001		0.00071	4.2		0.0000018		0.000205		0.018		0.0082		0.0000028	0		0.000177		0.0000530	0.6		0.00141		0.0099		
		1st Quartile		0.132		0.00075	188.5		0.0000031		0.000173		0.184		0.0172		0.000002	152		0.000312		0.0000438	85.2		0.001		0.0145		
		Median		0.132		0.00100	190		0.0000038		0.000245		0.190		0.0201		0.000003	152		0.000375		0.0000625	85.4		0.0015		0.018		
		3rd Quartile		0.132		0.00125	191.5		0.0000044		0.000318		0.197		0.023		0.000004	152		0.000438		0.0000813	85.7		0.002		0.0215		
QU1009S	Ex-situ 4-South shallow groundwater well. Fracture zone 10 m below till. Assesses vertical gradients & water quality down gradient of the 4-South Mine workings. Just outside of mine pool. (Below 3 Seam)	Average		0.025		0.00110	71.6		0.0000050		0.000100		0.112		0.376		0.0000050	238.0		0.000250		0.0000250	93.3		0.00050		0.0250		
		Count		1		1	1		1		1		1		1		1	1		1		1	1		1		1		
		Minimum		0.025		0.0011	71.6		<0.000010		<0.00020		0.112		0.376		<0.000010	238		<0.00050		<0.000050	93.3		<0.0010		<0.050		
		Maximum		0.025		0.0011	71.6		<0.000010		<0.00020		0.112		0.376		<0.000010	238		<0.00050		<0.000050	93.3		<0.0010		<0.050		
		Geometric Mean		0.025		0.0011	71.6		0.0000050		0.000100		0.112		0.376		0.0000050	238.0		0.00025		0.0000250	93.3		0.00050		0.0250		
		Count <DL		0		0	0		1		1		0		0		1	0		1		1	0		1		1		
		Standard Deviation		0		0	0		0.0000000		0.000000		0		0		0.0000000	0		0		0.0000000	0.0		0.00000		0.0000		
		1st Quartile		0.025		0.0011	71.6		<0.000010		<0.00020		0.112		0.376		<0.000010	238.0		<0.00050		<0.000050	93.3		<0.0010		<0.050		
		Median		0.025		0.00110	71.6		<0.000010		<0.00020		0.112		0.376		<0.000010	238.0		<0.00050		<0.000050	93.3		<0.0010		<0.050		
		3rd Quartile		0.025		0.0011	71.6		<0.000010		<0.00020		0.112		0.376		<0.000010	238.0		<0.00050		<0.000050	93.3		<0.0010		<0.050		
SPD			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E218582	Settling Pond # 1	Average	0.0012	0.00096	0.0444	0.01561	81.80	0.0000096	0.00000504	0.000932	0.00065	0.271	0.0598	0.0667	0.02794	0.00000184	0.00000118	391	0.0021	0.0022	0.0001	0.000100	325.5	0.00381	0.00319	0.0105	0.0072	0.2575	0.02361
		Count	12	12	12	12	16	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	44	12	12	8	3	8	8
		Minimum	0.00047	0.00031	0.005	<0.0030	29.40	<0.00001	<0.000005	<0.00050	0.00029	0.15	0.01	0.023	<0.0010	<0.000002	<0.000002	135	0.0012	0.0013	<0.00020	<0.00020	48.8	<0.0050	<0.0050	0.003	0.0053	<0.020	<0.0050
		Maximum	0.0024	0.00204	0.104	0.048	119.0	0.000039	0.000013	0.00185	0.00129	0.563	0.142	0.185	0.144	0.0000059	0.0000021	661	0.0045	0.0044	<0.00020	<0.00020	836	0.0146	0.0108	0.0191	0.0106	<2.0	0.0501
		Geometric Mean	0.00103	0.00081	0.0285	0.01121	78.6	0.0000074	0.00000426	0.000804	0.00059	0.252	0.0438	0.0542	0.00639	0.0000014	0.0000011	365	0.00200	0.002	0.0001	0.000100	289.40	0.00312	0.00282	0.0089	0.00680	0.0316	0.01737
		Count <DL	0	0	0	1	0	8	6	1	0	0	0	0	4	9	10	0	0	0	12	12	0	10	11	0	0	8	1
		Standard Deviation	0.00067	0.0006	0.0366	0.01299	20.9	0.0000098	0.00000319	0.000525	0.00031	0.118	0.0457	0.0495	0.04132	0.0000017	0.00000041	139.0	0.001	0.0011	0.000000	0.000000	149.4	0.00355	0.0024	0.0059	0.003	0.4583	0.01561
		1st Quartile	0.00061	0.00057	0.0111	0.00702	69.7	<0.000010	<0.0000050	0.000585	0.00045	0.192	0.0198	0.0331	<0.0010	<0.000002	<0.000002	332	0.0013	0.0015	<0.00020	<0.00020	267.8	<0.0050	<0.0050	0.0059	0.0055	<0.020	0.01665
		Median	0.00104	0.00072	0.034	0.0117	80.8	<0.00001	0.00000375	0.000715	0.0006	0.255	0.0505	0.0507	0.0122	<0.000002	<0.000002	368	0.002	0.0017	<0.00020	<0.00020	318.00	<0.0050	<0.0050	0.01	0.0057	<0.020	0.02185
		3rd Quartile	0.00166	0.00129	0.0739	0.02087	96.6	0.000010	0.00000700	0.001202	0.00072	0.305	0.0869	0.0734	0.04118	0.00000135	<0.000002	455	0.0026	0.0022	<0.00020	<0.00020	365.2	<0.0050	<0.0050	0.01280	0.0082	0.2575	0.03000
LLE	Long Lake Entrance (LLE)	Average	0.00098	0.000751	0.08278	0.01978	65.4	0.00000500	0.00000250	0.000643	0.00057	0.972	0.40385	0.1172	0.0958	0.00000186	0.0000011	297	0.00075	0.0005	0.000109	0.000100	282.8	0.00723	0.00250	0.0079		0.043	0.02730
E292130		Count	12	12	12	12	13	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	53	12	12	5		5	5
		Minimum	0.00061	<0.00010	<0.0030	<0.0030	30.1	<0.00001	<0.000005	<0.00050	0.00028	0.211	<0.0050	0.0278	<0.0010	<0.000002	<0.000002	124	<0.0010	<0.0010	<0.00020	<0.00020	27.8	<0.0050	<0.0050	0.0025		0.027	0.0086
		Maximum	0.0014	0.00137	0.246	0.0485	138	<0.00001	<0.000005	0.00122	0.00083	3.48	1.23	0.537	0.405	0.0000113	0.0000024	867	0.0017	<0.0010	0.00021	<0.00020	817	0.0506	<0.0050	0.015		0.052	0.0780
		Geometric Mean	0.00096	0.000616	0.0552	0.01145	58.8	0.000005	0.0000025	0.000529	0.00054	0.734	0.1927	0.0832	0.05037	0.00000122	0.00000108	239.0	0.00066	0.0005	0.000106	0.000100	220.7	0.0038	0.00250	0.0066		0.042	0.0197
		Count <DL	0	1	1	3	0	12	12	5	0	0	1	0	1	11	11	0	9	12	11	12	0	9	12	0		0	0
		Standard Deviation	0.00023	0.000338	0.06208	0.01633	33.2	1E-13	5E-14	0.000378	0.00018	0.881	0.35764	0.1373	0.10515	0.00000297	0.0000004	236	0.00046	0	0.000032	0.000000	213	0.01376	0.00000	0.0051		0.009	0.0287
		1st Quartile	0.00081	0.00059	0.05315	0.00728	42.1	<0.000010	<0.0000050	<0.00050	0.00043	0.551	0.149	0.0541	0.04748	<0.0000020	<0.0000020	150	<0.0010	<0.0010	<0.00020	<0.00020	133	<0.0050	<0.0050	0.0048		0.0430	0.01420
		Median	0.00096	0.000815	0.06955	0.0186	54.5	<0.000010	<0.000005	0.00071	0.0006	0.667	0.389	0.0795	0.0693	<0.000002	<0.000002	193	<0.0010	<0.0010	<0.00020	<0.00020	172	<0.0050	<0.0050	0.0061		0.045	0.0147
		3rd Quartile	0.00116	0.000962	0.09825	0.02582	83.7	<0.00001	<0.000005	0.00096	0.00069	1.048	0.4865	0.117	0.10445	<0.0000020	<0.0000020	308	0.00072	<0.0010	<0.00020	<0.00020	428	0.00345	<0.0050	0.01110		0.0460	0.02110
LLM1	Long Lake Middle 1 metre below Surface	Average	0.00051	0.00048	0.0295	0.0179	32.9	0.00000470	0.00000267	0.000593	0.00074	0.081	0.037	0.0197	0.01189	0.00000287	0.00000145	68.1	0.00059	0.00050	0.000100	0.000100	54.4	0.01853	0.00250	0.00377		0.0300	
E206619		Count	15	15	15	15	4	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	3		1	
		Minimum	0.00028	0.00031	0.0075	0.0049	23.9	<0.000005	<0.0000050	<0.00050	0.00031	0.029	0.0101	0.0054	<0.0010	<0.0000020	<0.0000020	29.4	<0.0010	<0.0010	<0.00020	<0.00020	17.5	<0.0050	<0.0050	<0.0050		0.03	
		Maximum	0.00071	0.0007	0.0659	0.0477	36.9	<0.000010	0.000005	0.0016	0.00161	0.133	0.0734	0.0605	0.0571	<0.000050	0.0000054	94.4	0.0019	<0.0010	<0.00020	<0.00020	88.1	0.237	<0.0050	0.0063		0.03	
		Geometric Mean	0.00049	0.00046	0.0226	0.0144	32.4	0.0000046	0.00000262	0.00051	0.00065	0.07	0.032	0.015	0.00385	0.00000143	0.00000121	65.2	0.00055	0.00050	0.000100	0.000100	50.4	0.00376	0.00250	0.0034		0.0300	
		Count <DL	0	0	0	0	0	15	14	5	0	0	0	0	6	13	13	0	14	15	15	15	0	12	15	1		0	
		Standard Deviation	0.00013	0.00013	0.0205	0.0125	6.1	0.00000090	0.00000065	0.000358	0.00041	0.04	0.0187	0.0154	0.01537	0.00000616	0.00000124	18.8	0.00036	0.00000	0.000000	0.000000	19.4	0.06045	0.00000	0.00219		0.0000	
		1st Quartile	0.00042	0.00036	0.0107	0.0094	31.8	<0.000010	<0.000005	<0.00050	0.00044	0.038	0.0207	0.007	<0.0010	<0.000002	<0.000002	53.2	<0.0010	<0.0010	<0.00020	<0.00020	36.7	<0.0050	<0.0050	<0.0050		0.03	
		Median	0.00047	0.00043	0.0288	0.0135	35.3	<0.000010	<0.0000050	0.00059	0.00065	0.102	0.04	0.0154	0.0075	<0.000002	<0.000002	72.7	<0.0010	<0.0010	<0.00020	<0.00020	63.9	<0.0050	<0.0050	0.0025		0.03	
		3rd Quartile	0.00062	0.00059	0.0389	0.0239	36.4	<0.000010	<0.0000050	0.0007	0.0008	0.1130	0.0482	0.0258	0.019	<0.000002	<0.000002	83.5	<0.0010	<0.0010	<0.00020	<0.00020	66.7	<0.0050	<0.0050	0.0044		0.03	

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 60
2016-2017 Annual Report

2014-15 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LLMB	Long Lake Middle 1 metre From Bottom	Average	0.00028	0.00021	0.0118	0.00624	54.3	0.00000633	0.0000037	0.000463	0.00052	0.127	0.01330	2.483	2.186	0.00000142	0.00000165	127.7	0.00050	0.00050	0.000100	0.000100	116.5	0.00250	0.00250	0.00330		0.066	
E206619		Count	15	15	15	15	4	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	3		1	
		Minimum	0.0002	0.00011	0.0038	<0.0030	52.1	<0.000005	<0.0000050	<0.00050	0.00021	0.05	0.0053	0.921	0.59	<0.0000020	<0.0000020	121	<0.0010	<0.0010	<0.00020	<0.00020	109	<0.0050	<0.0050	0.0022		0.066	
		Maximum	0.00041	0.00034	0.0224	0.0094	57.8	0.000019	0.000016	0.001	0.00096	0.318	0.0218	5.58	5.49	0.0000036	0.0000067	135	<0.0010	<0.0010	<0.00020	<0.00020	131	<0.0050	<0.0050	0.0052		0.066	
		Geometric Mean	0.00028	0.0002	0.0103	0.0054	54.3	0.00000546	0.00000303	0.000401	0.00048	0.103	0.0119	2.052	1.748	0.00000125	0.00000131	127.7	0.00050	0.00050	0.000100	0.000100	116.4	0.00250	0.00250	0.00306		0.066	
		Count <DL	0	0	0	2	0	12	13	8	0	0	0	0	0	12	12	0	15	15	15	15	0	15	15	1		0	
		Standard Deviation	0.00005	0.00006	0.0057	0.00281	2.5	0.00000437	0.00000359	0.000263	0.00022	0.095	0.006	1.661	1.5490	0.00000093	0.00000158	4.4	0.00000	0.00000	0.000000	0.000000	5.1	4E-11	0.00000	0.00165		0	
		1st Quartile	0.00024	0.00017	0.0068	0.00385	52.9	<0.000010	<0.000005	<0.00050	0.00037	0.068	0.0066	1.29	1.13	<0.000002	<0.000002	124.5	<0.0010	<0.0010	<0.00020	<0.00020	113	<0.0050	<0.0050	0.00235		0.066	
		Median	0.00028	0.00019	0.0112	0.0076	53.7	<0.00001	<0.0000050	<0.00050	0.00045	0.081	0.01450	1.56	1.46	<0.000002	<0.000002	128	<0.0010	<0.0010	<0.00020	<0.00020	117.0	<0.0050	<0.0050	<0.0050		0.066	
		3rd Quartile	0.00032	0.00024	0.016	0.00835	55.1	<0.000010	<0.0000050	0.000625	0.00062	0.15	0.01870	4.02	3.545	<0.000002	<0.0000020	130.5	<0.0010	<0.0010	<0.00020	<0.00020	118	<0.0050	<0.0050	0.00385		0.066	
LLO	Long Lake Outlet	Average	0.00054	0.00046	0.0407	0.0151	31.8	0.0000067	0.00000546	0.000639	0.00068	0.0980	0.03234	0.0223	0.00493	0.00000212	0.00000147	72.5	0.0005	0.00050	0.000100	0.000100	55.5	0.00324	0.00250				
E219412		Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	53	15	15				
		Minimum	0.00034	0.00031	0.0075	0.0034	17.5	<0.000005	<0.000005	<0.00050	0.00033	0.012	<0.0050	0.0048	<0.0010	<0.000002	<0.000002	39.7	<0.0010	<0.0010	<0.00020	<0.00020	15.3	<0.0050	<0.0050				
		Maximum	0.00093	0.00059	0.107	0.0382	41.2	0.000041	0.000039	0.00161	0.00119	0.291	0.065	0.122	0.0139	0.0000114	0.0000034	110	<0.0010	<0.0010	<0.00020	<0.00020	108	0.0092	<0.0050				
		Geometric Mean	0.00052	0.00045	0.0328	0.0117	30.9	0.0000048	0.0000034	0.000539	0.00064	0.077	0.02076	0.0158	0.00235	0.0000015	0.0000013	69.8	0.0005	0.00050	0.000100	0.000100	51.3	0.00292	0.00250				
		Count <DL	0	0	0	0	0	14	12	5	0	0	3	0	6	11	11	0	15	15	15	15	0	13	15				
		Standard Deviation	0.00015	0.00009	0.0268	0.0111	7.1	0.0000095	0.0000094	0.000377	0.00024	0.071	0.02217	0.0284	0.00477	0.00000275	0.00000083	20.3	0	0.00000	0.000000	0.000000	20.4	0.002	4E-11				
		1st Quartile	0.00044	0.00038	0.0204	0.0057	26.2	0.0000038	<0.000005	<0.00050	0.0005	0.05	0.01405	0.0112	<0.0010	<0.000002	<0.000002	55.6	<0.0010	<0.0010	<0.00020	<0.00020	38.5	<0.0050	<0.0050				
		Median	0.00054	0.00044	0.034	0.0131	35	<0.00001	<0.000005	0.00067	0.00062	0.09	0.033	0.0158	0.0045	<0.000002	<0.000002	73.7	<0.0010	<0.0010	<0.00020	<0.00020	55.4	<0.0050	<0.0050				
		3rd Quartile	0.00061	0.00052	0.0507	0.0168	36.8	<0.00001	<0.000005	0.000795	0.00082	0.106	0.0511	0.0204	0.0089	0.00000155	0.00000165	84.9	<0.0010	<0.0010	<0.00020	<0.00020	69.5	<0.0050	<0.0050				
WB	Middle Quinsam Lake Outlet	Average	0.00024	0.00024	0.0199	0.0131	34.8	0.0000052	0.0000035	0.000699	0.00093	0.048	0.0202	0.0075	0.00119	0.0000011	0.0000014	41.9	0.00050	0.00050	0.000100	0.000100	33.7	0.00250	0.00250				
E0900504		Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15				
		Minimum	0.00015	0.00014	0.0111	0.0041	23.4	<0.000005	<0.000005	<0.00050	0.00052	0.024	0.0095	0.0034	<0.0010	<0.000002	<0.000002	29.4	<0.0010	<0.0010	<0.00020	<0.00020	11	<0.0050	<0.0050				
		Maximum	0.00043	0.00046	0.0336	0.0216	42.9	0.000016	0.000015	0.00108	0.00448	0.083	0.0446	0.0156	0.0041	0.0000028	0.0000068	83.8	<0.0010	<0.0010	<0.00020	<0.00020	73	<0.0050	<0.0050				
		Geometric Mean	0.00023	0.000230	0.0189	0.0121	34.2	0.0000047	0.00000295	0.000666	0.00075	0.046	0.0190	0.0068	0.00089	0.00000107	0.00000114	40.6	0.00050	0.00050	0.000100	0.000100	30.5	0.00250	0.00250				
		Count <DL	0	0	0	0	0	14	13	1	0	0	0	0	9	14	14	0	15	15	15	15	0	15	15				
		Standard Deviation	0.00008	0.00008	0.0065	0.0051	6.3	0.0000032	0.00000325	0.000206	0.001	0.0140	0.0081	0.0034	0.00104	0.00000046	0.0000015	12.5	0.00000	0.00000	0.000000	0.000000	15	4E-11	4E-11				
		1st Quartile	0.00019	0.00018	0.0166	0.0104	33	<0.000010	<0.000005	0.00059	0.00056	0.039	0.0154	0.0046	<0.0010	<0.000002	<0.000002	36.3	<0.0010	<0.0010	<0.00020	<0.00020	27.8	<0.0050	<0.0050				
		Median	0.0002	0.000220	0.0178	0.0118	36.1	<0.000010	<0.000005	0.00067	0.00064	0.049	0.0183	0.0071	<0.0010	<0.000002	<0.000002	38.6	<0.0010	<0.0010	<0.00020	<0.00020	31.1	<0.0050	<0.0050				
		3rd Quartile	0.00026	0.000260	0.0243	0.0186	38.4	<0.00001	<0.000005	0.000785	0.00074	0.056	0.0228	0.0096	0.00185	<0.000002	<0.000002	42.5	<0.0010	<0.0010	<0.00020	<0.00020	40.8	<0.0050	<0.0050				
7SSD	Settling Pond at 7S- Discharge to Stream 1 -7S		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E292069		Average	0.00132	0.00081	0.2149	0.00928	124.8	0.0000247	0.00001833	0.00164	0.00091	0.499	0.0683	0.3139	0.26288	0.00000164	0.00000118	225	0.00156	0.00051	0.000117	0.000106	117.4	0.01019	0.00269	0.0039	0.0025	0.261	0.0163
		Count	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	1	1	1	1
		Minimum	0.0004	0.00024	0.0057	<0.0030	56.2	<0.000005	<0.000005	0.00074	0.00042	0.065	<0.0050	0.041	<0.0010	<0.000002	<0.000002	126	<0.0010	<0.0010	<0.00020	<0.00020	17.3	<0.0050	<0.0050	0.0039	<0.0050	0.261	0.0163
		Maximum	0.00448	0.00364	2.89	0.0515	208	0.00058	0.000519	0.00608	0.00352	2.27	0.333	5.14	4.08	0.0000086	0.0000051	343	0.0317	0.001	0.00044	0.00037	219	0.0831	0.0069	0.0039	<0.0050	0.261	0.0163
		Geometric Mean	0.0011	0.00065	0.0799	0.00613	119.6	0.00000920	0.0000053	0.00137	0.00084	0.392	0.032	0.1731	0.1043	0.00000129	0.00000109	217	0.00075	0.00051	0.000109	0.000103	99.3	0.00536	0.00262	0.0039	0.0025	0.261	0.0163
		Count <DL	0	0	0	7	0	24	20	0	0	0	4	0	3	35	40	0	31	42	40	42	0	25	41	0	1	0	0
		Standard Deviation	0.00097	0.00066	0.4635	0.00972	35.2	0.0000874	0.00007844	0.00127	0.0005	0.401	0.07754	0.765	0.6110	0.00000165	0.00000076	60	0.00475	0.00008	0.000067	0.000041	56.5	0.01572	0.00088	0	0	0	0
		1st Quartile	0.00074	0.0004	0.032	0.00355	101	<0.000010	<0.0000050	0.00094	0.00064	0.348	0.0109	0.098	0.0637	<0.0000020	<0.0000020	180.0	<0.0010	<0.0010	<0.00020	<0.00020	74.8	<0.0050	<0.0050	0.0039	<0.0050	0.261	0.0163
		Median	0.00102	0.0006	0.0806	0.0058	125	<0.000010	0.000005	0.00115	0.00082	0.427	0.0433	0.174	0.136	<0.000002	<0.000002	224	<0.0010	<0.0010	<0.00020	<0.00020	123.0	<0.0050	<0.0050	0.0039	<0.0050	0.261	0.0163
		3rd Quartile	0.00148	0.0009	0.215	0.0095	145.5	0.0000130	0.0000080	0.00173	0.00098	0.565	0.09335	0.2825	0.256	<0.0000020	<0.000002	277.0	0.0011	<0.0010	<0.00020	<0.00020	161.5	0.01225	<0.0050	0.0039	<0.0050	0.261	0.0163
7S	Stream 1-7S discharge to LWO	Average	0.000125	0.000109	0.0253	0.0193	27.7	0.00000779	0.00000656	0.000756	0.00058	0.0128	0.00469	0.00078	0.0005	0.00000152	0.0000012	50.6	0.00078	0.00057	0.000100	0.000100	30.280	0.00994	0.00294	0.002	0.0025	0.044	0.0112
E292109		Count	39	39	39	39	36	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	36	39	39	1	1	1	1
		Minimum	<0.00010	<0.00010	0.0078	0.0078	16.1	<0.000005	<0.000005	<0.00050	0.00025	<0.010	<0.0050	<0.0010	<0.0010	<0.000002	<0.000002	21.9	<0.0010	<0.0010	<0.00020	<0.00020	5.08	<0.0050	<0.0050	0.002	<0.0050	0.044	0.0112
		Maximum	0.00046	0.00029	0.0715	0.0599	51.4	0.0000390	0.000035	0.0063	0.00157	0.116	0.020	0.0051	<0.0010	0.000018	0.0000057	116	0.0074	0.0025	<0.00020	<0.00020	88.50	0.165	0.0085	0.0020	<0.0050	0.044	0.0112
		Geometric Mean	0.000108	0.000096	0.0222	0.0173	26.4	0.00000612	0.00000445	0.000491	0.00054	0.0081	0.00371	0.00063	0.0005	0.00000112	0.00000108	45.1	0.00057	0.00053	0.000100	0.000100	23.57	0.00397	0.00277	0.002	0.0025	0.044	0.0112
		Count <DL	9	12	0	0	0	30	24	20	0	26	26	31	39	37	37	0	37	37	39	39	0	30	35	0	1	0	0
		Standard Deviation	0.000078	0.000057	0.0145	0.0101	9.3	0.0000073	0.00000726	0.001069	0.00025	0.0196	0.00413	0.00082	0	0.00000276	0.00000089	25.7	0.00126	0.00034	0.000000	0.000000	20.71	0.02694	0.00139	0	0	0	0
		1st Quartile	0.0001	<0.00010	0.0156	0.012	21.4	<0.000010	<0.000005	<0.00050	0.00044	<0.010	<0.0050	<0.0010	<0.0010	<0.000020	<0.0000020	31.2	<0.0010	<0.0010	<0.00020	<0.00020	14.48	<0.0050	<0.0050	0.002	<0.0050	0.044	0.0112
		Median	0.00011	0.00011	0.0216	0.0175	23.9	<0.000010	<0.000005	<0.00050	0.00050	<0.010	<0.0050	<0.0010	<0.0010	<0.000002	<0.000002	47.0	<0.0010	<0.0010	<0.00020	<0.00020	28.3	<0.0050	<0.0050	0.00200	<0.0050	0.0440	0.01120
		3rd Quartile	0.00013	0.000125	0.0312	0.0237	31.9	<0.000010	0.00000915	0.00086	0.00063	0.0115	0.0057	<0.0010	<0.0010	<0.000002	<0.000002	61.8	<0.0010	<0.0010	<0.00020	<0.00020	42.18	<0.0050	<0.0050	0.002	<0.0050	0.044	0.0112
QU0813A	Ex-situ 7-South groundwater well down gradient of the CCR backfill towards QR (No. 4 Seam)	Average	0.43	0.433	0.0322	0.00192	186.0	0.0000050	0.000005	0.000250	0.000200	0.224	0.189	0.0387	0.0471	0.0000050	0.0000050	115.8	0.000250	0.000312	0.0000250	0.0000812	14.8	0.00470	0.00100	0.0167	0.0250		0.156
		Count	1	4	1	4	4	1	4	1	4	1	4	1	4	1	4	4	1	4	1	4	4	1	4	1	3		1
		Minimum	0.430	0.42	0.0322	0.0012	183	<0.000010	<0.000010	<0.00050	<0.00020	0.224	0.182	0.0387	0.0371	<0.000010	<0.000010	112	<0.00050	<0.00050	<0.000050	<0.000050	14	0.0047	<0.0010	0.0167	<0.050		0.156
		Maximum	0.43	0.45	0.0322	<0.0050	188	<0.000010	<0.000010	<0.00050	<0.0010	0.224	0.198	0.0387	0.0588	<0.000010	<0.000010	119	<0.00050	<0.0010	<0.000050	<0.000050	15.3	0.0047	<0.0050	0.0167	<0.050		0.156
		Geometric Mean	0.43	0.433	0.0322	0.00186	186.0	0.0000050	0.000005	0.00025	0.000150	0.224	0.189	0.0387	0.0465	0.0000050	0.0000050	115.7	0.000250	0.000297	0.0000250	0.0000445	14.8	0.0047	0.00075	0.0167	0.0250		0.156
		Count <DL	0	0	0	1	0	1	4	1	4	0	0	0	0	1	4	0	1	4	1	4	0	0	4	0	3		0
		Standard Deviation	0	0.015	0	0.00054	2.2	0.0000000	0	0	0.000200	0.000	0.008	0	0.0089	0.0000000	0.0000000	2.9	0.000000	0.000125	0.0000000	0.0001125	0.6	0	0.00100	0	0.0000		0
		1st Quartile	0.43	0.422	0.0322	0.00172	185.2	<0.000010	<0.000010	<0.00050	<0.00020	0.224	0.184	0.0387	0.0435	<0.000010	<0.000010	115	<0.00050	<0.00050	<0.000050	<0.000050	14.7	0.0047	<0.0010	0.0167	<0.050		0.156
		Median	0.43	0.432	0.0322	0.002	186.5	<0.000010	<0.000010	<0.00050	<0.00020	0.224	0.188	0.0387	0.0462	<0.000010	<0.000010	116	<0.00050	<0.00050	<0.000050	<0.000050	15	0.00470	<0.0010	0.0167	<0.050		0.156
		3rd Quartile	0.43	0.443	0.0322	0.0022	187.2	<0.000010	<0.000010	<0.00050	0.0002	0.224	0.194	0.0387	0.0499	<0.000010	<0.000010	116.8	<0.00050	0.000312	<0.000050	0.0000812	15.2	0.0047	0.001	0.0167	<0.050		0.156
QU0813B	Ex-situ 7-South groundwater well down gradient of the CCR backfill towards QR (Till & SST contact)	Average	0.439	0.5	1.85	0.00432	110.5	0.0000240	0.0000050	0.00483	0.000200	2.77	0.077	0.143	0.0826	0.0000050	0.0000050	72.8	0.00219	0.000312	0.000238	0.0000812	9.73	0.0061	0.00183	0.117	0.0250		0.111
		Count	1	4	1	4	4	1	4	1	4	1	4	1	4	1	4	4	1	4	1	4	4	1	4	1	3		1
		Minimum	0.439	0.446	1.85	<0.0050	48.1	0.000024	<0.000010	0.00483	<0.00020	2.77	0.068	0.143	0.0752	<0.000010	<0.000010	68.6	0.00219	<0.00050	0.000238	<0.000050	8.89	0.0061	<0.0010	0.117	<0.050		0.111
		Maximum	0.439	0.522	1.85	0.0059	138	0.000024	<0.000010	0.00483	<0.0010	2.77	0.084	0.143	0.0937	<0.000010	<0.000010	75.3	0.00219	<0.0010	0.000238	<0.00050	10.3	0.0061	0.0038	0.117	<0.050		0.111
		Geometric Mean	0.439	0.499	1.85	0.00412	102.1	0.0000240	0.0000050	0.00483	0.000150	2.77	0.077	0.143	0.0823	0.0000050	0.0000050	72.7	0.00219	0.000297	0.000238	0.0000445	9.72	0.0061	0.00124	0.117	0.0250		0.111
		Count <DL	0	0	0	1	0	0	4	0	4	0	0	0	0	1	4	0	0	4	0	4	0	0	3	0	3		0
		Standard Deviation	0.000	0.036	0.00	0.0015	42	0.0000000	0.0000000	0.00000	0.000200	0.00	0.007	0.000	0.0079	0.0000000	0.0000000	3.1	0.00000	0.000125	0.000000	0.0001125	0.6	0.0000	0.00162	0.0000	0.0000		0.000
		1st Quartile	0.439	0.494	1.85	0.00355	105.8	0.000024	<0.000010	0.00483	<0.00020	2.77	0.074	0.143	0.0784	<0.000010	<0.000010	71.2	0.00219	<0.00050	0.000238	<0.000050	9.53	0.0061	<0.0010	0.117	<0.050		0.111
		Median	0.439	0.516	1.85	0.00445	128	0.000024	<0.000010	0.00483	<0.00020	2.77	0.078	0.143	0.0808	<0.000010	<0.000010	73.6	0.00219	<0.00050	0.000238	<0.000050	9.87	0.0061	0.0015	0.117	<0.050		0.111
		3rd Quartile	0.439	0.521	1.85	0.00522	132.8	0.000024	<0.000010	0.00483	0.0002	2.77	0.082	0.143	0.085	<0.000010	<0.000010	75.1	0.00219	0.000312	0.000238	0.0000812	10.07	0.0061	0.00282	0.117	<0.050		0.111

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 61
2016-2017 Annual Report

2014-15 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
QU0821GD	Ex-situ 2-North groundwater well down gradient of u/g tailings disposal, measures water quality & hydraulic gradients downstream of Forjan Fault (No. 4 Seam)	Average		0.173		0.0041	201.0		0.000005		0.0001		1.05		0.177		0.0000010			0.0005		0.0001	0.25		0.0025		0.0504		
		Count		1		1	1		1		1		1		1		1			1		1	1		1		1		
		Minimum		0.173		0.0041	201		0.000005		<0.00020		1.05		0.177		<0.0000020			<0.0010		<0.00020	<0.50		<0.0050		0.0504		
		Maximum		0.173		0.0041	201		0.000005		<0.00020		1.05		0.177		<0.0000020			<0.0010		<0.00020	<0.50		<0.0050		0.0504		
		Geometric Mean		0.173		0.0041	201.0		0.000005		0.000100		1.05		0.177		0.0000010			0.0005		0.0001	0.25		0.0025		0.0504		
		Count <DL		0		0	0		0		1		0		0		1			1		1	1		1		0		
		Standard Deviation		0		0.00000	0.0		0		0		0		0		0.0000000			0		0	0		0.00000		0		
		1st Quartile		0.173		0.0041	201		0.000005		<0.00020		1.05		0.177		<0.0000020			<0.0010		<0.00020	<0.50		<0.0050		0.0504		
		Median		0.173		0.0041	201		0.000005		<0.00020		1.05		0.177		<0.0000020			<0.0010		<0.00020	<0.50		<0.0050		0.0504		
		3rd Quartile		0.173		0.0041	201		0.000005		<0.00020		1.05		0.177		<0.0000020			<0.0010		<0.00020	<0.50		<0.0050		0.0504		
QU0821GS	Ex-situ 2-North groundwater well down gradient of u/g tailings disposal, measures water quality & hydraulic gradients downstream of Forjan Fault (No. 1 Seam)	Average	**(ND) Only the deep well was sampled on an annual basis.**																										
		Count																											
		Minimum																											
		Maximum																											
		Geometric Mean																											
		Count <DL																											
		Standard Deviation																											
		1st Quartile																											
		Median																											
		3rd Quartile																											
QU1010D	Ex-situ 2-North deep groundwater well. Down gradient of u/g tailings disposal, measures water quality & hydraulic head downstream of 2-North workings. (No. 1 Seam / Mudstone).	Average	0.0225	0.0174	1.35	0.0049	100.3	0.000025	0.000025	0.0078	0.00050	11.0	12.3	1.03	0.745	0.0000050	0.0000050	1580.0	0.00125	0.00125	0.00096	0.000125	6.375	0.0075	0.0025	0.153	0.08500		0.659
		Count	1	2	1	2	2	1	2	1	2	1	2	1	2	1	2	2	1	2	1	2	2	1	2	1	2		1
		Minimum	0.0225	0.0166	1.35	<0.0050	98.6	<0.000050	<0.000050	0.0078	<0.0010	11.0	12.1	1.03	0.73	<0.000010	<0.000010	1560	<0.0025	<0.0025	0.00096	<0.00025	<0.50	<0.015	<0.0050	0.153	<0.10		0.659
		Maximum	0.0225	0.0181	1.35	0.0073	102	<0.000050	<0.000050	0.0078	<0.0010	11.0	12.5	1.03	0.76	<0.000010	<0.000010	1600	<0.0025	<0.0025	0.00096	<0.00025	<25	<0.015	<0.0050	0.153	0.12		0.659
		Geometric Mean	0.0225	0.0173	1.35	0.0043	100.3	0.000025	0.000025	0.0078	0.00050	11.0	12.3	1.03	0.745	0.0000050	0.0000050	1579.9	0.00125	0.00125	0.00096	0.000125	1.768	0.0075	0.0025	0.153	0.07700		0.659
		Count <DL	0	0	0	1	0	1	2	0	2	0	0	0	0	1	2	0	1	2	0	2	2	1	2	0	1		0
		Standard Deviation	0.0000	0.0011	0.00	0.0034	2.4	0.000000	0.000000	0.0000	0.00000	0.0	0.3	0.00	0.02	0.0000000	0.0000000	28.3	0.00000	0.00000	0.00000	0.000000	8.7	0.0000	0.0000	0.000	0.04900		0.000
		1st Quartile	0.0225	0.017	1.35	0.0037	99.4	<0.000050	<0.000050	0.0078	<0.0010	11.0	12.2	1.03	0.738	<0.000010	<0.000010	1570	<0.0025	<0.0025	0.00096	<0.00025	3.312	<0.015	<0.0050	0.153	0.068		0.659
		Median	0.0225	0.0174	1.35	0.0049	100.3	<0.000050	<0.000050	0.0078	<0.0010	11.0	12.3	1.03	0.745	<0.000010	<0.000010	1580	<0.0025	<0.0025	0.00096	<0.00025	6.375	<0.015	<0.0050	0.153	0.085		0.659
		3rd Quartile	0.0225	0.0177	1.35	0.0061	101.2	<0.000050	<0.000050	0.0078	<0.0010	11.0	12.4	1.03	0.752	<0.000010	<0.000010	1590	<0.0025	<0.0025	0.00096	<0.00025	9.438	<0.015	<0.0050	0.153	0.102		0.659
QU1010S	Ex-situ 2-North shallow groundwater well. Down gradient of u/g tailings disposal, measures water quality & hydraulic head downstream of 2-North workings. (No. 1 Seam / Sandstone).	Average	0.141	0.136	13.5	0.0018	151.0	0.0000780	0.0000050	0.0127	0.0001	6.22	0.254	0.113	0.0491	0.0000050	0.0000050	76.1	0.005170	0.000250	0.00459	0.0000250	15.2	0.02180	0.00085	0.107	0.025		0.204
		Count	1	2	1	2	2	1	2	1	2	1	2	1	2	1	2	2	1	2	1	2	2	1	2	1	2		1
		Minimum	0.141	0.133	13.5	0.0013	151	0.000078	<0.000010	0.0127	<0.00020	6.22	0.252	0.113	0.0478	<0.000010	<0.000010	74.9	0.00517	<0.00050	0.004590	<0.000050	14.9	0.0218	<0.0010	0.107	<0.050		0.204
		Maximum	0.141	0.138	13.50	0.0024	151	0.000078	<0.000010	0.0127	<0.00020	6.22	0.256	0.113	0.0504	<0.000010	<0.000010	77.2	0.00517	<0.00050	0.00459	<0.000050	15.6	0.0218	0.0012	0.1070	<0.050		0.204
		Geometric Mean	0.141	0.135	13.5	0.00180	151.0	0.000078	0.0000050	0.0127	0.0001	6.22	0.254	0.113	0.0491	0.0000050	0.0000050	76	0.00517	0.000250	0.00459	0.0000250	15.2	0.02180	0.00077	0.107	0.025		0.204
		Count <DL	0	0	0	0	0	0	2	0	2	0	0	0	0	1	2	0	0	2	0	2	0	0	1	0	2		0
		Standard Deviation	0	0.004	0	0.0008	0.0	0	0.0000000	0	0	0	0.003	0	0.0018	0.0000000	0.0000000	1.6	0	0.000000	0	0.0000000	0.5	0.00000	0.00049	0	0		0
		1st Quartile	0.141	0.134	13.5	0.0016	151	0.000078	<0.000010	0.0127	<0.00020	6.22	0.253	0.113	0.0484	<0.000010	<0.000010	75.5	0.005170	<0.00050	0.00459	<0.000050	15.1	0.0218	0.00068	0.107	<0.050		0.204
		Median	0.141	0.136	13.5	0.0018	151	0.0000780	<0.000010	0.0127	<0.00020	6.22	0.254	0.113	0.0491	<0.000010	<0.000010	76.1	0.005170	<0.00050	0.00459	<0.000050	15.2	0.0218	0.00085	0.107	<0.050		0.204
		3rd Quartile	0.141	0.137	13.5	0.0021	151	0.000078	<0.000010	0.0127	<0.00020	6.22	0.255	0.113	0.0498	<0.000010	<0.000010	76.6	0.005170	<0.00050	0.00459	<0.000050	15.4	0.0218	0.00102	0.107	<0.050		0.204
QU1011D	Ex-situ 2-North deep groundwater well. Measures water quality & hydraulic gradient in Forjian Fault (Fractured sandstone).	Average	**ND -** well was not sampled in between April 1, 2013 through March 31, 2014. Well was sampled in April 2014.																										
		Count																											
		Minimum																											
		Maximum																											
		Geometric Mean																											
		Count <DL																											
		Standard Deviation																											
		1st Quartile																											
		Median																											
		3rd Quartile																											
QU1011S	Ex-situ 2-North shallow groundwater well. Measures water quality & hydraulic gradient in Forjian Fault (Fractured sandstone).	Average		0.00140		0.0093	87.7		0.0000050		0.00026		0.226		0.0793		0.0000050	69.3		0.00052		0.0000250	4.09		0.00050		0.025		
		Count		1		1	1		1		1		1		1		1	1		1		1	1		1		1		
		Minimum		0.0014		0.0093	87.7		<0.000010		0.00026		0.226		0.0793		<0.000010	69.3		0.00052		<0.000050	4.09		<0.0010		<0.050		
		Maximum		0.0014		0.0093	87.7		<0.000010		0.00026		0.226		0.0793		<0.000010	69.3		0.00052		<0.000050	4.09		<0.0010		<0.050		
		Geometric Mean		0.0014		0.0093	87.7		0.0000050		0.00026		0.226		0.0793		0.0000050	69.3		0.00052		0.0000250	4.09		0.0005		0.025		
		Count <DL		0		0	0		1		0		0		0		1	0		0		1	0		1		1		
		Standard Deviation		0		0	0		0.0000000		0		0		0		0.0000000	0		0		0.0000000	0		0		0		
		1st Quartile		0.0014		0.0093	87.7		<0.000010		0.00026		0.226		0.0793		<0.000010	69.3		0.00052		<0.000050	4.09		<0.0010		<0.050		
		Median		0.00140		0.0093	87.7		<0.000010		0.00026		0.226		0.0793		<0.000010	69.3		0.00052		<0.000050	4.09		<0.0010		<0.050		
		3rd Quartile		0.0014		0.0093	87.7		<0.000010		0.00026		0.226		0.0793		<0.000010	69.3		0.00052		<0.000050	4.09		<0.0010		<0.050		

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 62
2016-2017 Annual Report

2014-15 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
QU1105S	Ex-situ River Barrier Pillar (RBP) shallow groundwater well. Monitors water quality & gradients above the RBP & 2-North Mine. (Sandstone)	Average		0.0998		0.0030	164		0.0000050		0.000100		0.675		0.2049		0.0000050	103.6		0.000250		0.0000250	108.7		0.00705		0.025		
		Count		2		2	2		2		2		2		2		2	2		2		2	2		2		2		
		Minimum		0.0856		0.0028	102		<0.000010		<0.00020		0.15		0.0288		<0.000010	40.2		<0.00050		<0.000050	27.4		<0.0010		<0.050		
		Maximum		0.114		0.0031	227		<0.000010		<0.00020		1.2		0.381		<0.000010	167		<0.00050		<0.000050	190		0.0136		<0.050		
		Geometric Mean		0.0988		0.00290	152		0.0000050		0.000100		0.424		0.1048		0.0000050	81.9		0.000250		0.0000250	72.2		0.00261		0.025		
		Count <DL		0		0	0		2		2		0		0		2	0		2		2	0		1		2		
		Standard Deviation		0.0201		0.00020	88		0.0000000		0.000000		0.742		0.2490		0.0000000	89.7		0.000000		0.0000000	115.0		0.00926		0.000		
		1st Quartile		0.0927		0.0029	133		<0.000010		<0.00020		0.412		0.1168		<0.000010	71.9		<0.00050		<0.000050	68		0.00377		<0.050		
		Median		0.0998		0.003	164		<0.000010		<0.00020		0.675		0.2049		<0.000010	103.6		<0.00050		<0.000050	108.7		0.00705		<0.050		
		3rd Quartile		0.1069		0.003	195		<0.000010		<0.00020		0.938		0.293		<0.000010	135.3		<0.00050		<0.000050	149.4		0.01032		<0.050		
QU1109S	Ex-situ River Barrier Pillar (RBP) shallow groundwater well. Monitors water quality & gradients above the RBP & 2-North Mine. (Sandstone)	Average	0.146	0.144	51.2	0.00318	208	0.000236	0.0000056	0.0234	0.000162	20.5	0.0630	0.455	0.00888	0.000005	0.0000043	8.37	0.008	0.000375	0.0602	0.00005	86.24	0.0787	0.00113	0.74	0.075		0.175
		Count	1	4	1	4	4	1	4	1	4	1	4	1	4	1	4	3	1	4	1	4	4	1	4	1	4		1
		Minimum	0.146	0.122	51.2	<0.0030	134	0.000236	<0.000005	0.0234	<0.00020	20.5	0.013	0.455	0.00503	<0.000010	0.0000021	6.21	0.008	<0.00050	0.0602	<0.000050	9.38	0.0787	<0.0010	0.74	0.0286		0.175
		Maximum	0.146	0.157	51.2	0.0051	382	0.000236	<0.000020	0.0234	0.00025	20.5	0.199	0.455	0.0193	<0.000010	<0.000010	12.6	0.008	<0.0010	0.0602	<0.00020	284	0.0787	<0.0050	0.74	0.106		0.175
		Geometric Mean	0.146	0.143	51.2	0.0029	188	0.000236	0.0000050	0.0234	0.00015	20.5	0.0320	0.455	0.00741	0.000005	0.0000040	7.9	0.008	0.000354	0.0602	0.000042	36.08	0.0787	0.00089	0.74	0.066		0.175
		Count <DL	0	0	0	1	0	0	4	0	3	0	0	0	0	1	3	0	0	4	0	4	0	0	4	0	0		0
		Standard Deviation	0.000	0.015	0.0	0.0015	117	0.000000	0.0000031	0.0000	0.00008	0.0	0.0910	0.00	0.00696	0.00000	0.0000015	3.67	0.0000	0.00014	0.000	0.000035	132.1	0.000	0.0010	0.000	0.038		0.000
		1st Quartile	0.146	0.142	51.2	0.00255	137	0.000236	0.0000044	0.0234	<0.00020	20.5	0.016	0.455	0.00505	<0.000010	0.00000428	6.25	0.008	<0.00050	0.0602	<0.000050	17.64	0.0787	<0.0010	0.74	0.0522		0.175
		Median	0.146	0.148	51.2	0.00305	159	0.000236	<0.000010	0.0234	0.00015	20.5	0.02	0.455	0.0056	<0.000010	<0.000010	6.29	0.008	0.000375	0.0602	0.0000375	25.8	0.0787	0.00075	0.74	0.0825		0.175
		3rd Quartile	0.146	0.151	51.2	0.00368	229	0.000236	0.0000062	0.0234	0.000213	20.5	0.067	0.455	0.00943	<0.000010	<0.000010	9.44	0.008	<0.0010	0.0602	0.0000625	94.4	0.0787	0.00138	0.74	0.1052		0.175
75QR	7-South Quinsam River downstream of 7-South Mining Operation	Average	0.00036	0.00031	0.0322	0.0148	34	0.00000763	0.00000588	0.000905	0.00075	0.103	0.0445	0.0058	0.00204	0.00000118	0.00000126	37.5	0.00050	0.00050	0.000100	0.000100	27.1	0.00708	0.00315	0.00720	0.00850	0.037	0.0086
E292113		Count	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	2	1	2	2
		Minimum	0.00021	0.00014	0.0111	0.0039	22.4	<0.000005	<0.000005	<0.00050	0.00032	0.053	0.0266	0.003	<0.0010	<0.000002	<0.000002	27.2	<0.0010	<0.0010	<0.00020	<0.00020	10.8	<0.0050	<0.0050	0.0056	0.0085	0.031	0.0069
		Maximum	0.00098	0.00048	0.062	0.0326	44.1	0.000034	0.0000351	0.00248	0.003	0.242	0.0801	0.0112	0.0086	0.0000053	0.0000043	54.6	<0.0010	<0.0010	<0.00020	<0.00020	43.5	0.0466	0.0135	0.0088	0.0085	0.042	0.0103
		Geometric Mean	0.00033	0.0003	0.0285	0.0129	33.5	0.00000583	0.0000037	0.000812	0.00067	0.098	0.0428	0.0056	0.00144	0.00000107	0.00000115	37.1	0.00050	0.00050	0.000100	0.000100	25	0.00387	0.0028	0.00700	0.00850	0.036	0.0084
		Count <DL	0	0	0	0	0	20	19	2	0	0	0	0	8	23	21	0	24	24	24	24	0	19	22	0	0	0	0
		Standard Deviation	0.00016	0.00008	0.0156	0.0075	6	0.00000795	0.00000812	0.000449	0.00051	0.038	0.0133	0.0018	0.00182	0.00000088	0.00000078	6	0.00000	0.00000	0.000000	0.000000	9.9	0.01108	0.00239	0.0023	0	0.008	0.0024
		1st Quartile	0.00026	0.00024	0.0184	0.0096	30.4	<0.000010	<0.000005	0.000695	0.00053	0.085	0.0361	0.0047	<0.0010	<0.000002	<0.000002	34.5	<0.0010	<0.0010	<0.00020	<0.00020	17.6	<0.0050	<0.0050	0.0064	0.0085	0.034	0.0078
		Median	0.00032	0.00031	0.0305	0.0123	34.8	<0.00001	<0.000005	0.000865	0.00063	0.098	0.0413	0.0054	0.00165	<0.0000020	<0.000002	38	<0.0010	<0.0010	<0.00020	<0.00020	27.8	<0.0050	<0.0050	0.0072	0.0085	0.037	0.0086
		3rd Quartile	0.0004	0.00037	0.0403	0.0204	38.1	<0.000010	<0.000005	0.000968	0.00074	0.11	0.0499	0.0064	0.00285	<0.000002	<0.000002	40.6	<0.0010	<0.0010	<0.00020	<0.00020	35.80	<0.0050	<0.0050	0.008	0.0085	0.039	0.0094
LQL1	Lower Quinsam Lake 1 metre below surface	Average	0.00080	0.00053	0.0407	0.0236	32.2	0.0000055	0.00000373	0.00082	0.00106	0.103	0.0455	0.0084	0.00262	0.00000157	0.00000169	33.6	0.00050	0.00050	0.000100	0.000100	16.33	0.02009	0.00250	0.00317		0.028	
E292118		Count	15	15	15	15	3	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	3		1	
		Minimum	0.00046	0.00031	0.0096	0.0079	27.2	<0.000005	<0.000005	0.00053	0.00047	0.051	0.0152	0.0037	<0.0010	<0.0000020	<0.0000020	28.6	<0.0010	<0.0010	<0.00020	<0.00020	1.40	<0.0050	<0.0050	<0.0020		0.028	
		Maximum	0.00388	0.00079	0.139	0.0508	36.7	0.000022	0.0000060	0.00129	0.00485	0.223	0.0793	0.0210	0.0100	0.0000066	0.0000064	38.5	<0.0010	<0.0010	<0.00020	<0.00020	22.3	0.215	<0.0050	0.0060		0.028	
		Geometric Mean	0.00065	0.00051	0.0311	0.0207	32.0	0.0000046	0.00000344	0.00079	0.00087	0.094	0.0419	0.0072	0.00134	0.00000124	0.00000137	33.4	0.00050	0.00050	0.000100	0.000100	13.99	0.00435	0.00250	0.00247		0.028	
		Count <DL	0	0	0	0	0	14	9	0	0	0	0	0	8	13	11	0	15	15	15	15	0	12	15	2		0	
		Standard Deviation	0.00086	0.00014	0.0330	0.0120	4.8	0.0000047	0.00000158	0.00023	0.00106	0.047	0.0179	0.0053	0.00310	0.00000159	0.00000150	3.5	0.00000	0.00000	0.000000	0.000000	6.50	0.05531	4E-11	0.00257		0.000	
		1st Quartile	0.00049	0.00042	0.0152	0.0146	30.0	0.0000038	<0.000005	0.00066	0.00068	0.069	0.0375	0.0046	<0.0010	<0.000002	<0.000002	31.2	<0.0010	<0.0010	<0.00020	<0.00020	11.04	<0.0050	<0.0050	0.00175		0.028	
		Median	0.00056	0.00050	0.0360	0.0235	32.8	<0.000010	<0.000005	0.00079	0.00085	0.085	0.0441	0.0058	<0.0010	<0.000002	<0.000002	32.3	<0.0010	<0.0010	<0.00020	<0.00020	19.2	<0.0050	<0.0050	<0.0050		0.028	
		3rd Quartile	0.00070	0.00066	0.0509	0.0290	34.8	<0.00001	0.00000525	0.00092	0.00090	0.136	0.0522	0.0092	0.00415	<0.000002	0.00000160	37.0	<0.0010	<0.0010	<0.00020	<0.00020	21.30	<0.0050	<0.0050	0.00425		0.028	
LQLB	LQLB 1 metre from Bottom	Average	0.00088	0.00064	0.0420	0.0254	32.7	0.00000783	0.00000633	0.000649	0.00092	0.538	0.2397	0.1814	0.1597	0.00000115	0.00000149	32.2	0.00050	0.00050	0.000100	0.000100	15.49	0.00326	0.00409	0.00550		0.031	
E292118		Count	15	15	15	15	3	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	3		1	
		Minimum	0.00045	0.00032	0.0170	0.0069	27.7	<0.000005	<0.000005	<0.00050	0.00045	0.081	0.0432	0.0057	0.0012	<0.0000020	<0.0000020	27.3	<0.0010	<0.0010	<0.00020	<0.00020	8.26	<0.0050	<0.0050	<0.0050		0.031	
		Maximum	0.00187	0.00104	0.151	0.0543	38.1	0.000016	0.0000140	0.00120	0.00276	2.23	0.669	0.635	0.496	0.0000021	0.0000066	35.9	<0.0010	<0.0010	<0.00020	<0.00020	20.1	0.0098	0.0223	0.0088		0.031	
		Geometric Mean	0.00077	0.00060	0.0347	0.0229	32.4	0.00000693	0.00000549	0.000605	0.00084	0.295	0.1469	0.0427	0.0269	0.00000110	0.00000121	32.1	0.00050	0.00050	0.000100	0.000100	14.78	0.00292	0.00309	0.00485		0.031	
		Count <DL	0	0	0	0	0	6	4	2	0	0	0	0	0	13	13	0	15	15	15	15	0	13	13	1		0	
		Standard Deviation	0.00048	0.00023	0.0334	0.0117	5.2	0.00000415	0.00000339	0.000231	0.00054	0.610	0.2260	0.2273	0.2003	0.00000039	0.00000149	2.4	0.00000	0.00000	0.000000	0.000000	4.45	0.00209	0.00515	0.00316		0.000	
		1st Quartile	0.00050	0.00044	0.0216	0.0176	30.0	<0.000010	0.00000375	0.000565	0.00063	0.118	0.0605	0.0079	0.0042	<0.000002	<0.000002	30.5	<0.0010	<0.0010	<0.00020	<0.00020	11.06	<0.0050	<0.0050	0.00385		0.031	
		Median	0.00053	0.00055	0.0357	0.0254	32.3	0.0000070	0.0000060	0.00066	0.00087	0.168	0.0857	0.0151	0.0101	<0.000002	<0.000002	33.0	<0.0010	<0.0010	<0.00020	<0.00020	17.3	<0.0050	<0.0050	0.0052		0.031	
		3rd Quartile	0.00130	0.00086	0.0456	0.0294	35.2	0.00000950	0.00000820	0.000715	0.00093	0.856	0.4585	0.3760	0.3670	<0.000002	<0.000002	34.2	<0.0010	<0.0010	<0.00020	<0.00020	19.2	<0.0050	<0.0050	0.00700		0.031	

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 63
2016-2017 Annual Report

2015-16 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
WA			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E0126402	Middle Quinsam Lake Inlet - Quinsam River at Argonaut Road upstream of mining operation.	Average	0.00014	0.000153	0.025	0.0215	20	0.00000732	0.00001318	0.000889	0.00075	0.025	0.0143	0.00121	0.00059	0.0000011	0.0000010	21.7	0.0005	0.00050	0.000100	0.000100	1.071	0.00396	0.0025	0.00300		0.013	0.0079
		Count	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	4		4	4
		Minimum	<0.00010	<0.00010	0.0141	0.0122	16.9	<0.0000050	<0.0000050	<0.00050	0.00049	0.013	0.0094	<0.0010	<0.0010	<0.0000020	<0.0000020	18.5	<0.0010	<0.0010	<0.00020	<0.00020	<0.50	<0.0050	<0.0050	<0.0050		<0.020	0.0054
		Maximum	0.00029	0.00023	0.0373	0.0414	23.2	0.000033	0.000123	0.00199	0.00154	0.065	0.0234	0.0023	0.0018	0.0000022	<0.0000020	33.4	<0.0010	<0.0010	<0.00020	<0.00020	1.73	0.023	<0.0050	0.0045		0.022	0.0106
		Geometric Mean	0.000123	0.000138	0.0243	0.0204	19.9	0.00000586	0.00000429	0.000798	0.00070	0.023	0.0135	0.00107	0.00055	0.00000106	0.000001	21.5	0.0005	0.00050	0.000100	0.000100	0.991	0.00293	0.0025	0.00290		0.0122	0.0076
		Count <DL	3	2	0	0	0	11	11	1	0	0	0	4	13	13	14	0	14	14	14	14	1	13	14	3		3	0
		Standard Deviation	0.000067	0.000061	0.0061	0.0077	2.3	0.00000756	0.00003216	0.000434	0.0003	0.013	0.0053	0.00058	0.00035	0.00000032	0	3.6	0	0.00000	0.000000	0.000000	0.363	0.00548	1E-10	0.00100		0.006	0.0028
		1st Quartile	0.000102	0.000108	0.021	0.0168	17.9	<0.000010	<0.0000050	0.000655	0.00058	0.018	0.0100	0.00065	<0.0010	<0.0000020	<0.000002	19.8	<0.0010	<0.0010	<0.00020	<0.00020	0.835	<0.0050	<0.0050	<0.0050		<0.020	0.0056
		Median	0.00014	0.00016	0.0234	0.0196	20.8	<0.000010	<0.0000050	0.00077	0.00065	0.022	0.0117	0.00125	<0.0010	<0.0000020	<0.000002	21.2	<0.0010	<0.0010	<0.00020	<0.00020	1.175	<0.0050	<0.0050	<0.0050		<0.020	0.0078
		3rd Quartile	0.000175	0.0002	0.0302	0.0244	22	<0.000010	<0.0000050	0.00108	0.00072	0.028	0.019	0.00148	<0.0010	<0.0000020	<0.0000020	22	<0.0010	<0.0010	<0.00020	<0.00020	1.248	<0.0050	<0.0050	0.003		0.013	0.01020
WD	Settling Pond #4	Average	0.00331	0.00195	0.0164	0.01384	376	0.000009	0.00000431	0.00072	0.00046	0.440	0.01146	0.047	0.03862	0.00000125	0.000001	312	0.00065	0.00071	0.000100	0.000100	526	0.01061	0.00250	0.0038		0.01	0.0306
E207409		Count	8	8	8	8	12	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	52	8	8	1		1	1
		Minimum	0.00193	0.00118	0.0038	<0.0030	320	<0.000010	<0.0000050	<0.00050	<0.00020	0.203	<0.0050	0.0117	<0.0010	<0.0000020	<0.0000020	264	<0.0010	<0.0010	<0.00020	<0.00020	258	<0.0050	<0.0050	0.0038		<0.020	0.0306
		Maximum	0.00439	0.00259	0.0556	0.0682	434	0.000029	0.000012	0.00143	0.00162	0.651	0.0233	0.0838	0.0783	0.000003	<0.0000020	375	0.0011	0.0016	<0.00020	<0.00020	820	0.0674	<0.0050	0.0038		<0.020	0.0306
		Geometric Mean	0.00322	0.00189	0.0112	0.00733	375	0.000007	0.0000035	0.000609	0.000342	0.414	0.00959	0.0391	0.01506	0.00000115	0.000001	309	0.0006	0.0006	0.000100	0.000100	515	0.00377	0.00250	0.0038		0.01	0.0306
		Count <DL	0	0	0	1	0	6	6	2	1	0	1	0	2	7	8	0	6	8	8	8	0	7	8	0		1	0
		Standard Deviation	0.00074	0.00048	0.0176	0.02211	33	0.0000086	0.0000357	0.000421	0.000479	0.148	0.00666	0.0277	0.03026	0.00000071	0.0000000	43	0.00028	0.00042	0.000000	0.000000	106	0.02295	3E-11	0		0.0000	0
		1st Quartile	0.00308	0.0017	0.0068	0.00518	360	<0.000010	<0.0000050	0.000452	0.00026	0.333	0.0072	0.0268	0.0191	<0.0000020	<0.0000020	269	<0.0010	<0.0010	<0.00020	<0.00020	454	<0.0050	<0.0050	0.0038		<0.020	0.03060
		Median	0.0034	0.00208	0.0099	0.00625	374	<0.000010	<0.0000050	0.00065	0.000305	0.492	0.01075	0.0403	0.0355	<0.0000020	<0.0000020	311	<0.0010	<0.0010	<0.00020	<0.00020	515	<0.0050	<0.0050	0.0038		<0.020	0.031
		3rd Quartile	0.00364	0.00221	0.0152	0.0093	396	0.000007	0.00000375	0.000907	0.00043	0.516	0.01385	0.0691	0.0642	<0.0000020	<0.0000020	342	0.00065	0.00065	<0.00020	<0.00020	582	<0.0050	<0.0050	0.0038		<0.020	0.03060
MW001D	Exsitu 2-North deep groundwater well below the coal wash plant (Till)	Average		0.0195		0.0314	91.6		0.00000775		0.00179		0.0058		0.0106		0.0000056			0.0005		0.0001	25.7		0.0025		0.178		
		Count		2		2	2		2		2		2		2		2			2		2	2		2		2		
		Minimum		0.0186		0.0302	89.8		<0.0000050		0.00131		<0.0050		0.006		0.0000048			<0.0010		<0.00020	24.8		<0.0050		0.174		
		Maximum		0.0205		0.0326	93.4		0.000013		0.00227		0.0091		0.0153		0.0000064			<0.0010		<0.00020	26.6		<0.0050		0.182		
		Geometric Mean		0.0195		0.0314	91.6		0.0000057		0.00172		0.00477		0.0096		0.0000055			0.0005		0.0001	25.7		0.0025		0.178		
		Count <DL		0		0	0		1		0		1		0		0			2		2	0		2		0		
		Standard Deviation		0.0013		0.0017	2.5		0.00000742		0.00068		0.00467		0.006600		0.0000011			0		0	1.3		0		0.006		
		1st Quartile		0.0191		0.0308	90.7		0.00000512		0.00155		0.00415		0.0083		0.0000052			<0.0010		<0.00020	25.2		<0.0050		0.176		
		Median		0.0195		0.0314	91.6		0.00000775		0.00179		0.0058		0.0106		0.0000056			<0.0010		<0.00020	25.7		<0.0050		0.178		
		3rd Quartile		0.02		0.032	92.5		0.00001038		0.00203		0.00745		0.013		0.000006			<0.0010		<0.00020	26.2		<0.0050		0.180		
MW001S	Exsitu 2-North shallow groundwater well below the coal wash plant (Till)	Average		0.00024		0.0015	361		0.000093		0.00046		0.107		1.79		0.0000037			0.0022		0.0001000	884		0.0025		0.00280		
		Count		2		2	2		2		2		2		2		2			2		2	2		2		2		
		Minimum		0.00015		<0.0030	356		0.000076		0.00038		0.055		1.59		0.0000035			0.0017		<0.00020	790		<0.0050		0.0023		
		Maximum		0.00032		<0.0030	366		0.000109		0.00055		0.159		1.99		0.0000039			0.0027		<0.00020	979		<0.0050		0.0032		
		Geometric Mean		0.00022		0.0015	361		0.000091		0.00046		0.0935		1.78		0.0000037			0.0021		0.0001000	879		0.0025		0.0027		
		Count <DL		0		2	0		0		0		0		0		0			0		2	0		2		0		
		Standard Deviation		0.00012		0	7.1		0.0000233		0.00012		0.0735		0.28		0.0000003			0.0007		0.0000000	133		0		0.00060		
		1st Quartile		0.00019		<0.0030	358.5		0.0000842		0.00042		0.081		1.69		0.0000036			0.002		<0.00020	837		<0.0050		0.00250		
		Median		0.00024		<0.0030	361		0.000093		0.00046		0.107		1.79		0.0000037			0.0022		<0.00020	884		<0.0050		0.00280		
		3rd Quartile		0.00028		<0.0030	363.5		0.000101		0.00051		0.133		1.89		0.0000038			0.0024		<0.00020	931		<0.0050		0.00300		
MW006D	Exsitu 2-North deep groundwater well below the coal wash plant (Till)	Average		0.0287		0.0326	81.3		0.0000043		0.00068		0.0034		0.0009		0.0000045			0.000500		0.0001000	11.8		0.00250		0.156		
		Count		3		3	3		3		3		3		3		3			3		3	3		3		3		
		Minimum		0.0278		0.022	77.7		<0.0000050		0.0005		<0.0050		<0.0010		0.0000036			<0.0010		<0.00020	11.1		<0.0050		0.147		
		Maximum		0.0292		0.0506	84.1		0.000008		0.00082		0.0051		0.0017		0.0000054			<0.0010		<0.00020	12.7		<0.0050		0.16		
		Geometric Mean		0.0287		0.0303	81.3		0.0000037		0.00067		0.00317		0.00075		0.0000044			0.000500		0.0001000	11.7		0.0025		0.156		
		Count <DL		0		0	0		2		0		2		2		0			3		3	0		3		0		
		Standard Deviation		0.0008		0.0157	3.3		0.0000032		0.00017		0.0015		0.00069		0.0000009			0.000000		0.0000000	0.8		4E-11		0.008		
		1st Quartile		0.0284		0.0236	80		<0.0000050		0.00062		<0.0050		<0.0010		0.000004			<0.0010		<0.00020	11.3		<0.0050		0.154		
		Median		0.029		0.0251	82.2		<0.0000050		0.00073		<0.0050		<0.0010		0.0000044			<0.0010		<0.00020	11.5		<0.0050		0.16		
		3rd Quartile		0.0291		0.0378	83.2		0.00000525		0.00078		0.0038		0.0011		0.0000049			<0.0010		<0.00020	12.1		<0.0050		0.16		
MW006S	Exsitu 2-North shallow groundwater well below the coal wash plant (Till)	Average		0.0018		0.01640	191.3		0.000021		0.00118		0.0142		0.0201		0.0000049			0.0007		0.0001	573.7		0.00250		0.0561		
		Count		3		3	3		3		3		3		3		3			3		3	3		3		3		
		Minimum		0.00157		0.0069	180		0.0000107		0.00078		0.0052		0.0122		<0.000002			<0.0010		<0.00020	559		<0.0050		0.0525		
		Maximum		0.00202		0.034	199		0.0000283		0.00141		0.0226		0.0302		0.0000071			0.0011		<0.00020	585		<0.0050		0.063		
		Geometric Mean		0.00179		0.0125	191.2		0.0000194		0.00114		0.0121		0.0188		0.0000036			0.00065		0.0001000	573.6		0.0025		0.0559		
		Count <DL		0		0	0		0		0		0		0		1			2		3	0		3		0		
		Standard Deviation		0.00023		0.0153	10.0		0.000009		0.000350		0.0087		0.0092		0.0000034			0.00035		0.0000000	13.3		4E-11		0.0059		
		1st Quartile		0.00168		0.00760	187.5		0.0000174		0.00107		0.01		0.0150		0.00000385			<0.0010		<0.00020	568		<0.0050		0.0528		
		Median		0.0018		0.00830	195		0.000024		0.00136		0.0149		0.0179		0.0000067			<0.0010		<0.00020	577.0		<0.0050		0.053		
		3rd Quartile		0.00191		0.02120	197		0.0000262		0.00138		0.0188		0.0241		0.0000069			0.0008		<0.00020	581		<0.0050		0.058		
WC		Average	0.00111	0.00102	0.0151	0.01532	307	0.0000056	0.00000294	0.001084	0.000328	0.085	0.0142	0.0072	0.00512	0.000001	0.00000115	263	0.0005	0.00059	0.000123	0.000100	504	0.00250	0.00250				
E207411	2-North Pit Culvert discharge into Middle Quinsam Lake	Count	8	8	8	8	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	12	8	8				
		Minimum	0.00039	0.00073	<0.0030	<0.0030	231	<0.000010	<0.0000050	<0.00050	<0.00020	0.045	0.0079	0.0037	<0.0010	<0.0000020	<0.0000020	163	<0.0010	<0.0010	<0.00020	<0.00020	348	<0.0050	<0.0050				
		Maximum	0.00155	0.00133	0.0283	0.059	365	0.000010	0.000006	0.00692	0.00074	0.125	0.0266	0.0123	0.0087	<0.0000020	0.0000022	329	<0.0010	0.0012	0.00028	<0.00020	670	<0.0050	<0.0050				
		Geometric Mean	0.00104	0.00101	0.01127	0.00942	304	0.0000055	0.00000279	0.00038	0.000253	0.0810	0.0128	0.0068	0.00414	0.000001	0.0000011	257	0.0005	0.00056	0.000114	0.000100	495	0.00250	0.0025				
		Count <DL	0	0	1	1	0	7	7	7	3	0	0	0	1	8	7	0	8	7	7	8	0	8	8				
		Standard Deviation	0.00033	0.00021	0.00993	0.01848	47	0.0000018	0.0000012	0.002358	0.000228	0.026	0.0073	0.0027	0.00238	0	0.0000042	57	0	0.00025	0.000064	0.000000	97	3E-11	3E-11				
		1st Quartile	0.00109	0.00084	0.00865	0.00628	287	<0.000010	<0.0000050	<0.00050	<0.00020	0.067	0.00840	0.0059	0.00423	<0.0000020	<0.0000020	229	<0.0010	<0.0010	<0.00020	<0.00020	443	<0.0050	<0.0050				
		Median	0.00114	0.00108	0.0116	0.0085	297	<0.000010	<0.0000050	<0.00050	0.000325	0.092	0.0113	0.0072	0.0057	<0.0000020	<0.0000020	266	<0.0010	<0.0010	<0.00020	<0.00020	488	<0.0050	<0.0050				
		3rd Quartile	0.00124	0.00114	0.02455	0.01435	343	<0.000010	<0.0000050	<0.00050	0.000452	0.0980	0.0183	0.0083	0.00605	<0.0000020	<0.0000020	306	<0.0010	<0.0010	<0.00020	<0.00020	562	<0.0050	<0.0050				
MQL1	Middle Quinsam Lake 1 metre below surface	Average	0.00027	0.0002200	0.0198	0.0161	40.3	0.0000066	0.00000273	0.00098	0.0006	0.135	0.0225	0.0104	0.00167	0.000001	0.00000100	38.1	0.0005	0.0005	0.000159	0.0001	31.9	0.00363	0.0025	0.00335			
E206618		Count	15	15	15	15	5	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	4			
		Minimum	0.00011	0.00011	0.0064	0.0078	31	<0.000010	<0.000005	0.00055	0.00043	0.029	0.0073	0.0034	<0.0010	<0.000002	<0.000002	30.8	<0.0010	<0.0010	<0.00020	<0.00020	22.8	<0.0050	<0.0050	<0.0020			
		Maximum	0.00069	0.00034	0.0352	0.0216	49.4	0.000029	0.000006	0.00429	0.00086	1.48	0.0404	0.0283	0.0052	<0.000002	<0.000002	59.3	<0.0010	<0.0010	0.00074	<0.00020	38.9	0.0169	<0.0050	0.007			
		Geometric Mean	0.00023	0.00021	0.018	0.0153	39.8	0.0000056	0.00000265	0.00082	0.00059	0.048	0.0206	0.0082	0.00113	0.000001	0.000001	37.6	0.0005	0.0005	0.000124	0.00010000	31.4	0.00297	0.0025	0.00236			
		Count <DL	0	0	0	0	0	14	14	0	0	0	0	0	7	15	15	0	15	15	13	15	0	13	15	2			
		Standard Deviation	0.00016	0.00008	0.0083	0.0047	7	0.0000062	0.0000009	0.00093	0.00014	0.372	0.0095	0.008	0.00162	0	0	6.9	0	0	0.000173	0	5.6	0.00373	4E-11	0.00291			
		1st Quartile	0.00016	0.00016	0.0138	0.012	36.9	<0.000010	<0.0000050	0.00062	0.000500	0.034	0.0158	0.0044	<0.0010	<0.0000020	<0.0000020	34.4	<0.0010	<0.0010	<0.00020	<0.00020	26.6	<0.0050	<0.0050	<0.0020			
		Median	0.0002	0.0002000	0.0204	0.0179	39.9	<0.000010	<0.000005	0.000660	0.00058	0.037	0.0218	0.0077	0.00100	<0.0000020	<0.0000020	36.8	<0.0010	<0.0010	<0.00020	<0.00020	34.10	<0.0050	<0.0050	0.0027			
		3rd Quartile	0.00035	0.00027	0.0254	0.0194	44.2	<0.000010	<0.000005	0.00086	0.00067	0.045	0.0282	0.0124	0.00205	<0.000002	<0.000002	40	<0.0010	<0.0010	<0.00020	<0.00020	35.9	<0.0050	<0.0050	0.00505			
MQLB	Middle Quinsam Lake 1 metre from bottom	Average	0.0002	0.00019	0.01115	0.00678	40.8	0.004658	0.00003567	0.000527	0.00046	0.493	0.0813	0.429	0.3947	0.000001	0.00000100	54.8	0.00057	0.0005	0.0001	0.0001	45.6	0.004450	0.0025	0.00390			
E206618		Count	15	15	15	15	5	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	4			
		Minimum	0.00013	0.0001	<0.0030	<0.0030	36.1	<0.000010	<0.000005	<0.00050	0.00034	0.0590	0.01	0.0192	0.0028	<0.000002	<0.000002	37.1	<0.0010	<0.0010	<0.00020	<0.00020	31.6	<0.0050	<0.0050	0.0023			
		Maximum	0.00037	0.00041	0.0211	0.0106	47.3	0.0698	0.000484	0.00092	0.00068	2.75	0.534	1.58	1.5	<0.000002	<0.000002	63.2	0.0016	<0.0010	<0.00020	<0.00020	53.5	0.0317	<0.0050	0.0053			
		Geometric Mean	0.00019	0.00018	0.00927	0.00559	40.7	0.0000094	0.0000043	0.000473	0.000450	0.192	0.0383	0.1332	0.0877	0.000001	0.000001	54.5	0.00054	0.0005	0.0001	0.0001	45.3	0.00296	0.0025	0.00380			
		Count <DL	0	0	1	3	0	14	12	5	0	0	0	0	0	15	15	0	14	15	15	15	0	14	15	0			
		Standard Deviation	0.00007	0.00008	0.00592	0.00336	4.1	0.018021	0.00012406	0.000238	0.0001	0.862	0.1342	0.6029	0.5804	0	0	6	0.00028	0	0	0.00000000	5.8	0.00754	4E-11	0.00130			
		1st Quartile	0.00015	0.00013	0.00595	0.00445	39.6	<0.000010	<0.0000050	<0.00050	0.00039	0.07	0.0142	0.028	0.0182	<0.0000020	<0.0000020	53.1	<0.0010	<0.0010	<0.00020	<0.00020	44	<0.0050	<0.0050	0.0033			
		Median	0.00019	0.0001600	0.0106	0.0078	40.4	<0.000010	<0.000005	0.00054	0.000420	0.118	0.0284	0.0796	0.0768	<0.0000020	<0.0000020	55.8	<0.0010	<0.0010	<0.00020	<0.00020	45.4	<0.0050	<0.0050	0.0041			
		3rd Quartile	0.00024	0.00021	0.016	0.00955	40.8	<0.000010	<0.0000050	0.00069	0.00048	0.31	0.0874	0.6370	0.572	<0.000002	<0.000002	56.7	<0.0010	<0.0010	<0.00020	<0.00020	48.7	<0.0050	<0.0050	0.0048			

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 64
2016-2017 Annual Report

2015-16 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
NNL1			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E217018		Average	0.00029	0.000290	0.0245	0.0208	12.9	0.0000062	0.00000267	0.000339	0.00053	0.042	0.0303	0.004	0.00289	0.000001	0.000001	15	0.0005	0.0005	0.0001	0.0001	2.31	0.0142	0.00279	0.0068			
		Count	15	15	15	15	5	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	4			
		Minimum	0.00019	0.00019	0.0059	0.006	11.4	<0.000010	<0.0000050	<0.00050	0.00023	0.023	0.0112	0.0024	<0.0010	<0.0000020	<0.0000020	11.2	<0.0010	<0.0010	<0.00020	<0.00020	1.32	<0.0050	<0.0050	0.0038			
		Maximum	0.00045	0.00036	0.0486	0.0343	14.6	0.000023	0.000005	0.00068	0.00091	0.078	0.0611	0.0095	0.0084	<0.0000020	<0.0000020	17.0	<0.0010	<0.0010	<0.00020	<0.00020	3.95	0.125	0.0068	0.0133			
	No Name Lake 1 metre below surface	Geometric Mean	0.00029	0.00028	0.0215	0.0186	12.8	0.00000550	0.00000262	0.000313	0.0005	0.04	0.0266	0.00360	0.00188	0.00000100	0.00000100	14.9	0.0005	0.0005	0.0001	0.0001	2.2	0.00462	0.00267	0.00600			
		Count <DL	0	0	0	0	0	14	14	11	0	0	0	0	5	15	15	0	15	15	15	15	0	11	14	0			
		Standard Deviation	0.000070	0.00005	0.0118	0.0090	1.5	0.0000046	0.00000065	0.000158	0.00019	0.014	0.0146	0.0019	0.00237	0.00000000	0.00000000	1.6	0	0	0.00000000	0	0.78	0.03242	0.00111	0.0044			
		1st Quartile	0.00023	0.00024	0.0136	0.0122	11.5	<0.000010	<0.000005	<0.00050	0.0004	0.03	0.0174	0.0028	<0.0010	<0.000002	<0.000002	13.8	<0.0010	<0.0010	<0.00020	<0.00020	1.72	<0.0050	<0.0050	0.0044			
		Median	0.00031	0.000310	0.0227	0.0218	12.8	<0.000010	<0.0000050	<0.00050	0.00054	0.044	0.0331	0.00320	0.00280	<0.0000020	<0.0000020	15	<0.0010	<0.0010	<0.00020	<0.00020	2.03	<0.0050	<0.0050	0.005			
		3rd Quartile	0.00034	0.00032	0.033	0.0274	14.1	<0.000010	<0.0000050	0.000375	0.00066	0.047	0.0390	0.0044	0.00415	<0.0000020	<0.0000020	16.4	<0.0010	<0.0010	<0.00020	<0.00020	2.52	0.0051	<0.0050	0.0074			
NNLB		Average	0.00025	0.00022	0.0335	0.0274	11.4	0.000005	0.0000025	0.000416	0.00055	0.184	0.1027	0.0303	0.0237	0.000001	0.000001	16.7	0.0005	0.0005	0.0001	0.0001	4.82	0.0025	0.002500	0.00420			
E217018		Count	15	15	15	15	5	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	4			
		Minimum	0.00015	0.00016	0.0249	0.0202	10.2	<0.000010	<0.0000050	<0.00050	0.00029	0.092	0.0438	0.0061	0.0023	<0.0000020	<0.0000020	15.1	<0.0010	<0.0010	<0.00020	<0.00020	4.06	<0.0050	<0.0050	0.0024			
		Maximum	0.00035	0.00031	0.0434	0.0333	12.7	<0.000010	<0.0000050	0.00077	0.00139	0.416	0.197	0.094	0.0807	<0.0000020	<0.0000020	19.1	<0.0010	<0.0010	<0.00020	<0.00020	5.81	<0.0050	<0.0050	0.0067			
	No Name Lake 1 metre from bottom	Geometric Mean	0.00024	0.000210	0.0331	0.027	11.4	0.000005	0.0000025	0.000368	0.00051	0.164	0.0896	0.0161	0.0087	0.00000100	0.00000100	16.7	0.0005000	0.0005	0.0001	0.0001	4.8	0.0025	0.0025	0.00400			
		Count <DL	0	0	0	0	0	15	15	9	0	0	0	0	0	15	15	0	15	15	15	15	0	15	15	0			
		Standard Deviation	0.00006	0.00004	0.0057	0.0044	1	1E-13	1E-13	0.000218	0.00026	0.099	0.0557	0.0345	0.031	0.00000000	0.00000000	1.1	0	0.0000000	0	0	0.46	4E-11	0.000000	0.00180			
		1st Quartile	0.00023	0.0002	0.0289	0.0243	10.6	<0.000010	<0.000005	<0.00050	0.00042	0.12	0.0516	0.0074	0.003	<0.000002	<0.000002	16	<0.0010	<0.0010	<0.00020	<0.00020	4.51	<0.0050	<0.0050	0.0032			
		Median	0.00025	0.00021	0.0345	0.0286	11.5	<0.000010	<0.0000050	<0.00050	0.00048	0.136	0.0844	0.0077	0.0036	<0.0000020	<0.0000020	16.4	<0.0010	<0.0010	<0.00020	<0.00020	4.84	<0.0050	<0.0050	0.0039			
		3rd Quartile	0.00026	0.00023	0.0377	0.031	12.1	<0.000010	<0.0000050	0.000640	0.0006	0.254	0.159	0.0596	0.0505	<0.0000020	<0.0000020	17.4	<0.0010	<0.0010	<0.00020	<0.00020	5.08	<0.0050	<0.0050	0.005			
NNO		Average	0.00026	0.00026	0.0358	0.0302	12.36	0.0000055	0.00000275	0.0007	0.00073	0.061	0.0386	0.006	0.00432	0.0000010	0.0000013	14.5	0.0005	0.00050	0.000100	0.000100	1.8	0.00324	0.0025	0.00274	0.0028	0.0122	0.009
E217017		Count	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	5	5	5	5
		Minimum	0.00021	0.00019	0.02	0.0167	9.55	<0.000005	<0.000005	<0.00050	0.00034	0.044	0.0223	0.0026	<0.0010	<0.000002	<0.000002	12.4	<0.0010	<0.0010	<0.00020	<0.00020	1.19	<0.0050	<0.0050	<0.0020	<0.0020	<0.020	0.0051
		Maximum	0.00031	0.00039	0.0501	0.0434	15.3	0.000015	0.0000050	0.00193	0.00262	0.101	0.0719	0.0151	0.0137	<0.000002	0.000004	17.1	<0.0010	<0.0010	<0.00020	<0.00020	2.69	0.0099	<0.0050	0.0039	0.0042	0.021	0.0154
	No Name Lake Outlet	Geometric Mean	0.00026	0.00025	0.0347	0.0295	12.25	0.00000486	0.00000268	0.000543	0.0006	0.059	0.0352	0.0048	0.0024	0.000001	0.00000115	14.5	0.0005	0.00050	0.000100	0.000100	1.72	0.00287	0.0025	0.0025	0.00253	0.0116	0.0082
		Count <DL	0	0	0	0	0	9	9	4	0	0	0	0	3	10	9	0	10	10	10	10	0	9	10	1	1	4	0
		Standard Deviation	0.00004	0.00006	0.0089	0.0068	1.77	0.0000035	0.00000079	0.000542	0.00067	0.0190	0.0181	0.0045	0.00448	0	0.00000095	1.5	0	0.00000	0.000000	0.000000	0.59	0.00234	4E-11	0.00107	0.0012	0.0049	0.0043
		1st Quartile	0.00024	0.0002	0.0304	0.0277	11.18	<0.000010	<0.0000050	<0.00050	0.00045	0.05	0.0234	0.0027	0.00078	<0.000002	<0.0000020	13.8	<0.0010	<0.0010	<0.00020	<0.00020	1.36	<0.0050	<0.0050	0.0027	0.0025	<0.020	0.0058
		Median	0.00027	0.00026	0.0357	0.03	12.05	<0.000010	<0.000005	0.00061	0.00050	0.054	0.0327	0.0042	0.003	<0.0000020	<0.000002	14.2	<0.0010	<0.0010	<0.00020	<0.00020	1.44	<0.0050	<0.0050	0.0029	0.0028	<0.020	0.0074
		3rd Quartile	0.00029	0.0003	0.0408	0.0320	13.23	<0.000010	<0.000005	0.000893	0.00067	0.06	0.0495	0.0073	0.00578	<0.000002	<0.0000020	15.7	<0.0010	<0.0010	<0.00020	<0.00020	2.26	<0.0050	<0.0050	0.0032	0.0035	<0.020	0.011
LLS		Average	0.00474	0.00196	0.0398	0.01257	228	0.00001200	0.00001014	0.000967	0.000681	1.777	0.00836	0.4052	0.394	0.0000010	0.0000010	604	0.0036	0.0034	0.000100	0.0001	533	0.00338	0.00309				
E292131		Count	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12				
		Minimum	0.00078	0.00037	<0.0030	<0.0030	159	<0.000010	<0.0000050	<0.00050	<0.00020	0.271	<0.0050	0.0966	0.0949	<0.0000020	<0.0000020	393	0.0015	0.0015	<0.00020	<0.00020	281	<0.0050	<0.0050				
		Maximum	0.0113	0.0038	0.226	0.0651	263	0.000072	0.0000693	0.00364	0.00324	5.48	0.0334	0.602	0.58	<0.0000020	<0.0000020	791	0.0121	0.0108	<0.00020	<0.00020	709	0.0104	0.0096				
	Small Seep into Long Lake	Geometric Mean	0.00388	0.00157	0.0114	0.00559	226	0.0000073	0.00000476	0.000642	0.000268	1.265	0.00604	0.3645	0.3528	0.000001	0.000001	591	0.003	0.0029	0.000100	0.0001	511	0.00299	0.0028				
		Count <DL	0	0	2	3	0	9	7	5	7	0	4	0	0	12	12	0	0	0	12	12	0	10	11				
		Standard Deviation	0.0028	0.00117	0.06927	0.02002	32	0.0000192	0.00001914	0.000985	0.001047	1.562	0.00852	0.1543	0.1562	0	0	126	0.0029	0.0025	0.000000	0.000000	148	0.00234	0.00205				
		1st Quartile	0.00285	0.00115	0.00532	0.00278	211	<0.000010	<0.0000050	<0.00050	<0.00020	0.777	<0.0050	0.357	0.2978	<0.0000020	<0.0000020	535	0.0022	0.002	<0.00020	<0.00020	405	<0.0050	<0.0050				
		Median	0.00468	0.0016	0.0083	0.0050	243	<0.000010	<0.000005	0.000755	<0.00020	1.21	0.0065	0.447	0.438	<0.0000020	<0.0000020	648	0.0024	0.0024	<0.00020	<0.00020	580	<0.0050	<0.0050				
		3rd Quartile	0.00559	0.00282	0.02655	0.00808	249	0.0000062	0.00000592	0.001132	0.000677	2.418	0.00902	0.5075	0.5108	<0.0000020	<0.0000020	694	0.0039	0.0039	<0.00020	<0.00020	660	<0.0050	<0.0050				
LLSM		Average	0.00137	0.00096	0.02277	0.01510	195.1	0.000005	0.00000434	0.000583	0.000446	0.445	0.00489	0.1838	0.1805	0.000001	0.00000151	509	0.0027	0.0026	0.0001	0.0001	459	0.0025	0.0025				
E292131		Count	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7				
		Minimum	0.00059	0.00036	<0.0030	0.004	173	<0.000010	<0.0000050	<0.00050	<0.00020	0.249	<0.0050	0.0722	0.0591	<0.0000020	<0.0000020	455	0.0018	0.0015	<0.00020	<0.00020	370	<0.0050	<0.0050				
		Maximum	0.00188	0.00140	0.0549	0.0396	228	<0.000010	0.000009	0.00141	0.00101	0.669	0.0123	0.285	0.298	<0.0000020	0.0000032	561	0.0044	0.0041	<0.00020	<0.00020	617	<0.0050	<0.0050				
	Long Lake Middle Seep	Geometric Mean	0.00127	0.00087	0.01168	0.011	194	0.000005	0.00000379	0.000451	0.00034	0.419	0.00402	0.1628	0.1557	0.000001	0.00000134	508	0.0026	0.0025	0.000100	0.0001	451	0.0025	0.00250				
		Count <DL	0	0	2	0	0	7	4	4	1	0	4	0	0	7	5	0	0	0	7	7	0	7	7				
		Standard Deviation	0.0005	0.00041	0.02073	0.0129	22.6	1E-13	0.00000256	0.000461	0.00036	0.158	0.00366	0.0901	0.0952	0.0000000	0.0000009	39	0.0008	0.0009	0	0	90	0	0				
		1st Quartile	0.001	0.00064	0.00705	0.0053	174	<0.000010	<0.0000050	<0.00050	0.00023	0.344	<0.0050	0.1177	0.1122	<0.0000020	<0.0000020	487	0.0023	0.0021	<0.00020	<0.00020	382	<0.0050	<0.0050				
		Median	0.00156	0.00117	0.0134	0.012	193	<0.000010	<0.000005	<0.00050	0.00024	0.445	<0.0050	0.154	0.1540	<0.0000020	<0.0000020	504	0.0026	0.0023	<0.00020	<0.00020	453	<0.0050	<0.0050				
		3rd Quartile	0.00176	0.00126	0.03775	0.0199	212	<0.000010	0.00000575	0.000835	0.000655	0.531	0.00595	0.2700	0.264	<0.0000020	0.0000017	537	0.0027	0.003	<0.00020	<0.00020	505	<0.0050	<0.0050				

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 65
2016-2017 Annual Report

2015-16 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW002	Ex-situ 2-3 South shallow groundwater well beside 3-South Pit (1 Seam)	Average		0.0005		0.0032	200		0.0000074		0.000997		2.38		2.56		0.0000032			0.0026		0.000100	1195		0.0025		0.00330		
		Count		4		4	4		4		4		4		4		4			4		4	4		4		4		
		Minimum		0.00037		<0.0030	193		0.000005		<0.00020		2.06		2.29		0.0000024			0.0023		<0.00020	1150		<0.0050		0.0023		
		Maximum		0.00069		0.0059	210		0.000011		0.00369		2.77		2.69		0.0000037			0.0028		<0.00020	1220		<0.0050		0.0053		
		Geometric Mean		0.00049		0.00268	199.9		0.0000071		0.000246		2.36		2.55		0.0000031			0.0026		0.000100	1194.7		0.0025		0.0031		
		Count <DL		0		2	0		0		3		0		0		0			0		4	0		4		0		
		Standard Deviation		0.00014		0.00213	7.7		0.0000026		0.001795		0.3		0.18		0.0000006			0.0002		0.000000	31.1		0		0.0014		
		1st Quartile		0.0004		<0.0030	194.5		0.0000058		<0.00020		2.23		2.54		0.0000028			0.0026		<0.00020	1187.5		<0.0050		0.0024		
		Median		0.00047		0.0027	198.5		0.0000068		<0.00020		2.34		2.63		0.0000032			0.0028		<0.00020	1205		<0.0050		0.0028		
		3rd Quartile		0.00057		0.0044	204		0.0000084		0.000998		2.48		2.65		0.0000036			0.0028		<0.00020	1212.5		<0.0050		0.00380		
QU1009D	Ex-situ 4-South deep groundwater well. Down gradient of 4-South Mine. Base of Dunsmuir Member. Assesses vertical gradients & water quality down gradient of the 4-South Mine workings. Just outside of mine pool. (Below 3 Seam)	Average		0.122		0.02190	185.5		0.0000025		0.000100		0.205		0.0164		0.0000010			0.000500		0.0001000	80.6		0.00250		0.0340		
		Count		2		2	2		2		2		2		2		2			2		2	2		2		2		
		Minimum		0.118		0.0046	185		<0.0000050		<0.00020		0.194		0.0147		<0.0000020			<0.0010		<0.00020	76.8		<0.0050		0.03		
		Maximum		0.125		0.0392	186		<0.0000050		<0.00020		0.216		0.018		<0.0000020			<0.0010		<0.00020	84.4		<0.0050		0.038		
		Geometric Mean		0.121		0.0134	185.5		0.0000025		0.000100		0.205		0.0163		0.0000010			0.000500		0.0001000	80.5		0.00250		0.0338		
		Count <DL		0		0	0		2		2		0		0		2			2		2	0		2		0		
		Standard Deviation		0.005		0.0245	0.7		0.0000000		0.000000		0.016		0.0023		0.0000000			0.000000		0.0000000	5.4		0.00000		0.0057		
		1st Quartile		0.12		0.01320	185.2		<0.0000050		<0.00020		0.2		0.0155		<0.0000020			<0.0010		<0.00020	78.7		<0.0050		0.032		
		Median		0.122		0.02190	185.5		<0.0000050		<0.00020		0.205		0.0164		<0.0000020			<0.0010		<0.00020	80.6		<0.0050		0.034		
		3rd Quartile		0.123		0.03060	185.8		<0.0000050		<0.00020		0.21		0.0172		<0.0000020			<0.0010		<0.00020	82.5		<0.0050		0.036		
QU1009S	Ex-situ 4-South shallow groundwater well. Fracture zone 10 m below till. Assesses vertical gradients & water quality down gradient of the 4-South Mine workings. Just outside of mine pool. (Below 3 Seam)	Average		0.0857		0.00150	134.5		0.0000025		0.000100		5.42		0.366		0.0000043			0.000500		0.0001000	111.9		0.00250		0.0335		
		Count		2		2	2		2		2		2		2		2			2		2	2		2		2		
		Minimum		0.0787		<0.0030	129		<0.0000050		<0.00020		5.01		0.326		0.0000033			<0.0010		<0.00020	97.8		<0.0050		0.0333		
		Maximum		0.0927		<0.0030	140		<0.0000050		<0.00020		5.84		0.406		0.0000053			<0.0010		<0.00020	126		<0.0050		0.0338		
		Geometric Mean		0.0854		0.0015	134.4		0.0000025		0.000100		5.41		0.364		0.0000042			0.0005		0.0001000	111.0		0.00250		0.0335		
		Count <DL		0		2	0		2		2		0		0		0			2		2	0		2		0		
		Standard Deviation		0.0099		0	7.8		0.0000000		0.000000		0.59		0.057		0.0000014			0		0.0000000	19.9		0.00000		0.0004		
		1st Quartile		0.0822		<0.0030	131.8		<0.0000050		<0.00020		5.22		0.346		0.0000038			<0.0010		<0.00020	104.8		<0.0050		0.0334		
		Median		0.0857		<0.0030	134.5		<0.0000050		<0.00020		5.42		0.366		0.0000043			<0.0010		<0.00020	111.9		<0.0050		0.0335		
		3rd Quartile		0.0892		<0.0030	137.2		<0.0000050		<0.00020		5.63		0.386		0.0000048			<0.0010		<0.00020	119		<0.0050		0.0337		
SPD			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E218582	Settling Pond # 1	Average	0.00159	0.00125	0.0362	0.0179	80.00	0.0000108	0.00000818	0.00117	0.00054	0.568	0.0871	0.1744	0.15571	0.000001	0.000001	448	0.0043	0.0042	0.0001	0.000108	337.4	0.00361	0.00394	0.0131		0.5050	0.0147
		Count	13	13	13	13	10	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	36	13	13	2		2	2
		Minimum	0.00034	0.00018	0.0077	0.0031	46.20	<0.000010	<0.0000050	0.00062	0.00028	0.092	0.0103	0.0219	<0.0020	<0.0000020	<0.0000020	305	0.001	<0.0020	<0.00020	<0.00020	41.9	<0.0050	<0.0050	0.0078		<0.020	0.0053
		Maximum	0.00414	0.00333	0.0893	0.0447	110.0	0.00003	0.000020	0.0041	0.00093	1.64	0.226	0.647	0.571	<0.0000020	<0.0000020	584	0.0105	0.0116	<0.00020	<0.00040	505	0.0083	0.0079	0.0184		<2.0	0.0241
		Geometric Mean	0.00124	0.00089	0.0267	0.0131	78.1	0.0000087	0.00000596	0.00098	0.00051	0.37	0.0605	0.1008	0.04528	0.0000010	0.0000010	440	0.00310	0.00309	0.0001	0.000105	299.50	0.0032	0.00353	0.012		0.1000	0.0113
		Count <DL	0	0	0	0	0	7	5	0	0	0	0	0	1	13	13	0	0	1	13	13	0	10	9	0		2	0
		Standard Deviation	0.00114	0.00102	0.0266	0.0147	17.3	0.0000081	0.00000664	0.00096	0.00018	0.519	0.0675	0.1942	0.19427	0.0000000	0	90.0	0.0035	0.00349	0.000000	0.000028	125.7	0.00214	0.00202	0.0075		0.7	0.0133
		1st Quartile	0.00068	0.00053	0.0114	0.0075	70.7	<0.000010	<0.0000050	0.00068	0.00042	0.161	0.0305	0.0383	0.0125	<0.0000020	<0.0000020	362	0.0017	0.0017	<0.00020	<0.00020	288.8	<0.0050	<0.0050	0.0104		0.2575	0.01
		Median	0.00130	0.00083	0.029	0.0111	80.2	<0.000010	0.0000054	0.00079	0.00049	0.267	0.0777	0.124	0.106	<0.0000020	<0.0000020	475	0.0021	0.0024	<0.00020	<0.00020	359.00	<0.0050	<0.0050	0.0131		0.505	0.01470
		3rd Quartile	0.00205	0.00203	0.0547	0.0242	89.4	0.000018	0.00001100	0.00104	0.00066	0.94	0.1150	0.157	0.161	<0.0000020	<0.0000020	502	0.0071	0.0058	<0.00020	<0.00020	426	<0.0050	0.0054	0.01580		0.7525	0.01940
LLE	Long Lake Entrance (LLE)	Average	0.00092	0.00072	0.0889	0.03440	55.9	0.00000700	0.00000361	0.001265	0.00079	0.418	0.1551	0.107	0.0912	0.000001	0.0000010	250	0.00082	0.00072	0.000115	0.000100	210.4	0.00353	0.00250	0.0092	0.0045	0.0392	0.01736
E292130		Count	11	11	11	11	11	11	11	11	11	11	11	11	11	10	11	11	11	11	11	11	41	11	11	19	1	12	12
		Minimum	0.00027	0.00025	0.0137	0.0044	39.2	<0.000010	<0.0000050	<0.00050	0.00022	0.268	0.0239	0.0171	0.0019	<0.0000020	<0.0000020	140	<0.0010	<0.0010	<0.00020	<0.00020	64.6	<0.0050	<0.0050	0.004	0.0045	<0.020	<0.0050
		Maximum	0.00197	0.00133	0.235	0.0803	82.1	0.0000270	0.0000062	0.00568	0.00343	0.753	0.406	0.26	0.258	<0.0000020	<0.0000020	416	0.0023	0.0019	0.00026	<0.00020	481	0.0109	<0.0050	0.0319	0.0045	0.11	0.0470
		Geometric Mean	0.00078	0.00064	0.0648	0.0226	54.2	0.0000058	0.00000334	0.000859	0.00053	0.403	0.1124	0.0766	0.0511	0.000001	0.000001	233.0	0.00066	0.00062	0.000109	0.000100	192.9	0.00307	0.00250	0.0079	0.0045	0.0263	0.0113
		Count <DL	0	0	0	0	0	10	7	2	0	0	0	0	0	10	11	0	9	9	10	11	0	9	11	0	0	5	2
		Standard Deviation	0.00055	0.00037	0.0655	0.02750	14.9	0.0000066	0.00000158	0.001516	0.00094	0.131	0.1212	0.0836	0.0821	0	0	101	0.00071	0.00049	0.000048	0.000000	91.5	0.0026	0.00000	0.0062	0	0.0351	0.01594
		1st Quartile	0.00051	0.00046	0.0385	0.008	46.1	<0.000010	<0.0000050	0.000665	0.00027	0.332	0.067	0.0377	0.031	<0.0000020	<0.0000020	184	<0.0010	<0.0010	<0.00020	<0.00020	145	<0.0050	<0.0050	0.0053	0.0045	<0.020	0.00575
		Median	0.00085	0.00064	0.0917	0.0345	49.2	<0.000010	<0.000005	0.00084	0.00042	0.411	0.105	0.0839	0.0785	<0.0000020	<0.0000020	215	<0.0010	<0.0010	<0.00020	<0.00020	189	<0.0050	<0.0050	0.0083	0.0045	0.028	0.01145
		3rd Quartile	0.00122	0.00094	0.114	0.049	64.2	<0.000010	0.000005	0.0012	0.00072	0.452	0.2205	0.173	0.129	<0.0000020	<0.0000020	314	<0.0010	<0.0010	<0.00020	<0.00020	235	<0.0050	<0.0050	0.01050	0.0045	0.0555	0.02232
LLM1	Long Lake Middle 1 metre below Surface	Average	0.00056	0.00052	0.0147	0.0102	33.3	0.00005470	0.0000025	0.000579	0.00040	0.037	0.015	0.0082	0.0012	0.000001	0.000001	94	0.00059	0.00050	0.000213	0.000100	81.1	0.00415	0.00250	0.00268			
E206619		Count	15	15	15	15	5	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	4			
		Minimum	0.00037	0.00034	0.0064	0.0035	26	<0.000010	<0.0000050	<0.00050	0.00029	0.018	0.0057	0.0036	<0.0010	<0.0000020	<0.0000020	66	<0.0010	<0.0010	<0.00020	<0.00020	44.8	<0.0050	<0.0050	<0.0020			
		Maximum	0.00084	0.00094	0.0327	0.0175	39.5	0.000699	<0.0000050	0.00219	0.00054	0.08	0.0306	0.0193	0.0053	<0.0000020	<0.0000020	125	0.0019	<0.0010	0.00179	<0.00020	108	0.0128	<0.0050	0.0046			
		Geometric Mean	0.00054	0.0005	0.0131	0.0094	32.8	0.0000093	0.0000025	0.00039	0.00039	0.034	0.0132	0.0071	0.00083	0.000001	0.000001	91.6	0.00055	0.00050	0.000121	0.000100	78.2	0.00345	0.00250	0.00234			
		Count <DL	0	0	0	0	0	11	15	11	0	0	0	0	10	15	15	0	14	15	14	15	0	11	15	1			
		Standard Deviation	0.00015	0.00015	0.0076	0.0039	6.3	0.00017840	1E-13	0.000671	0.00009	0.019	0.0073	0.0049	0.00134	0	0	21.6	0.00036	0.00000	0.000436	0.000000	20.9	0.00313	0.00000	0.00148			
		1st Quartile	0.00044	0.00042	0.0096	0.0079	27.5	<0.000010	<0.0000050	<0.00050	0.00035	0.024	0.009	0.0048	<0.0010	<0.0000020	<0.0000020	73.4	<0.0010	<0.0010	<0.00020	<0.00020	59.6	<0.0050	<0.0050	0.00205			
		Median	0.00051	0.00048	0.0133	0.01	34.6	<0.000010	<0.0000050	<0.00050	0.00037	0.033	0.016	0.0069	<0.0010	<0.0000020	<0.0000020	90.5	<0.0010	<0.0010	<0.00020	<0.00020	88.3	<0.0050	<0.0050	0.00255			
		3rd Quartile	0.00064	0.00058	0.0176	0.0128	38.8	0.00001100	<0.0000050	0.000485	0.00048	0.0420	0.019	0.0086	0.00135	<0.0000020	<0.0000020	114	<0.0010	<0.0010	<0.00020	<0.00020	97.4	0.0045	<0.0050	0.00318			

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 66
2016-2017 Annual Report

2015-16 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LLMB	Long Lake Middle 1 metre From Bottom	Average	0.00032	0.00026	0.0126	0.00773	46.1	0.00000500	0.00000283	0.000432	0.00041	0.059	0.01377	2.345	2.141	0.000001	0.000001	124.2	0.00050	0.00050	0.000100	0.000109	107.8	0.00271	0.00250	0.00310			
E206619		Count	15	15	15	15	5	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	4			
		Minimum	0.00024	0.00021	0.0032	<0.0030	43.2	<0.000010	<0.0000050	<0.00050	0.00023	0.021	<0.0050	0.291	0.238	<0.0000020	<0.0000020	114	<0.0010	<0.0010	<0.00020	<0.00020	104	<0.0050	<0.0050	0.0025			
		Maximum	0.00044	0.00033	0.0211	0.0127	49.6	<0.000010	0.000005	0.00107	0.00064	0.116	0.0402	5.69	5.41	<0.0000020	<0.0000020	132	<0.0010	<0.0010	<0.00020	0.00023	115	0.0056	<0.0050	0.0034			
		Geometric Mean	0.00031	0.00026	0.0112	0.00615	46.1	0.000005	0.00000274	0.000364	0.0004	0.052	0.00974	1.35	1.206	0.000001	0.000001	124.1	0.00050	0.00050	0.000100	0.000106	107.8	0.00264	0.00250	0.00300			
		Count <DL	0	0	0	3	0	15	13	10	0	0	2	0	0	15	15	0	15	15	15	14	0	14	15	0			
		Standard Deviation	0.00006	0.00004	0.0056	0.00418	2.4	1E-13	0.00000088	0.00029	0.00013	0.031	0.01174	2.09	1.9470	0	0	5.1	0.00000	0.00000	0.000000	0.000034	3.4	0.0008	0.00000	0.00040			
		1st Quartile	0.00027	0.00024	0.0092	0.0049	44.8	<0.000010	<0.0000050	<0.00050	0.00033	0.034	0.0058	0.391	0.335	<0.0000020	<0.0000020	120	<0.0010	<0.0010	<0.00020	<0.00020	105	<0.0050	<0.0050	0.0029			
		Median	0.00032	0.00026	0.0114	0.0084	46.4	<0.000010	<0.000005	<0.00050	0.00038	0.053	0.00890	1.91	1.83	<0.0000020	<0.0000020	125	<0.0010	<0.0010	<0.00020	<0.00020	108.0	<0.0050	<0.0050	0.0032			
		3rd Quartile	0.00035	0.0003	0.0166	0.0115	46.6	<0.000010	<0.0000050	0.000585	0.00046	0.076	0.02410	4.165	3.615	<0.0000020	<0.0000020	128.5	<0.0010	<0.0010	<0.00020	<0.00020	109	<0.0050	<0.0050	0.0033			
LLO	Long Lake Outlet	Average	0.00044	0.0004	0.0179	0.0117	32.7	0.0000048	0.00000250	0.000735	0.00047	0.0429	0.01723	0.0094	0.00186	0.000001	0.000001	91.2	0.00321	0.00050	0.000212	0.000100	66.2	0.00405	0.00250	0.00506		0.088	0.00588
E219412		Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	52	15	15	5		5	5
		Minimum	0.00035	0.00027	0.0039	0.0038	20.8	<0.000005	<0.0000050	<0.00050	0.00027	<0.010	<0.0050	0.0031	<0.0010	<0.0000020	<0.0000020	44.4	<0.0010	<0.0010	<0.00020	<0.00020	11.7	<0.0050	<0.0050	<0.0050		<0.020	<0.0050
		Maximum	0.00059	0.00049	0.0371	0.025	40.6	<0.000010	<0.0000050	0.00559	0.00129	0.099	0.039	0.0229	0.0056	<0.0000020	<0.0000020	123	0.0412	<0.0010	0.00178	<0.00020	113	0.0258	<0.0050	0.0098		0.295	0.009
		Geometric Mean	0.00044	0.00039	0.0145	0.0098	32.1	0.0000048	0.0000025	0.000407	0.00043	0.0314	0.01251	0.0078	0.00129	0.0000010	0.0000010	87.6	0.00067	0.00050	0.000121	0.000100	57.9	0.00292	0.00250	0.00442		0.0372	0.00504
		Count <DL	0	0	0	0	0	15	15	10	0	2	2	0	6	15	15	0	14	15	14	15	0	14	15	2		2	2
		Standard Deviation	0.00007	0.00007	0.011	0.0066	6.1	0.0000006	1E-13	0.001364	0.00025	0.0294	0.01226	0.0059	0.00165	0	0	24.9	0.01051	0.00000	0.000434	0.000000	29.2	0.00602	4E-11	0.00299		0.1217	0.00323
		1st Quartile	0.00038	0.00035	0.0084	0.0056	27.7	<0.000010	<0.000005	<0.00050	0.00034	0.0195	0.0064	0.0047	<0.0010	<0.00002	<0.000002	67.9	<0.0010	<0.0010	<0.00020	<0.00020	42.1	<0.0050	<0.0050	<0.0050		<0.020	<0.0050
		Median	0.00045	0.00041	0.0158	0.0125	35.2	<0.000010	<0.0000050	<0.00050	0.0004	0.034	0.0138	0.0091	0.0016	<0.0000020	<0.0000020	101	<0.0010	<0.0010	<0.00020	<0.00020	66.1	<0.0050	<0.0050	0.0051		0.024	0.0066
		3rd Quartile	0.00048	0.00046	0.0278	0.0168	37.7	<0.000010	<0.0000050	0.0006	0.00044	0.064	0.0292	0.0120	0.0022	<0.0000020	<0.0000020	112.5	<0.0010	<0.0010	<0.00020	<0.00020	90.8	<0.0050	<0.0050	0.0054		0.101	0.00880
WB	Middle Quinsam Lake Outlet	Average	0.00024	0.00022	0.0185	0.015	39	0.0000049	0.0000028	0.000687	0.00057	0.045	0.0196	0.0109	0.00107	0.0000010	0.0000010	40.9	0.00073	0.00050	0.000100	0.000100	34.6	0.00250	0.00250	0.00536		0.0100	0.00892
E0900504		Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	5		5	5
		Minimum	0.00012	0.00013	0.0068	0.0072	26.4	<0.000005	<0.0000050	<0.00050	0.00046	0.03	0.0093	0.0027	<0.0010	<0.0000020	<0.0000020	27.5	<0.0010	<0.0010	<0.00020	<0.00020	18.3	<0.0050	<0.0050	<0.0050		<0.020	<0.0050
		Maximum	0.00044	0.00034	0.0257	0.0211	48	0.000006	0.0000007	0.00169	0.00086	0.094	0.0392	0.0188	0.0059	<0.0000020	<0.0000020	62.2	0.0026	<0.0010	<0.00020	<0.00020	48.7	<0.0050	<0.0050	0.0102		<0.020	0.016
		Geometric Mean	0.00023	0.000210	0.0175	0.0143	38.3	0.00000483	0.00000268	0.000599	0.00056	0.042	0.0185	0.009	0.00073	0.000001	0.000001	39.8	0.00061	0.00050	0.000100	0.000100	33.5	0.00250	0.00250	0.00458		0.0100	0.00664
		Count <DL	0	0	0	0	0	14	14	3	0	0	0	0	11	15	15	0	13	15	15	15	0	15	15	2		5	2
		Standard Deviation	0.00009	0.00008	0.0058	0.0046	7.3	0.00000071	0.00000116	0.000379	0.0001	0.0180	0.0073	0.0057	0.00141	0	0	10	0.00062	0.00000	0.000000	0.000000	8.5	4E-11	4E-11	0.00332		0	0.00651
		1st Quartile	0.00018	0.00015	0.0144	0.0108	32.2	<0.000010	<0.000005	0.000535	0.00052	0.032	0.0154	0.0046	<0.0010	<0.000002	<0.000002	35.4	<0.0010	<0.0010	<0.00020	<0.00020	29.3	<0.0050	<0.0050	<0.0050		<0.020	<0.0050
		Median	0.00025	0.000230	0.0202	0.0157	40.9	<0.000010	<0.0000050	0.00062	0.00055	0.041	0.0179	0.0122	<0.0010	<0.0000020	<0.0000020	37	<0.0010	<0.0010	<0.00020	<0.00020	35.0	<0.0050	<0.0050	0.0044		<0.020	0.0086
		3rd Quartile	0.00029	0.000280	0.0234	0.019	46	<0.000010	<0.000005	0.00072	0.00058	0.045	0.0238	0.0152	0.0008	<0.0000020	<0.0000020	44	<0.0010	<0.0010	<0.00020	<0.00020	38.7	<0.0050	<0.0050	0.0072		<0.020	0.015
7SSD	Settling Pond at 7S- Discharge to Stream 1 -7S		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E292069		Average	0.00265	0.00224	0.2187	0.0147	134.2	0.0000096	0.00000485	0.00181	0.00093	0.34	0.01843	0.0741	0.03816	0.00000109	0.00000116	172	0.00063	0.00071	0.00011	0.0001	35.3	0.00845	0.00308				
		Count	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20				
		Minimum	0.00067	0.00037	0.0088	<0.0030	50.1	<0.000005	<0.0000050	0.00087	0.00049	0.037	<0.0050	0.0109	<0.0010	<0.0000020	<0.0000020	60.2	<0.0010	<0.0010	<0.00020	<0.00020	10.5	<0.0050	<0.0050				
		Maximum	0.00952	0.00921	0.927	0.0508	208	0.000031	0.000021	0.00371	0.00202	1.16	0.0547	0.16	0.0962	0.0000028	0.0000042	298	0.0012	0.0046	0.00029	<0.00020	98.6	0.0912	0.0142				
		Geometric Mean	0.00198	0.00139	0.0953	0.00797	122.4	0.00000740	0.00000358	0.00167	0.00087	0.203	0.0117	0.0601	0.01342	0.00000105	0.00000107	157	0.00059	0.00056	0.000105	0.000100	29.2	0.00379	0.00273				
		Count <DL	0	0	0	5	0	13	15	0	0	0	3	0	4	19	19	0	16	19	19	20	0	16	19				
		Standard Deviation	0.00243	0.00252	0.2831	0.01484	51.4	0.0000082	0.0000051	0.00079	0.00038	0.366	0.01779	0.0428	0.0341	0.0000004	0.00000072	69.2	0.00026	0.00092	0.000042	0.000000	23.9	0.01987	0.00262				
		1st Quartile	0.00123	0.00066	0.032	0.00278	89	<0.000010	<0.0000050	0.0014	0.00071	0.109	0.00622	0.0369	0.0025	<0.0000020	<0.0000020	125.0	<0.0010	<0.0010	<0.00020	<0.00020	20	<0.0050	<0.0050				
		Median	0.00171	0.00117	0.0872	0.0083	153	<0.000010	<0.000005	0.0016	0.0008	0.162	0.0105	0.0844	0.040	<0.0000020	<0.0000020	177	<0.0010	<0.0010	<0.00020	<0.00020	25.6	<0.0050	<0.0050				
		3rd Quartile	0.00268	0.00241	0.276	0.0219	166.5	0.0000105	0.0000031	0.00186	0.00117	0.446	0.02672	0.0925	0.06542	<0.000002	<0.000002	204.8	<0.0010	<0.0010	<0.00020	<0.00020	41.8	<0.0050	<0.0050				
7S	Stream 1-7S discharge to LWO	Average	0.000108	0.000149	0.0474	0.0396	18.9	0.00000622	0.0000035	0.009704	0.00055	0.0235	0.00976	0.00057	0.0005	0.00000111	0.00000112	20.1	0.00050	0.00050	0.000100	0.000100	4.280	0.00250	0.00250				
E292109		Count	18	18	18	18	17	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	17	18	18				
		Minimum	<0.00010	<0.00010	0.0163	0.0129	11.4	<0.000005	<0.0000050	<0.00050	0.00027	<0.010	<0.0050	<0.0010	<0.0010	<0.0000020	<0.0000020	13	<0.0010	<0.0010	<0.00020	<0.00020	2.19	<0.0050	<0.0050				
		Maximum	0.00022	0.00039	0.134	0.0948	38	0.0000320	0.000008	0.165	0.00197	0.09	0.032	0.0018	<0.0010	0.0000029	0.0000022	40.9	<0.0010	<0.0010	<0.00020	<0.00020	7.65	<0.0050	<0.0050				
		Geometric Mean	0.000098	0.000114	0.0372	0.032	17.7	0.00000513	0.00000314	0.000643	0.00046	0.0152	0.00647	0.00054	0.0005	0.00000106	0.00000109	19.2	0.00050	0.00050	0.000100	0.000100	4.08	0.00250	0.00250				
		Count <DL	5	7	0	0	0	17	14	8	0	6	7	17	18	17	16	0	18	18	18	18	0	18	18				
		Standard Deviation	0.000047	0.000110	0.0363	0.0273	7.4	0.00000648	0.00000196	0.038758	0.00042	0.0243	0.00953	0.00031	0	0.00000045	0.00000036	7	0.00000	0.00000	0.000000	0.000000	1.45	3E-11	3E-11				
		1st Quartile	0.000062	<0.00010	0.0187	0.0173	12.3	<0.000010	<0.0000050	<0.00050	0.00033	<0.010	<0.0050	<0.0010	<0.0010	<0.0000020	<0.0000020	14.8	<0.0010	<0.0010	<0.00020	<0.00020	3.26	<0.0050	<0.0050				
		Median	0.00011	0.00012	0.0374	0.0337	16	<0.000010	<0.000005	0.00053	0.00038	0.015	0.0064	<0.0010	<0.0010	<0.0000020	<0.0000020	18.6	<0.0010	<0.0010	<0.00020	<0.00020	3.99	<0.0050	<0.0050				
		3rd Quartile	0.00013	0.000205	0.0604	0.0511	23.9	<0.000010	<0.0000050	0.000932	0.00055	0.0265	0.01078	<0.0010	<0.0010	<0.000002	<0.0000020	23.4	<0.0010	<0.0010	<0.00020	<0.00020	4.84	<0.0050	<0.0050				
QU0813A	Ex-situ 7-South groundwater well down gradient of the CCR backfill towards QR (No. 4 Seam)	Average		0.4		0.0099	171.5		0.0000025		0.000100		0.21		0.052		0.0000018			0.000500		0.0001000	18.4		0.00250		0.1750		
		Count		4		4	4		4		4		4		4		4			4		4	4		4		4		
		Minimum		0.393		0.0032	162		<0.0000050		<0.00020		0.176		0.0346		<0.0000020			<0.0010		<0.00020	14.5		<0.0050		0.137		
		Maximum		0.415		0.0251	179		<0.0000050		<0.00020		0.262		0.0739		0.0000041			<0.0010		<0.00020	24.3		<0.0050		0.216		
		Geometric Mean		0.4		0.0069	171.4		0.0000025		0.000100		0.208		0.0501		0.0000014			0.000500		0.0001000	18		0.00250		0.1720		
		Count <DL		0		0	0		4		4		0		0		3			4		4	0		4		0		
		Standard Deviation		0.01		0.0103	7.1		0		0.000000		0.037		0.0163		0.0000016			0.000000		0.0000000	4.7		0.00000		0.0330		
		1st Quartile		0.395		0.0038	168.8		<0.0000050		<0.00020		0.193		0.0446		<0.0000020			<0.0010		<0.00020	14.7		<0.0050		0.16		
		Median		0.396		0.0056	172.5		<0.0000050		<0.00020		0.202		0.0497		<0.000002			<0.0010		<0.00020	17.5		<0.0050		0.173		
		3rd Quartile		0.402		0.0116	175.2		<0.0000050		<0.00020		0.219		0.057		0.00000178			<0.0010		<0.00020	21.2		<0.0050		0.188		
QU0813B	Ex-situ 7-South groundwater well down gradient of the CCR backfill towards QR (Till & SST contact)	Average		0.468		0.0332	120.2		0.0000034		0.000100		0.1124		0.0896		0.0000028			0.000500		0.0001000	9.19		0.00250		0.1920		
		Count		4		4	4		4		4		4		4		4			4		4	4		4		4		
		Minimum		0.455		0.0057	116		<0.0000050		<0.00020		0.084		0.0808		<0.0000020			<0.0010		<0.00020	8.72		<0.0050		0.155		
		Maximum		0.487		0.112	125		0.000006		<0.00020		0.156		0.107		0.0000069			<0.0010		<0.00020	9.44		<0.0050		0.208		
		Geometric Mean		0.467		0.0137	120.2		0.0000031		0.000100		0.1089		0.0891		0.0000020			0.000500		0.0001000	9.19		0.00250		0.1910		
		Count <DL		0		0	0		3		4		0		0		2			4		4	0		4		0		
		Standard Deviation		0.015		0.0526	4.4		0.0000018		0.000000		0.033		0.0119		0.0000028			0.000000		0.0000000	0.3		0.00000		0.0250		
		1st Quartile		0.457		0.0062	116.8		<0.0000050		<0.00020		0.088		0.0824		<0.000002			<0.0010		<0.00020	9.11		<0.0050		0.19		
		Median		0.464		0.0074	120		<0.000005		<0.00020		0.1047		0.0854		0.00000165			<0.0010		<0.00020	9.3		<0.0050		0.203		
		3rd Quartile		0.474		0.0344	123.5		0.00000338		<0.00020		0.129		0.0926		0.00000345			<0.0010		<0.00020	9.39		<0.0050		0.206		

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 67
2016-2017 Annual Report

2015-16 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
QU0821GD	Ex-situ 2-North groundwater well down gradient of u/g tailings disposal, measures water quality & hydraulic gradients downstream of Forjan Fault (No. 4 Seam)	Average		0.161		0.0116	206.0		0.000006		0.000133		1.075		0.171		0.0000021			0.00067		0.000133	0.25		0.00333		0.049		
		Count		3		3	3		3		3		3		3		3			3		3	3		3		3		
		Minimum		0.116		0.0034	191		<0.000010		<0.00020		0.735		0.127		<0.0000020			<0.0010		<0.00020	<0.50		<0.0050		0.0224		
		Maximum		0.222		0.0174	216		0.000007		<0.00040		1.41		0.194		0.0000032			<0.0020		<0.00040	<0.50		<0.010		0.0703		
		Geometric Mean		0.155		0.0094	205.7		0.00000594		0.000126		1.038		0.168		0.0000019			0.00063		0.000126	0.25		0.00315		0.0441		
		Count <DL		0		0	0		1		3		0		0		1			3		3	3		3		0		
		Standard Deviation		0.055		0.00730	13.2		0.000001		0.000058		0.338		0.038		0.0000011			0.00029		0.000058	0		0.00144		0.0244		
		1st Quartile		0.131		0.0087	201		0.0000055		<0.00020		0.908		0.159		0.0000016			<0.0010		<0.00020	<0.50		<0.0050		0.0383		
		Median		0.146		0.0141	211		0.000006		<0.00020		1.08		0.191		0.0000022			<0.0010		<0.00020	<0.50		<0.0050		0.0543		
		3rd Quartile		0.184		0.0158	213.5		0.0000065		0.00015		1.245		0.192		0.0000027			0.00075		0.00015	<0.50		0.00375		0.0623		
QU0821GS	Ex-situ 2-North groundwater well down gradient of u/g tailings disposal, measures water quality & hydraulic gradients downstream of Forjan Fault (No. 1 Seam)	Average		0.274		0.009	196.5		0.0000034		0.0001		0.786		0.1498		0.0000024			0.000500		0.0001000	0.725		0.00685		0.205		
		Count		4		4	4		4		4		4		4		4			4		4	4		4		3		
		Minimum		0.215		0.0044	190		<0.0000050		<0.00020		0.381		0.0831		<0.0000020			<0.0010		<0.00020	<0.50		<0.0050		0.127		
		Maximum		0.365		0.0177	201		0.000006		<0.00020		1.06		0.191		0.0000044			<0.0010		<0.00020	2.15		0.0199		0.249		
		Geometric Mean		0.267		0.0078	196.4		0.0000031		0.0001		0.726		0.1426		0.0000020			0.000500		0.0001000	0.428		0.0042		0.197		
		Count <DL		0		0	0		3		4		0		0		2			4		4	3		3		0		
		Standard Deviation		0.069		0.0059	5.4		0.0000018		0		0.326		0.0491		0.0000017			0.000000		0.0000000	0.95		0.0087		0.068		
		1st Quartile		0.223		0.006	193		<0.0000050		<0.00020		0.592		0.128		<0.0000020			<0.0010		<0.00020	<0.50		<0.0050		0.184		
		Median		0.257		0.007	197.5		<0.0000050		<0.00020		0.852		0.1625		0.00000215			<0.0010		<0.00020	<0.50		<0.0050		0.24		
		3rd Quartile		0.307		0.0099	201		0.00000338		<0.00020		1.045		0.1842		0.00000358			<0.0010		<0.00020	0.725		0.00685		0.244		
QU1010D	Ex-situ 2-North deep groundwater well. Down gradient of u/g tailings disposal, measures water quality & hydraulic head downstream of 2-North workings. (No. 1 Seam / Mudstone).	Average		0.0148		0.0128	95.1		0.000006		0.00010		10.9		0.514		0.0000053			0.00050		0.000100	1.087		0.0025		0.07560		
		Count		3		3	3		3		3		3		3		3			3		3	3		3		3		
		Minimum		0.0143		0.0053	91.2		0.000005		<0.00020		10.1		0.51		0.0000039			<0.0010		<0.00020	<0.50		<0.0050		0.0688		
		Maximum		0.0151		0.0271	97.3		0.000007		<0.00020		11.3		0.517		0.0000061			<0.0010		<0.00020	<5.0		<0.0050		0.0814		
		Geometric Mean		0.0148		0.0095	95.1		0.000006		0.00010		10.9		0.514		0.0000052			0.00050		0.000100	0.683		0.0025		0.07550		
		Count <DL		0		0	0		0		3		0		0		0			3		3	2		3		0		
		Standard Deviation		0.0005		0.0124	3.4		0.000001		0.00000		0.7		0.00		0.0000012			0.00000		0.000000	1.2		0.0000		0.00640		
		1st Quartile		0.0147		0.0056	94		0.000006		<0.00020		10.6		0.512		0.000005			<0.0010		<0.00020	0.38		<0.0050		0.0728		
		Median		0.0151		0.0059	96.8		0.000007		<0.00020		11.2		0.514		0.000006			<0.0010		<0.00020	0.51		<0.0050		0.0767		
		3rd Quartile		0.0151		0.0165	97		0.000007		<0.00020		11.2		0.516		0.000006			<0.0010		<0.00020	1.505		<0.0050		0.0791		
QU1010S	Ex-situ 2-North shallow groundwater well. Down gradient of u/g tailings disposal, measures water quality & hydraulic head downstream of 2-North workings. (No. 1 Seam / Sandstone).	Average		0.122		0.01023	147.7		0.0000025		0.0001		0.278		0.0347		0.0000010			0.000500		0.0001000	16.6		0.00250		0.0532		
		Count		3		3	3		3		3		3		3		3			3		3	3		3		3		
		Minimum		0.121		<0.0030	144		<0.000005		<0.00020		0.217		0.0318		<0.000002			<0.0010		<0.00020	14.8		<0.0050		0.0516		
		Maximum		0.123		0.0225	152		<0.000005		<0.00020		0.339		0.0385		<0.000002			<0.0010		<0.00020	18		<0.0050		0.0545		
		Geometric Mean		0.122		0.00609	147.6		0.0000025		0.0001		0.273		0.0346		0.0000010			0.000500		0.0001000	16.5		0.0025		0.0532		
		Count <DL		0		1	0		3		3		0		0		3			3		3	0		3		0		
		Standard Deviation		0.001		0.01094	4.0		0.0000000		0		0.061		0.0035		0.0000000			0.000000		0.0000000	1.6		4E-11		0.0015		
		1st Quartile		0.122		0.0041	145.5		<0.0000050		<0.00020		0.248		0.0328		<0.0000020			<0.0010		<0.00020	15.9		<0.0050		0.0525		
		Median		0.123		0.0067	147		<0.0000050		<0.00020		0.278		0.0337		<0.0000020			<0.0010		<0.00020	17		<0.0050		0.0534		
		3rd Quartile		0.123		0.0146	149.5		<0.0000050		<0.00020		0.308		0.0361		<0.0000020			<0.0010		<0.00020	17.5		<0.0050		0.054		
QU1011D	Ex-situ 2-North deep groundwater well. Measures water quality & hydraulic gradient in Forjian Fault (Fractured sandstone).	Average		0.0169		0.0143	205		0.0000025		0.00226		0.747		0.22		0.0000042			0.0005		0.0001	5.9		0.0025		0.030		
		Count		1		1	1		1		1		1		1		1			1		1	1		1		1		
		Minimum		0.0169		0.0143	205		<0.0000050		0.00226		0.747		0.22		0.0000042			<0.0010		<0.00020	5.89		<0.0050		0.0304		
		Maximum		0.0169		0.0143	205		<0.0000050		0.00226		0.747		0.22		0.0000042			<0.0010		<0.00020	5.89		<0.0050		0.0304		
		Geometric Mean		0.0169		0.0143	205		0.0000025		0.00226		0.747		0.22		0.0000042			0.0005		0.0001	5.9		0.0025		0.030		
		Count <DL		0		0	0		1		0		0		0		0			1		1	0		1		0		
		Standard Deviation		0.00000		0.0000	0		0.0000000		0.00000		0.00		0.000		0.0000000			0.00000		0.000000	0.0		0.0000		0.000		
		1st Quartile		0.0169		0.0143	205		<0.0000050		0.00226		0.747		0.22		0.0000042			<0.0010		<0.00020	5.89		<0.0050		0.0304		
		Median		0.0169		0.0143	205		<0.0000050		0.00226		0.747		0.22		0.0000042			<0.0010		<0.00020	5.89		<0.0050		0.0304		
		3rd Quartile		0.0169		0.0143	205		<0.0000050		0.00226		0.747		0.22		0.0000042			<0.0010		<0.00020	5.89		<0.0050		0.0304		
QU1011S	Ex-situ 2-North shallow groundwater well. Measures water quality & hydraulic gradient in Forjian Fault (Fractured sandstone).	Average		0.00223		0.0168	86		0.0000060		0.00041		0.227		0.0564		0.0000052			0.0005		0.0001000	4.26		0.00250		0.0073		
		Count		1		1	1		1		1		1		1		1			1		1	1		1		1		
		Minimum		0.00223		0.0168	86		0.000006		0.00041		0.227		0.0564		0.0000052			<0.0010		<0.00020	4.26		<0.0050		0.0073		
		Maximum		0.00223		0.0168	86		0.000006		0.00041		0.227		0.0564		0.0000052			<0.0010		<0.00020	4.26		<0.0050		0.0073		
		Geometric Mean		0.00223		0.0168	86		0.0000060		0.00041		0.227		0.0564		0.0000052			0.0005		0.0001000	4.26		0.0025		0.0073		
		Count <DL		0		0	0		0		0		0		0		0			1		1	0		1		0		
		Standard Deviation		0		0	0		0.0000000		0		0		0		0.0000000			0		0.0000000	0		0		0		
		1st Quartile		0.00223		0.0168	86		0.000006		0.00041		0.227		0.0564		0.0000052			<0.0010		<0.00020	4.26		<0.0050		0.0073		
		Median		0.00223		0.0168	86		0.000006		0.00041		0.227		0.0564		0.0000052			<0.0010		<0.00020	4.26		<0.0050		0.0073		
		3rd Quartile		0.00223		0.0168	86		0.000006		0.00041		0.227		0.0564		0.0000052			<0.0010		<0.00020	4.26		<0.0050		0.0073		

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 68
2016-2017 Annual Report

2015-16 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
QU1105S	Ex-situ River Barrier Pillar (RBP) shallow groundwater well. Monitors water quality & gradients above the RBP & 2-North Mine. (Sandstone)	Average		0.0782		0.00920	229		0.0000025		0.000125		1.25		0.3147		0.0000044			0.000500		0.0001000	151.3		0.00250		0.031		
		Count		4		4	4		4		4		4		4		4			4		4	4		4		4		
		Minimum		0.0456		0.0032	126		<0.0000050		<0.00020		0.189		0.037		<0.0000020			<0.0010		<0.00020	55.3		<0.0050		0.0178		
		Maximum		0.0913		0.0243	335		<0.0000050		0.0002		2.64		0.736		0.0000063			<0.0010		<0.00020	303		<0.0050		0.0394		
		Geometric Mean		0.0753		0.00640	213		0.0000025		0.000119		0.707		0.1852		0.0000036			0.000500		0.0001000	123.4		0.00250		0.030		
		Count <DL		0		0	0		4		3		0		0		1			4		4	0		4		0		
		Standard Deviation		0.0219		0.01010	97		0.0000000		0.000050		1.221		0.3145		0.0000023			0.000000		0.0000000	110.5		0.00000		0.010		
		1st Quartile		0.0754		0.004	160		<0.0000050		<0.00020		0.244		0.097		0.0000037			<0.0010		<0.00020	78.2		<0.0050		0.0265		
		Median		0.0878		0.0046	229		<0.0000050		<0.00020		1.086		0.243		0.00000505			<0.0010		<0.00020	123.4		<0.0050		0.0332		
		3rd Quartile		0.0906		0.0098	298		<0.0000050		0.000125		2.092		0.4608		0.0000057			<0.0010		<0.00020	196.5		<0.0050		0.0375		
QU1109S	Ex-situ River Barrier Pillar (RBP) shallow groundwater well. Monitors water quality & gradients above the RBP & 2-North Mine. (Sandstone)	Average		0.108		0.0062	401		0.0000025		0.0001		0.1647		0.0156		0.0000020			0.0005		0.0001	284		0.0025		0.071		
		Count		4		4	4		4		4		4		4		4			4		4	4		4		4		
		Minimum		0.080		<0.0030	280		<0.0000050		<0.00020		0.0889		0.0087		<0.0000020			<0.0010		<0.00020	166		<0.0050		0.0445		
		Maximum		0.126		0.0165	516		<0.0000050		<0.00020		0.214		0.02		0.0000031			<0.0010		<0.00020	442		<0.0050		0.0906		
		Geometric Mean		0.107		0.00411	391		0.0000025		0.0001		0.1557		0.0149		0.0000017			0.0005		0.0001	266		0.0025		0.069		
		Count <DL		0		1	0		4		4		0		0		2			4		4	0		4		0		
		Standard Deviation		0.020		0.0069	97		0.0000000		0.00000		0.0580		0.00490		0.0000012			0.00000		0.000000	118.0		0.0000		0.019		
		1st Quartile		0.103		0.00285	359		<0.000005		<0.00020		0.1347		0.0142		<0.0000020			<0.0010		<0.00020	212		<0.0050		0.0669		
		Median		0.114		0.0034	404		<0.0000050		<0.00020		0.178		0.017		0.00000195			<0.0010		<0.00020	265		<0.0050		0.075		
		3rd Quartile		0.119		0.00675	445		<0.0000050		<0.00020		0.208		0.0183		0.00000295			<0.0010		<0.00020	337		<0.0050		0.0794		
7SQR	7-South Quinsam River downstream of 7-South Mining Operation	Average	0.00049	0.00044	0.0374	0.0201	38.8	0.00001321	0.00001043	0.00088	0.00082	0.11	0.0536	0.0072	0.00301	0.0000011	0.00000116	40.7	0.00074	0.00050	0.000100	0.000100	31	0.00277	0.0025	0.00780		0.0152	0.015
E292113		Count	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	5		5	5
		Minimum	0.00027	0.00023	0.0114	0.0095	24	<0.0000050	<0.0000050	0.00053	0.00045	0.051	0.0286	0.003	<0.0010	<0.0000020	<0.0000020	26.9	<0.0010	<0.0010	<0.00020	<0.00020	14	<0.0050	<0.0050	0.0053		<0.020	0.0069
		Maximum	0.00094	0.00067	0.156	0.0908	51.5	0.00018	0.000161	0.00194	0.004	0.215	0.0903	0.0129	0.0062	0.000003	0.0000043	67.2	0.0056	<0.0010	<0.00020	<0.00020	45.8	0.0081	<0.0050	0.0103		0.025	0.024
		Geometric Mean	0.00046	0.00042	0.0294	0.017	38	0.00000555	0.00000334	0.0008	0.0007	0.101	0.0506	0.0067	0.00243	0.00000105	0.00000107	39.8	0.00056	0.00050	0.000100	0.000100	29.9	0.00264	0.0025	0.00760		0.0139	0.0135
		Count <DL	0	0	0	0	0	19	18	0	0	0	0	0	3	20	20	0	20	21	21	21	0	20	21	0		3	0
		Standard Deviation	0.00017	0.00013	0.0353	0.0173	8.2	0.00003824	0.00003452	0.00044	0.00075	0.045	0.0184	0.0026	0.00162	0.00000044	0.00000072	9	0.00111	0.00000	0.000000	0.000000	7.9	0.00122	0	0.0019		0.0073	0.0075
		1st Quartile	0.00037	0.00035	0.0208	0.0125	32.7	<0.000010	<0.0000050	0.00061	0.00054	0.069	0.0398	0.0054	0.0017	<0.0000020	<0.0000020	35.1	<0.0010	<0.0010	<0.00020	<0.00020	25	<0.0050	<0.0050	0.0073		<0.020	0.01
		Median	0.00044	0.00040	0.025	0.0152	36.3	<0.000010	<0.0000050	0.00069	0.00061	0.113	0.0507	0.0072	0.0034	<0.0000020	<0.0000020	37.7	<0.0010	<0.0010	<0.00020	<0.00020	32.3	<0.0050	<0.0050	0.0074		<0.020	0.0123
		3rd Quartile	0.00058	0.00054	0.0393	0.0196	47.7	<0.000010	<0.0000050	0.00087	0.00085	0.129	0.0649	0.0085	0.0041	<0.0000020	<0.0000020	43.9	<0.0010	<0.0010	<0.00020	<0.00020	36.60	<0.0050	<0.0050	0.0088		0.021	0.022
LQL1	Lower Quinsam Lake 1 metre below surface	Average	0.00067	0.00061	0.0185	0.0142	35.9	0.0000057	0.00000363	0.000633	0.00055	0.080	0.0414	0.0135	0.00563	0.00000100	0.00000100	34.3	0.00050	0.00050	0.000100	0.000100	21.3	0.01197	0.00250	0.00330			
E292118		Count	15	15	15	15	9	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	7			
		Minimum	0.00046	0.00042	0.0079	0.0065	27.3	<0.000005	<0.000005	<0.00050	0.00040	0.025	0.0096	0.0029	<0.0010	<0.000002	<0.000002	24.1	<0.0010	<0.0010	<0.00020	<0.00020	15.6	<0.0050	<0.0050	<0.0020			
		Maximum	0.00114	0.00084	0.0344	0.0239	42.7	0.000018	0.0000080	0.00110	0.00077	0.222	0.132	0.0586	0.0361	<0.000002	<0.000002	40.6	<0.0010	<0.0010	<0.00020	<0.00020	24.0	0.124	<0.0050	0.0047			
		Geometric Mean	0.00065	0.00060	0.0161	0.0134	35.6	0.0000052	0.00000325	0.000578	0.00054	0.067	0.0322	0.0091	0.00156	0.00000100	0.00000100	34.0	0.00050	0.00050	0.000100	0.000100	21.1	0.00411	0.00250	0.00302			
		Count <DL	0	0	0	0	0	14	11	3	0	0	0	0	8	15	15	0	15	15	15	15	0	11	15	1			
		Standard Deviation	0.00018	0.00013	0.0101	0.0050	4.9	0.0000035	0.00000200	0.000251	0.00010	0.052	0.0313	0.0149	0.01007	0.00000000	0.00000000	4.3	0.00000	0.00000	0.000000	0.000000	2.6	0.03121	4E-11	0.00117			
		1st Quartile	0.00052	0.00048	0.0102	0.0116	34.4	<0.000010	<0.0000050	0.00058	0.00050	0.040	0.0168	0.0054	<0.0010	<0.0000020	<0.0000020	32.0	<0.0010	<0.0010	<0.00020	<0.00020	19.8	<0.0050	<0.0050	0.00300			
		Median	0.00069	0.00065	0.0131	0.0130	36.8	<0.000010	<0.0000050	0.00062	0.00055	0.068	0.0388	0.0062	<0.0010	<0.0000020	<0.0000020	35.4	<0.0010	<0.0010	<0.00020	<0.00020	22.2	<0.0050	<0.0050	0.0037			
		3rd Quartile	0.00075	0.00068	0.0280	0.0170	38.8	<0.000010	0.00000425	0.000760	0.00062	0.103	0.0479	0.0161	0.00460	<0.000002	<0.000002	36.6	<0.0010	<0.0010	<0.00020	<0.00020	23.4	0.00410	<0.0050	0.00385			
LQLB	LQLB 1 metre from Bottom	Average	0.00206	0.00097	0.0317	0.0181	34.1	0.0000089	0.00000605	0.00106	0.00070	1.184	0.2998	0.3515	0.2078	0.00000100	0.00000100	34.6	0.00050	0.00050	0.000100	0.000100	15.6	0.00431	0.00250	0.00587			
E292118		Count	15	15	15	15	8	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	7			
		Minimum	0.00048	0.00041	0.0193	0.0074	25.4	<0.000005	<0.000005	0.00063	0.00040	0.074	0.0425	0.0059	0.0016	<0.000002	<0.000002	28.1	<0.0010	<0.0010	<0.00020	<0.00020	12.0	<0.0050	<0.0050	<0.0020			
		Maximum	0.00598	0.00141	0.0475	0.0377	37.4	0.000017	0.0000130	0.00342	0.00151	4.19	0.599	0.980	0.750	<0.000002	<0.000002	41.9	<0.0010	<0.0010	<0.00020	<0.00020	20.4	0.0203	<0.0050	0.0098			
		Geometric Mean	0.00162	0.00091	0.0307	0.0169	33.9	0.0000076	0.00000520	0.00094	0.00067	0.662	0.2212	0.1549	0.0894	0.00000100	0.00000100	34.4	0.00050	0.00050	0.000100	0.000100	15.5	0.00319	0.00250	0.00498			
		Count <DL	0	0	0	0	0	8	5	0	0	0	0	0	0	15	15	0	15	15	15	15	0	13	15	1			
		Standard Deviation	0.00152	0.00035	0.0084	0.0074	4.1	0.0000049	0.00000327	0.00070	0.00027	1.198	0.1944	0.3377	0.2188	0.00000000	0.00000000	4.1	0.00000	0.00000	0.000000	0.000000	2.2	0.00503	4E-11	0.00268			
		1st Quartile	0.00089	0.00062	0.0260	0.0132	33.6	<0.000010	<0.000005	0.00070	0.00056	0.260	0.0937	0.0446	0.0347	<0.0000020	<0.0000020	32.2	<0.0010	<0.0010	<0.00020	<0.00020	14.4	<0.0050	<0.0050	0.00510			
		Median	0.00154	0.00106	0.0314	0.0169	35.6	<0.000010	0.0000060	0.00081	0.00065	0.774	0.314	0.270	0.156	<0.0000020	<0.0000020	34.9	<0.0010	<0.0010	<0.00020	<0.00020	15.3	<0.0050	<0.0050	0.0063			
		3rd Quartile	0.00274	0.00124	0.0351	0.0200	36.9	0.0000135	0.0000080	0.00116	0.00076	1.860	0.4270	0.6080	0.3465	<0.000002	<0.000002	37.2	<0.0010	<0.0010	<0.00020	<0.00020	16.2	<0.0050	<0.0050	0.00690			

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 69
2016-2017 Annual Report

2016-17 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
WA			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E0126402	Middle Quinsam Lake Inlet - Quinsam River at Argonaut Road upstream of mining operation.	Average	0.000124	0.000151	0.0266	0.0212	21	0.0000056	0.00000272	0.000879	0.00068	0.021	0.01248	0.00146	0.00058	0.0000011	0.0000014	20.4	0.0005	0.00054	0.000118	0.000117	1.34	0.00250	0.0025				
		Count	16	16	16	16	15	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16				
		Minimum	<0.00010	<0.00010	0.0172	0.0142	17.2	<0.000010	<0.0000050	<0.00050	0.00035	0.01	<0.0050	<0.0010	<0.0010	<0.000002	<0.000002	18.4	<0.0010	<0.0010	<0.00020	<0.00020	0.97	<0.0050	<0.0050				
		Maximum	0.00029	0.00028	0.0536	0.0343	24.2	0.000014	0.000006	0.00356	0.0017	0.046	0.0238	0.0042	0.0018	0.0000032	0.0000031	22.2	<0.0010	0.0012	0.00039	0.00037	2.12	<0.0050	<0.0050				
		Geometric Mean	0.000113	0.000141	0.025	0.0207	20.9	0.0000053	0.00000264	0.000749	0.00064	0.019	0.0112	0.00122	0.00054	0.00000108	0.00000128	20.4	0.0005	0.00053	0.000109	0.000109	1.32	0.00250	0.0025				
		Count <DL	3	1	0	0	0	15	15	1	0	0	1	4	15	15	12	0	16	15	15	15	0	16	16				
		Standard Deviation	0.000058	0.000056	0.0111	0.0049	1.5	0.0000023	0.00000088	0.000734	0.00031	0.009	0.00538	0.00096	0.00032	0.00000055	0.00000079	1.3	0	0.00017	0.000072	0.000067	0.28	4E-11	4E-11				
		1st Quartile	0.000108	0.00012	0.0199	0.0174	20.2	<0.000010	<0.0000050	0.000658	0.00054	0.016	0.0093	0.00095	<0.0010	<0.0000020	<0.0000020	19.5	<0.0010	<0.0010	<0.00020	<0.00020	1.21	<0.0050	<0.0050				
		Median	0.00012	0.000145	0.0232	0.0218	21.0	<0.000010	<0.0000050	0.00071	0.00058	0.02	0.0124	0.00135	<0.0010	<0.0000020	<0.000002	20.3	<0.0010	<0.0010	<0.00020	<0.00020	1.3	<0.0050	<0.0050				
		3rd Quartile	0.000132	0.000155	0.0274	0.0236	21.8	<0.000010	<0.0000050	0.000772	0.0007	0.024	0.01498	0.00152	<0.0010	<0.0000020	0.0000014	21.4	<0.0010	<0.0010	<0.00020	<0.00020	1.44	<0.0050	<0.0050				
WD	Settling Pond #4	Average	0.00203	0.00108	0.0467	0.01319	366.5	0.0000282	0.00000775	0.00193	0.00059	0.637	0.0132	0.2017	0.09038	0.000001	0.000001	403	0.01831	0.00395	0.000100	0.000100	733	0.01471	0.00325				
E207409		Count	9	8	9	8	13	9	8	9	8	9	8	9	8	8	8	9	9	8	9	8	53	9	8				
		Minimum	0.00093	0.00032	0.0045	<0.0030	321	<0.000010	<0.0000050	0.00055	0.00024	0.215	0.0094	0.009	<0.0010	<0.0000020	<0.0000020	292	<0.0010	<0.0010	<0.00020	<0.00020	320	<0.0050	<0.0050				
		Maximum	0.00361	0.00181	0.178	0.0297	413	0.000115	0.000033	0.00369	0.00095	1.33	0.0180	0.551	0.362	<0.0000020	<0.0000020	664	0.0925	0.0263	<0.00020	<0.00020	1170	0.0507	0.0085				
		Geometric Mean	0.00182	0.00095	0.0236	0.00967	365.4	0.0000131	0.0000048	0.00147	0.00054	0.506	0.0129	0.1103	0.02302	0.000001	0.000001	390	0.0031	0.0011	0.000100	0.000100	703	0.00701	0.00291				
		Count <DL	0	0	0	1	0	5	4	0	0	0	0	0	1	8	8	0	3	5	9	8	0	5	7				
		Standard Deviation	0.00101	0.00053	0.0564	0.00952	28.7	0.0000383	0.00001045	0.00139	0.00023	0.438	0.003	0.1889	0.12317	0	0.0000000	118	0.03134	0.00904	0.000000	0.0000000	211	0.01837	0.00212				
		1st Quartile	0.00133	0.00076	0.0064	0.00695	337	<0.000010	<0.0000050	0.00069	0.00044	0.279	0.0106	0.0893	0.00422	<0.0000020	<0.0000020	304	<0.0010	<0.0010	<0.00020	<0.00020	579	<0.0050	<0.0050				
		Median	0.00157	0.00103	0.0268	0.0102	375	<0.000010	0.0000375	0.00119	0.00056	0.42	0.0134	0.137	0.0403	<0.0000020	<0.0000020	389	0.0013	<0.0010	<0.00020	<0.00020	676	<0.0050	<0.0050				
		3rd Quartile	0.00248	0.00153	0.0521	0.01992	387	0.000038	0.000006	0.00332	0.00073	0.893	0.0152	0.366	0.1335	<0.0000020	<0.0000020	419	0.0267	0.00135	<0.00020	<0.00020	896	0.0168	<0.0050				
MW001D	Exsitu 2-North deep groundwater well below the coal wash plant (Till)	Average		0.0208		0.1134	87.8		0.00000425		0.00204		0.0968		0.0078		0.0000058			0.0005		0.0001	26.8		0.0025		0.168		
		Count		2		2	2		2		2		2		2		2			2		2	2		2		2		
		Minimum		0.0193		0.0989	87.1		<0.0000050		0.00177		0.0746		0.0051		0.0000048			<0.0010		<0.00020	25.8		<0.0050		0.164		
		Maximum		0.0223		0.128	88.4		0.000006		0.0023		0.119		0.0106		0.0000067			<0.0010		<0.00020	27.9		<0.0050		0.172		
		Geometric Mean		0.0207		0.1125	87.7		0.00000387		0.00202		0.0942		0.0074		0.0000057			0.0005		0.0001	26.8		0.0025		0.168		
		Count <DL		0		0	0		1		0		0		0		0			2		2	0		2		0		
		Standard Deviation		0.0021		0.0206	0.9		0.00000247		0.00037		0.0314		0.003900		0.0000013			0		0	1.5		0		0.006		
		1st Quartile		0.0201		0.1062	87.4		0.00000338		0.0019		0.0857		0.0065		0.0000053			<0.0010		<0.00020	26.3		<0.0050		0.166		
		Median		0.0208		0.1134	87.8		0.00000425		0.00204		0.0968		0.0078		0.0000058			<0.0010		<0.00020	26.8		<0.0050		0.168		
		3rd Quartile		0.0216		0.1207	88.1		0.00000512		0.00217		0.1079		0.0092		0.0000062			<0.0010		<0.00020	27.4		<0.0050		0.170		
MW001S	Exsitu 2-North shallow groundwater well below the coal wash plant (Till)	Average		0.00009		0.01045	355.5		0.000066		0.0001		0.057		1.316		0.0000043			0.002		0.0001000	810		0.0025		0.00330		
		Count		2		2	2		2		2		2		2		2			2		2	2		2		2		
		Minimum		<0.00010		<0.0030	348		0.0000291		<0.00020		0.0284		0.681		0.0000032			0.0012		<0.00020	644		<0.0050		0.003		
		Maximum		0.00013		0.0194	363		0.000103		<0.00020		0.0857		1.95		0.0000054			0.0027		<0.00020	977		<0.0050		0.0036		
		Geometric Mean		0.00008		0.00539	355.4		0.0000547		0.0001		0.0493		1.152		0.0000042			0.0018		0.0001000	793		0.0025		0.0033		
		Count <DL		1		1	0		0		2		0		0		0			0		2	0		2		0		
		Standard Deviation		0.000057		0.01266	10.6		0.0000523		0		0.0405		0.897		0.0000016			0.0011		0.0000000	235		0		0.00040		
		1st Quartile		0.00007		0.00597	351.8		0.0000476		<0.00020		0.0427		0.998		0.0000038			0.0016		<0.00020	727		<0.0050		0.00320		
		Median		0.00009		0.01045	355.5		0.000066		<0.00020		0.057		1.316		0.0000043			0.002		<0.00020	810		<0.0050		0.00330		
		3rd Quartile		0.00011		0.01492	359.2		0.00085		<0.00020		0.0714		1.633		0.0000048			0.0023		<0.00020	893		<0.0050		0.00340		
MW006D	Exsitu 2-North deep groundwater well below the coal wash plant (Till)	Average		0.0284		0.021	80.2		0.0000025		0.00088		0.0087		0.001		0.0000069			0.000500		0.0001000	11.8		0.00515		0.165		
		Count		2		2	2		2		2		2		2		2			2		2	2		2		2		
		Minimum		0.0277		0.0194	78.1		<0.0000050		0.00064		<0.0050		<0.0010		0.0000059			<0.0010		<0.00020	11.6		<0.0050		0.165		
		Maximum		0.0291		0.0226	82.4		<0.0000050		0.00111		0.0148		0.0015		0.0000079			<0.0010		<0.00020	12		0.0078		0.165		
		Geometric Mean		0.0284		0.0209	80.2		0.0000025		0.00084		0.00608		0.00087		0.0000068			0.000500		0.0001000	11.8		0.00442		0.165		
		Count <DL		0		0	0		2		0		1		1		0			2		2	0		1		0		
		Standard Deviation		0.001		0.0023	3.0		0.0000000		0.00033		0.0087		0.00071		0.0000014			0.000000		0.0000000	0.3		0.00375		0		
		1st Quartile		0.028		0.0202	79.2		<0.0000050		0.00076		0.00558		0.00075		0.0000064			<0.0010		<0.00020	11.7		0.00382		0.165		
		Median		0.0284		0.021	80.2		<0.0000050		0.00088		0.0087		0.001		0.0000069			<0.0010		<0.00020	11.8		0.00515		0.165		
		3rd Quartile		0.0288		0.0218	81.3		<0.0000050		0.00099		0.01172		0.00125		0.0000074			<0.0010		<0.00020	11.9		0.00648		0.165		
MW006S	Exsitu 2-North shallow groundwater well below the coal wash plant (Till)	Average		0.00164		0.00540	179.0		0.0000225		0.00082		0.0156		0.0501		0.0000058			0.0005		0.0001	606.5		0.00250		0.0556		
		Count		2		2	2		2		2		2		2		2			2		2	2		2		2		
		Minimum		0.00156		0.0041	172		0.000015		0.0008		0.0073		0.0451		0.0000053			<0.0010		<0.00020	606		<0.0050		0.0536		
		Maximum		0.00173		0.0067	186		0.00003		0.00084		0.0239		0.0551		0.0000064			<0.0010		<0.00020	607		<0.0050		0.058		
		Geometric Mean		0.00164		0.0052	178.9		0.0000212		0.00082		0.0132		0.0498		0.0000058			0.00050		0.0001000	606.5		0.0025		0.0556		
		Count <DL		0		0	0		0		0		0		0		0			2		2	0		2		0		
		Standard Deviation		0.00012		0.0018	9.9		0.000011		0.000030		0.0117		0.0071		0.0000008			0		0.0000000	0.7		0		0.0028		
		1st Quartile		0.0016		0.00480	175.5		0.0000188		0.00081		0.0114		0.0476		0.0000056			<0.0010		<0.00020	606.2		<0.0050		0.0546		
		Median		0.00164		0.00540	179		0.0000225		0.00082		0.0156		0.0501		0.0000058			<0.0010		<0.00020	606.5		<0.0050		0.0556		
		3rd Quartile		0.00169		0.00600	182.5		0.0000262		0.00083		0.0198		0.0526		0.0000061			<0.0010		<0.00020	606.8		<0.0050		0.0566		
WC		Average	0.0008	0.00067	0.019	0.0112	315	0.000024	0.0000205	0.000751	0.000413	0.19	0.0214	0.1125	0.1117	0.000001	0.000001	391	0.01929	0.0191	0.000100	0.000100	691	0.01013	0.00884				
E207411	2-North Pit Culvert discharge into Middle Quinsam Lake	Count	7	7	7	7	2	7	7	7	7	7	7	7	7	6	7	7	7	7	7	7	12	7	7				
		Minimum	0.00054	0.00035	0.0063	0.0037	282	<0.000010	<0.0000050	<0.00050	<0.00020	0.039	0.0095	0.0075	0.0031	<0.0000020	<0.0000020	290	<0.0010	<0.0010	<0.00020	<0.00020	482	<0.0050	<0.0050				
		Maximum	0.00111	0.00096	0.0416	0.0179	348	0.000116	0.000096	0.00176	0.00075	0.451	0.0506	0.533	0.545	<0.0000020	<0.0000020	524	0.114	0.111	<0.00020	<0.00020	1080	0.0507	0.0438				
		Geometric Mean	0.00078	0.00064	0.0149	0.0098	313.3	0.00001	0.00000776	0.00055	0.000348	0.1480	0.0171	0.036	0.0251	0.000001	0.000001	381	0.00219	0.00218	0.000100	0.000100	664	0.00451	0.00422				
		Count <DL	0	0	0	0	0	5	3	3	1	0	0	0	0	6	6	0	4	4	7	7	0	5	5				
		Standard Deviation	0.00022	0.00019	0.0142	0.0055	46.7	0.0000414	0.0000344	0.000631	0.000231	0.143	0.0166	0.1928	0.1998	2E-14	2E-14	94	0.0422	0.04109	0.000000	0.000000	209	0.01799	0.01546				
		1st Quartile	0.00062	0.00058	0.0082	0.0068	298.5	<0.000010	<0.0000050	<0.00050	0.000270	0.107	0.01020	0.0132	0.006	<0.0000020	<0.0000020	314	<0.0010	<0.0010	<0.00020	<0.00020	535	<0.0050	<0.0050				
		Median	0.00084	0.00066	0.0136	0.0117	315	<0.000010	0.000006	0.00056	0.00035	0.132	0.0132	0.0213	0.0166	<0.0000020	<0.0000020	370	<0.0010	<0.0010	<0.00020	<0.00020	600	<0.0050	<0.0050				
		3rd Quartile	0.00095	0.00078	0.0274	0.0158	331.5	0.000016	0.000017	0.001095	0.000575	0.2470	0.028	0.0998	0.1026	<0.0000020	<0.0000020	463	0.00950	0.01035	<0.00020	<0.00020	853	0.0051	0.00405				
MQL1	Middle Quinsam Lake 1 metre below surface	Average	0.00019	0.0001600	0.0256	0.0194	32.6	0.000005	0.00000303	0.000703	0.00061	0.043	0.0187	0.0059	0.00153	0.00000134	0.00000112	34.3	0.00067	0.00065	0.0001	0.0001	27.64	0.0025	0.00276	0.0036			
E206618		Count	15	15	15	15	4	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	3			
		Minimum	0.00011	0.00011	0.0134	0.0113	29	<0.000010	<0.0000050	<0.00050	0.0004	0.028	0.0064	0.0039	<0.0010	<0.0000020	<0.0000020	22.8	<0.0010	<0.0010	<0.00020	<0.00020	7.66	<0.0050	<0.0050	0.0029			
		Maximum	0.0008	0.0002	0.0635	0.0323	37.1	<0.000010	0.000008	0.00114	0.00142	0.065	0.0309	0.0072	0.0051	0.0000042	0.0000028	39.5	0.0018	0.0017	<0.00020	<0.00020	38.7	<0.0050	0.0064	0.0042			
		Geometric Mean	0.00016	0.00016	0.0228	0.0186	32.5	0.000005	0.00000283	0.000663	0.00058	0.041	0.0175	0.0058	0.00094	0.00000118	0.00000107	34	0.00059	0.00059	0.0001	0.00010000	26.24	0.0025	0.00266	0.0035			
		Count <DL	0	0	0	0	0	15	13	1	0	0	0	0	10	13	14	0	13	13	15	15	0	15	14	0			
		Standard Deviation	0.00017	0.00003	0.0144	0.0061	3.4	1E-13	0.00000152	0.000239	0.00024	0.013	0.0066	0.0011	0.00168	0.00000093	0.00000046	4.2	0.00044	0.00041	0	0	7.44	4E-11	0.00101	0.0007			
		1st Quartile	0.00013	0.00014	0.0165	0.0152	30.9	<0.000010	<0.0000050	0.000565	0.000480	0.032	0.0148	0.0048	<0.0010	<0.0000020	<0.0000020	32.4	<0.0010	<0.0010	<0.00020	<0.00020	24.45	<0.0050	<0.0050	0.0032			
		Median	0.00015	0.0001700	0.0203	0.0175	32.2	<0.000010	<0.0000050	0.000680	0.00053	0.038	0.0176	0.0061	<0.0010	<0.0000020	<0.0000020	34.8	<0.0010	<0.0010	<0.00020	<0.00020	28.30	<0.0050	<0.0050	0.0036			
		3rd Quartile	0.00018	0.00018	0.031	0.0231	34	<0.000010	<0.0000050	0.00073	0.00064	0.052	0.0220	0.0068	0.00230	<0.0000020	<0.0000020	37.7	<0.0010	<0.0010	<0.00020	<0.00020	31.35	<0.0050	<0.0050	0.0039			
MQLB	Middle Quinsam Lake 1 metre from bottom	Average	0.000154	0.000133	0.0202	0.0164	34.6	0.000005	0.00000274	0.000559	0.00058	0.071	0.0238	0.033	0.02559	0.000001	0.00000100	34.2	0.00068	0.00067	0.0001	0.0001	25.8	0.002500	0.0025	0.00430			
E206618		Count	15	15	15	15	4	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	3			
		Minimum	<0.00010	<0.00010	0.0076	0.0047	32.6	<0.000010	<0.0000050	<0.00050	0.00032	0.0160	0.0082	0.0017	<0.0010	<0.0000020	<0.0000020	28.6	<0.0010	<0.0010	<0.00020	<0.00020	17	<0.0050	<0.0050	0.0031			
		Maximum	0.00034	0.00017	0.043	0.0291	36	<0.000010	0.0000061	0.00079	0.00093	0.231	0.0498	0.159	0.131	<0.0000020	<0.0000020	39.7	0.0019	0.0018	<0.00020	<0.00020	40	<0.0050	<0.0050	0.0059			
		Geometric Mean	0.000142	0.000128	0.017	0.0144	34.5	0.000005	0.00000265	0.000534	0.000570	0.05	0.0209	0.0115	0.00414	0.000001	0.000001	34.1	0.0006	0.00059	0.0001	0.0001	25.2	0.0025	0.0025	0.00410			
		Count <DL	1	1	0	0	0	15	14	2	0	0	0	0	5	15	15	0	13	13	15	15	0	15	15	0			
		Standard Deviation	0.000065	0.000033	0.0123	0.0078	1.6	1E-13	0.00000093	0.00015	0.00014	0.07	0.0126	0.0484	0.04098	0	0	3	0.00048	0.00046	0	0.00000000	6.2	4E-11	4E-11	0.00150			
		1st Quartile	0.000115	0.00011	0.0102	0.00860	33.6	<0.000010	<0.0000050	0.000525	0.0005	0.029	0.0142	0.0042	<0.0010	<0.0000020	<0.0000020	32.4	<0.0010	<0.0010	<0.00020	<0.00020	23	<0.0050	<0.0050	0.0034			
		Median	0.00014	0.0001400	0.0166	0.0175	34.8	<0.000010	<0.0000050	0.00055	0.000580	0.038	0.0174	0.0066	0.0014	<0.0000020	<0.0000020	34.0	<0.0010	<0.0010	<0.00020	<0.00020	23.8	<0.0050	<0.0050	0.0038			
		3rd Quartile	0.000185	0.00016	0.0248	0.022	35.8	<0.000010	<0.0000050	0.00064	0.00065	0.076	0.0318	0.0506	0.04005	<0.0000020	<0.0000020	36.3	<0.0010	<0.0010	<0.00020	<0.00020	24.6	<0.0050	<0.0050	0.0048			

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 70
2016-2017 Annual Report

2016-17 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
NNL1			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E217018		Average	0.00033	0.000350	0.0418	0.035	13.6	0.000005	0.0000025	0.000517	0.00073	0.086	0.0603	0.005	0.00291	0.00000128	0.00000119	13.9	0.0005	0.00066	0.0001	0.0001	1.025	0.0025	0.0025	0.0087			
		Count	15	15	15	15	5	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	3			
		Minimum	0.00018	0.00022	0.0221	0.017	11.3	<0.000010	<0.0000050	<0.00050	0.00037	0.035	0.0325	0.0032	<0.0010	<0.0000020	<0.0000020	9.96	<0.0010	<0.0010	<0.00020	<0.00020	<0.50	<0.0050	<0.0050	<0.0020			
		Maximum	0.00055	0.00053	0.0803	0.0603	16.8	<0.000010	<0.0000050	0.00112	0.00279	0.127	0.0817	0.0081	0.0053	0.000004	0.0000025	19.4	<0.0010	0.0029	<0.00020	<0.00020	1.95	<0.0050	<0.0050	0.0163			
	No Name Lake 1 metre below surface	Geometric Mean	0.00031	0.00033	0.0376	0.0327	13.4	0.00000500	0.0000025	0.000454	0.00063	0.08	0.058	0.00480	0.00248	0.00000116	0.00000112	13.64	0.0005	0.00056	0.0001	0.0001	0.849	0.0025	0.0025	0.00523			
		Count <DL	0	0	0	0	0	15	15	6	0	0	0	0	1	13	13	0	15	14	15	15	3	15	15	1			
		Standard Deviation	0.000130	0.00012	0.0208	0.0135	2.7	1E-13	1E-13	0.00027	0.00059	0.03	0.0162	0.0014	0.00148	0.00000081	0.00000049	2.87	0	0.00062	0.00000000	0	0.553	4E-11	4E-11	0.00765			
		1st Quartile	0.00024	0.00025	0.0256	0.0232	11.6	<0.000010	<0.0000050	<0.00050	0.00048	0.058	0.0501	0.0043	0.00195	<0.0000020	<0.0000020	11.95	<0.0010	<0.0010	<0.00020	<0.00020	0.755	<0.0050	<0.0050	0.0049			
		Median	0.00028	0.000310	0.0305	0.0317	12.2	<0.000010	<0.0000050	0.00056	0.00055	0.093	0.0635	0.00460	0.00310	<0.0000020	<0.0000020	12.3	<0.0010	<0.0010	<0.00020	<0.00020	0.97	<0.0050	<0.0050	0.0088			
		3rd Quartile	0.00046	0.00048	0.0639	0.0487	16.3	<0.000010	<0.0000050	0.00064	0.0007	0.107	0.0718	0.0055	0.00425	<0.0000020	<0.0000020	16.8	<0.0010	<0.0010	<0.00020	<0.00020	1.42	<0.0050	<0.0050	0.01255			
NNLB		Average	0.00025	0.00022	0.0478	0.0384	10.4	0.000005	0.0000025	0.000441	0.00049	0.136	0.0812	0.011	0.00672	0.00000107	0.00000109	12.6	0.0005	0.00068	0.0001	0.0001	2.62	0.0025	0.003070	0.00500			
E217018		Count	15	15	15	15	5	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	3			
		Minimum	0.00017	0.00017	0.0338	0.0309	9.72	<0.000010	<0.0000050	<0.00050	0.00026	0.049	0.0303	0.0024	<0.0010	<0.0000020	<0.0000020	11	<0.0010	<0.0010	<0.00020	<0.00020	0.68	<0.0050	<0.0050	0.0027			
		Maximum	0.00037	0.00029	0.0756	0.0549	11.3	<0.000010	<0.0000050	0.00111	0.00091	0.255	0.168	0.0364	0.0291	0.0000021	0.0000023	14.5	<0.0010	0.0032	<0.00020	<0.00020	3.77	<0.0050	0.0111	0.0065			
	No Name Lake 1 metre from bottom	Geometric Mean	0.00024	0.000220	0.0466	0.0377	10.39	0.000005	0.0000025	0.000387	0.00046	0.119	0.0721	0.0079	0.00383	0.00000105	0.00000106	12.5	0.0005000	0.00057	0.0001	0.0001	2.36	0.0025	0.00276	0.00470			
		Count <DL	0	0	0	0	0	15	15	8	0	0	0	0	1	14	14	0	15	14	15	15	0	15	14	0			
		Standard Deviation	0.00006	0.00004	0.0118	0.0076	0.59	1E-13	1E-13	0.00025	0.00017	0.067	0.0401	0.0097	0.00756	0.00000028	0.00000034	1.1	0	0.0007000	0	0	0.99	4E-11	0.002220	0.00200			
		1st Quartile	0.0002	0.00019	0.0408	0.0327	10.1	<0.000010	<0.0000050	<0.00050	0.00037	0.065	0.0507	0.0036	0.00145	<0.0000020	<0.0000020	11.9	<0.0010	<0.0010	<0.00020	<0.00020	2.49	<0.0050	<0.0050	0.0043			
		Median	0.00023	0.0002	0.0438	0.0358	10.3	<0.000010	<0.0000050	<0.00050	0.00048	0.141	0.0830	0.0092	0.0059	<0.0000020	<0.0000020	12.4	<0.0010	<0.0010	<0.00020	<0.00020	2.78	<0.0050	<0.0050	0.0059			
		3rd Quartile	0.0003	0.00026	0.0528	0.0395	10.6	<0.000010	<0.0000050	0.000585	0.00054	0.181	0.0957	0.0138	0.0088	<0.0000020	<0.0000020	13.2	<0.0010	<0.0010	<0.00020	<0.00020	3.32	<0.0050	<0.0050	0.0062			
NNO		Average	0.00036	0.00034	0.0457	0.0352	13.16	0.0000077	0.00000283	0.000591	0.00054	0.091	0.0582	0.006	0.00256	0.0000024	0.0000013	14	0.0005	0.00050	0.000100	0.000100	1.2	0.0025	0.0025	0.0082	0.0097		
E217017		Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	2	2		
		Minimum	0.00017	0.0002	0.0257	0.0192	9.74	<0.000010	<0.0000050	<0.00050	0.00021	0.03	0.0252	0.0031	<0.0010	<0.000002	<0.000002	10.3	<0.0010	<0.0010	<0.00020	<0.00020	0.58	<0.0050	<0.0050	0.0066	0.0084		
		Maximum	0.00061	0.00055	0.0766	0.0588	17.5	0.000046	0.0000050	0.00188	0.00094	0.152	0.084	0.0166	0.0051	0.0000074	0.0000033	18	<0.0010	<0.0010	<0.00020	<0.00020	2.06	<0.0050	<0.0050	0.0099	0.011		
	No Name Lake Outlet	Geometric Mean	0.00033	0.00033	0.0423	0.0330	12.93	0.0000058	0.00000274	0.000484	0.00052	0.082	0.0546	0.0054	0.00203	0.00000169	0.00000117	13.8	0.0005	0.00050	0.000100	0.000100	1.11	0.0025	0.0025	0.0081	0.0096		
		Count <DL	0	0	0	0	0	14	13	6	0	0	0	0	3	10	13	0	15	15	15	15	0	15	15	0	0		
		Standard Deviation	0.00015	0.00012	0.0189	0.0135	2.6	0.0000106	0.00000088	0.000434	0.00017	0.0390	0.0193	0.0033	0.00144	0.00000229	0.00000079	2.5	0	0.00000	0.000000	0.000000	0.5	4E-11	4E-11	0.0023	0.0018		
		1st Quartile	0.00022	0.00026	0.0309	0.0247	11.1	<0.000010	<0.0000050	<0.00050	0.00047	0.056	0.0434	0.0044	0.00165	<0.0000020	<0.0000020	12.1	<0.0010	<0.0010	<0.00020	<0.00020	0.88	<0.0050	<0.0050	0.0074	0.009		
		Median	0.00031	0.0003	0.0374	0.0307	12.5	<0.000010	<0.0000050	0.00056	0.00053	0.095	0.0624	0.0051	0.0026	<0.0000020	<0.0000020	12.7	<0.0010	<0.0010	<0.00020	<0.00020	1.05	<0.0050	<0.0050	0.0082	0.0097		
		3rd Quartile	0.00048	0.00044	0.0655	0.0454	15.5	<0.000010	<0.0000050	0.00066	0.00055	0.118	0.0728	0.0066	0.0033	0.00000315	<0.0000020	16.5	<0.0010	<0.0010	<0.00020	<0.00020	1.68	<0.0050	<0.0050	0.0091	0.0104		
LLS		Average	0.00376	0.0017	0.0081	0.0065	233.4	0.00000500	0.00000667	0.000273	0.000236	1.159	0.00598	0.288	0.286	0.0000011	0.0000010	556	0.0016	0.0015	0.000100	0.0001	500	0.00282	0.0025	0.0021			
E292131		Count	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	3			
		Minimum	0.00077	0.00055	<0.0030	<0.0030	201	<0.000010	<0.0000050	<0.00050	<0.00020	0.255	<0.0050	0.159	0.152	<0.0000020	<0.0000020	431	0.0011	0.0011	<0.00020	<0.00020	333	<0.0050	<0.0050	<0.0020			
		Maximum	0.00939	0.00292	0.0206	0.0128	256	<0.000010	0.000049	0.00053	0.00051	3.6	0.022	0.439	0.443	0.0000025	<0.0000020	744	0.0028	0.0025	<0.00020	<0.00020	656	0.0064	<0.0050	0.003			
	Small Seep into Long Lake	Geometric Mean	0.00292	0.00148	0.00551	0.00533	232.8	0.000005	0.00000345	0.000266	0.00019	0.857	0.00384	0.272	0.27	0.00000108	0.000001	548	0.0015	0.0015	0.000100	0.0001	488	0.0027	0.0025	0.0019			
		Count <DL	0	0	3	2	0	12	10	11	6	0	9	0	0	11	12	0	0	0	12	12	0	11	12	1			
		Standard Deviation	0.00257	0.00083	0.00669	0.00383	17	1E-13	0.00001337	0.000081	0.000158	0.968	0.00745	0.096	0.095	0.00000043	0	96	0.0005	0.0005	0.000000	0.000000	114	0.00113	1E-10	0.00101			
		1st Quartile	0.00176	0.00089	0.00285	0.00428	226	<0.000010	<0.0000050	<0.00050	<0.00020	0.492	<0.0050	0.22	0.222	<0.0000020	<0.0000020	458	0.0013	0.0013	<0.00020	<0.00020	393	<0.0050	<0.0050	0.00165			
		Median	0.00348	0.00172	0.0056	0.0054	231.5	<0.000010	<0.0000050	<0.00050	0.000170	0.91	<0.0050	0.300	0.289	<0.0000020	<0.0000020	574	0.0014	0.0013	<0.00020	<0.00020	543	<0.0050	<0.0050	0.0023			
		3rd Quartile	0.00537	0.00237	0.01478	0.0094	246.5	<0.000010	<0.0000050	<0.00050	0.000360	1.56	0.00328	0.359	0.354	<0.0000020	<0.0000020	612	0.0016	0.0016	<0.00020	<0.00020	571	<0.0050	<0.0050	0.00265			
LLSM		Average	0.00181	0.00122	0.02865	0.01710	212.9	0.000005	0.00000531	0.000483	0.000408	0.562	0.00579	0.1786	0.1749	0.000001	0.000001	525	0.0021	0.0021	0.0001	0.0001	470	0.0025	0.0025				
E292131		Count	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8				
		Minimum	0.00111	0.00048	<0.0030	0.004	163	<0.000010	<0.0000050	<0.00050	<0.00020	0.288	<0.0050	0.0842	0.0902	<0.0000020	<0.0000020	377	0.0016	0.0016	<0.00020	<0.00020	320	<0.0050	<0.0050				
		Maximum	0.00282	0.00178	0.107	0.0613	235	<0.000010	0.000017	0.00154	0.00081	0.758	0.0144	0.281	0.252	<0.0000020	<0.0000020	653	0.0035	0.0032	<0.00020	<0.00020	519	<0.0050	<0.0050				
	Long Lake Middle Seep	Geometric Mean	0.00172	0.00115	0.01314	0.0113	211.7	0.000005	0.00000401	0.000364	0.00035	0.532	0.00434	0.1671	0.164	0.000001	0.000001	518	0.002	0.0021	0.000100	0.0001	466	0.0025	0.00250				
		Count <DL	0	0	1	0	0	8	5	6	1	0	5	0	0	8	8	0	0	0	8	8	0	8	8				
		Standard Deviation	0.00061	0.00042	0.03627	0.0191	22.6	1E-13	0.00000512	0.000472	0.00022	0.182	0.00491	0.0661	0.0629	0.0000000	0.0000000	86	0.0006	0.0005	0	0	66	3E-11	3E-11				
		1st Quartile	0.00128	0.00107	0.00402	0.0052	209	<0.000010	<0.0000050	<0.00050	0.000235	0.414	<0.0050	0.1360	0.1272	<0.0000020	<0.0000020	473	0.0017	0.0018	<0.00020	<0.00020	459	<0.0050	<0.0050				
		Median	0.00176	0.0011	0.01645	0.0108	216.5	<0.000010	<0.0000050	<0.00050	0.00043	0.602	<0.0050	0.1775	0.1790	<0.0000020	<0.0000020	535	0.002	0.002	<0.00020	<0.00020	491	<0.0050	<0.0050				
		3rd Quartile	0.0022	0.00153	0.03158	0.0173	227	<0.000010	0.00000575	0.000392	0.000508	0.72	0.0086	0.2222	0.2275	<0.0000020	<0.0000020	580	0.0021	0.0022	<0.00020	<0.00020	512	<0.0050	<0.0050				

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 71
2016-2017 Annual Report

2016-17 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW002	Ex-situ 2-3 South shallow groundwater well beside 3-South Pit (1 Seam)	Average		0.0006		0.00395	203.2		0.0000081		0.000100		2.68		2.53		0.0000031			0.0027		0.000100	1265		0.0025		0.00190		
		Count		4		4	4		4		4		4		4		4			4		4	4		4		4		
		Minimum		0.0004		<0.0030	187		<0.0000050		<0.00020		2.39		2.4		<0.0000020			0.0025		<0.00020	1210		<0.0050		<0.0020		
		Maximum		0.00082		0.0097	215		0.000012		<0.00020		3.07		2.68		0.0000051			0.0029		<0.00020	1320		<0.0050		0.0046		
		Geometric Mean		0.00058		0.00287	203		0.0000068		0.0001		2.67		2.53		0.0000027			0.0027		0.000100	1264		0.0025		0.00146		
		Count <DL		0		2	0		1		4		0		0		1			0		4	0		4		3		
		Standard Deviation		0.0002		0.00391	11.7		0.0000047		0		0.29		0.12		0.0000017			0.0002		0.000000	49		0		0.0018		
		1st Quartile		0.00046		<0.0030	200.5		0.00000512		<0.00020		2.51		2.48		0.0000025			0.0026		<0.00020	1232		<0.0050		<0.0020		
		Median		0.0006		0.0023	205.5		0.000009		<0.00020		2.62		2.51		0.00000315			0.0026		<0.00020	1265		<0.0050		<0.0020		
		3rd Quartile		0.00074		0.00475	208.2		0.000012		<0.00020		2.79		2.56		0.00000375			0.0028		<0.00020	1297		<0.0050		0.00190		
QU1009D	Ex-situ 4-South deep groundwater well. Down gradient of 4-South Mine. Base of Dunsmuir Member. Assesses vertical gradients & water quality down gradient of the 4-South Mine workings. Just outside of mine pool. (Below 3 Seam)	Average		0.0988		0.00150	186		0.0000025		0.000100		0.544		0.131		0.0000028			0.000500		0.0001000	89.3		0.00250		0.0403		
		Count		2		2	2		2		2		2		2		2			2		2	2		2		2		
		Minimum		0.098		<0.0030	184		<0.0000050		<0.00020		0.346		0.115		<0.0000020			<0.0010		<0.00020	84.8		<0.0050		0.0338		
		Maximum		0.1		<0.0030	188		<0.0000050		<0.00020		0.741		0.147		0.0000045			<0.0010		<0.00020	93.8		<0.0050		0.0468		
		Geometric Mean		0.0988		0.0015	186		0.0000025		0.000100		0.506		0.13		0.0000021			0.000500		0.0001000	89.2		0.00250		0.0398		
		Count <DL		0		2	0		2		2		0		0		1			2		2	0		2		0		
		Standard Deviation		0.0016		0	2.8		0.0000000		0.000000		0.279		0.023		0.0000025			0.000000		0.0000000	6.4		0.00000		0.0092		
		1st Quartile		0.0983		<0.0030	185		<0.0000050		<0.00020		0.445		0.123		0.00000188			<0.0010		<0.00020	87		<0.0050		0.037		
		Median		0.0988		<0.0030	186		<0.0000050		<0.00020		0.544		0.131		0.00000275			<0.0010		<0.00020	89.3		<0.0050		0.0403		
		3rd Quartile		0.0994		<0.0030	187		<0.0000050		<0.00020		0.642		0.139		0.00000362			<0.0010		<0.00020	91.6		<0.0050		0.0436		
QU1009S	Ex-situ 4-South shallow groundwater well. Fracture zone 10 m below till. Assesses vertical gradients & water quality down gradient of the 4-South Mine workings. Just outside of mine pool. (Below 3 Seam)	Average		0.0868		0.00150	144.5		0.0000025		0.000100		5.4		0.38		0.0000046			0.000500		0.0001000	112.5		0.00250		0.0290		
		Count		2		2	2		2		2		2		2		2			2		2	2		2		2		
		Minimum		0.0829		<0.0030	132		<0.0000050		<0.00020		5.07		0.354		0.0000033			<0.0010		<0.00020	109		<0.0050		0.0232		
		Maximum		0.0907		<0.0030	157		<0.0000050		<0.00020		5.72		0.405		0.0000058			<0.0010		<0.00020	116		<0.0050		0.0347		
		Geometric Mean		0.0867		0.0015	144		0.0000025		0.000100		5.39		0.379		0.0000044			0.0005		0.0001000	112.4		0.00250		0.0284		
		Count <DL		0		2	0		2		2		0		0		0			2		2	0		2		0		
		Standard Deviation		0.0055		0	17.7		0.0000000		0.000000		0.46		0.036		0.0000018			0		0.0000000	4.9		0.00000		0.0081		
		1st Quartile		0.0849		<0.0030	138.2		<0.0000050		<0.00020		5.23		0.367		0.0000039			<0.0010		<0.00020	110.8		<0.0050		0.0261		
		Median		0.0868		<0.0030	144.5		<0.0000050		<0.00020		5.4		0.38		0.0000046			<0.0010		<0.00020	112.5		<0.0050		0.029		
		3rd Quartile		0.0888		<0.0030	150.8		<0.0000050		<0.00020		5.56		0.392		0.0000052			<0.0010		<0.00020	114.2		<0.0050		0.0318		
SPD	Settling Pond # 1		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E218582		Average	0.00093	0.00064	0.0597	0.01586	102.00	0.000005	0.00000438	0.001293	0.00076	0.893	0.0812	0.1021	0.09174	0.00000116	0.000001	318.3	0.00269	0.00255	0.0001	0.000100	282.6	0.00250	0.0025	0.0105	0.0073		
		Count	12	12	12	12	10	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	45	12	12	10	11		
		Minimum	0.0003	0.00023	0.0032	<0.0030	22.50	<0.000010	<0.0000050	<0.00050	0.00031	0.145	0.0102	0.0059	<0.0010	<0.0000020	<0.0000020	37.4	<0.0010	<0.0010	<0.00020	<0.00020	32.8	<0.0050	<0.0050	0.0053	0.0026		
		Maximum	0.00335	0.00273	0.254	0.0768	280.0	<0.000010	0.000015	0.00321	0.00153	2.85	0.138	0.544	0.56	0.0000029	<0.0000020	520	0.0067	0.0073	<0.00020	<0.00020	632	<0.0050	<0.0050	0.0218	0.0228		
		Geometric Mean	0.00075	0.00049	0.0284	0.00978	81	0.000005	0.00000357	0.001085	0.00071	0.501	0.0619	0.0541	0.0194	0.0000011	0.0000010	266.6	0.00189	0.00171	0.0001	0.000100	225.40	0.0025	0.0025	0.0095	0.00600		
		Count <DL	0	0	0	1	0	12	8	1	0	0	0	0	3	11	12	0	2	3	12	12	0	12	12	0	0		
		Standard Deviation	0.00080	0.00068	0.0715	0.02031	74.1	1E-13	0.00000371	0.000791	0.00031	0.969	0.0507	0.1468	0.15459	0.0000006	0	150.4	0.00226	0.00228	0.000000	0.000000	163.3	1E-10	1E-10	0.0053	0.0058		
		1st Quartile	0.00055	0.00032	0.0069	0.00538	48.8	<0.000010	<0.0000050	0.00091	0.00058	0.202	0.0331	0.0271	0.0044	<0.0000020	<0.0000020	183.5	0.001	0.00095	<0.00020	<0.00020	151	<0.0050	<0.0050	0.0071	0.004		
		Median	0.00074	0.0004	0.0386	0.0106	92	<0.000010	<0.0000050	0.00103	0.00074	0.298	0.0934	0.0607	0.04905	<0.0000020	<0.0000020	341.5	0.00165	0.0014	<0.00020	<0.00020	267.00	<0.0050	<0.0050	0.0088	0.0055		
		3rd Quartile	0.00099	0.00063	0.0866	0.01485	118.5	<0.000010	0.00000500	0.001655	0.00082	1.748	0.1260	0.0921	0.09335	<0.0000020	<0.0000020	440.5	0.0037	0.00342	<0.00020	<0.00020	441	<0.0050	<0.0050	0.01040	0.0087		
LLE	Long Lake Entrance (LLE)	Average	0.00085	0.00072	0.065	0.02323	71.9	0.00000500	0.00000282	0.000583	0.00046	0.327	0.165	0.0499	0.0472	0.00000135	0.0000014	268.8	0.00050	0.0005	0.0001	0.000100	229.6	0.0025	0.00250	0.0081	0.0084	0.0395	0.01663
E292130		Count	14	14	14	14	12	14	14	14	14	14	14	14	14	13	13	14	14	14	14	14	52	14	14	13	2	12	12
		Minimum	0.00055	0.00049	0.0071	<0.0030	38.1	<0.000010	<0.0000050	<0.00050	<0.00020	0.142	0.0306	0.0184	0.0024	<0.0000020	<0.0000020	95.8	<0.0010	<0.0010	<0.00020	<0.00020	81.3	<0.0050	<0.0050	0.004	0.0063	<0.020	<0.0050
		Maximum	0.00144	0.00119	0.192	0.0676	106	<0.000010	0.000007	0.00131	0.00072	0.812	0.595	0.107	0.119	0.0000028	0.0000058	610	<0.0010	<0.0010	<0.00020	<0.00020	566	<0.0050	<0.0050	0.0182	0.0106	0.105	0.0560
		Geometric Mean	0.00082	0.0007	0.0402	0.01441	68.8	0.000005	0.00000269	0.0005	0.000423	0.298	0.1246	0.0453	0.0355	0.00000123	0.00000114	219.9	0.0005	0.0005	0.0001	0.000100	198.6	0.0025	0.00250	0.0074	0.0082	0.0269	0.0109
		Count <DL	0	0	0	1	0	14	13	5	1	0	0	0	0	10	12	0	14	14	14	14	0	14	14	0	0	5	3
		Standard Deviation	0.00024	0.00019	0.0572	0.01985	21.2	1E-13	0.0000012	0.000328	0.000158	0.166	0.1477	0.0232	0.0299	0.00000067	0.00000133	179.1	0	0	0	0.000000	133.7	1E-10	0.00000	0.0038	0.003	0.0328	0.01515
		1st Quartile	0.00067	0.00056	0.0141	0.0062	58.8	<0.000010	<0.0000050	<0.00050	0.00038	0.24	0.093	0.035	0.0273	<0.0000020	<0.0000020	135.5	<0.0010	<0.0010	<0.00020	<0.00020	139.8	<0.0050	<0.0050	0.0062	0.0074	<0.020	0.00542
		Median	0.0008	0.00072	0.0601	0.02075	73.1	<0.000010	<0.0000050	0.00055	0.00047	0.302	0.119	0.0468	0.0496	<0.0000020	<0.0000020	197.5	<0.0010	<0.0010	<0.00020	<0.00020	183.5	<0.0050	<0.0050	0.007	0.0084	0.028	0.015
		3rd Quartile	0.00091	0.00076	0.0959	0.03645	87.4	<0.000010	<0.0000050	0.000742	0.000568	0.326	0.1755	0.060	0.0598	<0.0000020	<0.0000020	397.5	<0.0010	<0.0010	<0.00020	<0.00020	267.2	<0.0050	<0.0050	0.00970	0.0095	0.0652	0.02325
LLM1	Long Lake Middle 1 metre below Surface	Average	0.00047	0.00044	0.0324	0.0256	31.9	0.00000500	0.00000485	0.000433	0.00053	0.068	0.0407	0.0084	0.0027	0.00000108	0.00000126	63.1	0.00050	0.00050	0.000100	0.000100	50.43	0.00250	0.00250	0.0038			
E206619		Count	15	15	15	15	6	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	5			
		Minimum	0.00034	0.0003	0.0073	0.0066	13.4	<0.000010	<0.0000050	<0.00050	<0.00020	0.032	0.0193	0.0043	<0.0010	<0.000002	<0.000002	12.8	<0.0010	<0.0010	<0.00020	<0.00020	3.6	<0.0050	<0.0050	0.0027			
		Maximum	0.00071	0.00063	0.0775	0.0513	37.8	<0.000010	0.0000241	0.00132	0.001	0.127	0.0719	0.0204	0.0107	0.0000022	0.0000035	91.8	<0.0010	<0.0010	<0.00020	<0.00020	81.1	<0.0050	<0.0050	0.0057			
		Geometric Mean	0.00045	0.00043	0.0233	0.0206	30.2	0.000005	0.00000341	0.00037	0.000469	0.062	0.0371	0.0076	0.0016	0.00000105	0.00000115	52.5	0.00050	0.00050	0.000100	0.000100	35.94	0.0025	0.00250	0.0037			
		Count <DL	0	0	0	0	0	15	12	9	1	0	0	0	6	14	13	0	15	15	15	15	0	15	15	0			
		Standard Deviation	0.00012	0.00011	0.0265	0.0170	9.3	0.00000000	0.00000606	0.000295	0.000225	0.032	0.0185	0.0044	0.00288	0.00000031	0.00000072	29.7	0.00000	0.00000	0.000000	0.000000	27.88	4E-11	0.00000	0.0012			
		1st Quartile	0.00038	0.00036	0.0114	0.0124	33.2	<0.000010	<0.0000050	<0.00050	0.000385	0.044	0.0276	0.0052	<0.0010	<0.0000020	<0.0000020	39	<0.0010	<0.0010	<0.00020	<0.00020	30.85	<0.0050	<0.0050	0.003			
		Median	0.0004	0.0004	0.018	0.018	35.4	<0.000010	<0.0000050	<0.00050	0.0005	0.059	0.033	0.0077	0.002	<0.0000020	<0.000002	76.6	<0.0010	<0.0010	<0.00020	<0.00020	62.5	<0.0050	<0.0050	0.0033			
		3rd Quartile	0.0006	0.00055	0.0584	0.0445	36.8	<0.000010	<0.0000050	0.000565	0.000615	0.0940	0.0562	0.0088	0.0034	<0.0000020	<0.0000020	84.8	<0.0010	<0.0010	<0.00020	<0.00020	69.45	<0.0050	<0.0050	0.0043			

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 72
2016-2017 Annual Report

2016-17 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LLMB	Long Lake Middle 1 metre From Bottom	Average	0.00029	0.00024	0.0168	0.0119	48.8	0.00000500	0.00000411	0.00039	0.000419	0.052	0.01493	0.3531	0.1721	0.000001	0.000001	134	0.00050	0.00050	0.000100	0.000100		0.00250	0.00250	0.00360			
E206619		Count	15	15	15	15	6	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	5			
		Minimum	0.00017	0.00019	0.0095	0.0044	47.1	<0.000010	<0.0000050	<0.00050	<0.00020	0.026	<0.0050	0.0378	<0.0010	<0.000002	<0.000002	87.6	<0.0010	<0.0010	<0.00020	<0.00020	123	<0.0050	<0.0050	0.003			
		Maximum	0.00034	0.00029	0.0278	0.0236	50.3	<0.000010	0.0000186	0.00085	0.00091	0.075	0.0317	1.02	0.62	<0.000002	<0.000002	158	<0.0010	<0.0010	<0.00020	<0.00020	138	<0.0050	<0.0050	0.0047			
		Geometric Mean	0.00029	0.00024	0.016	0.0101	48.7	0.000005	0.00000314	0.000346	0.000385	0.05	0.01112	0.2128	0.03415	0.000001	0.000001	133	0.00050	0.00050	0.000100	0.000100	131.1	0.00250	0.00250	0.00360			
		Count <DL	0	0	0	0	0	15	13	10	1	0	2	0	3	15	15	0	15	15	15	15	0	15	15	0			
		Standard Deviation	0.00004	0.00003	0.0057	0.0068	1.3	1E-13	0.00000451	0.000214	0.000172	0.013	0.0106	0.337	0.2069	0	0	15.4	0.00000	0.00000	0.000000	0.000000	3.4	4E-11	0.00000	0.00070			
		1st Quartile	0.00028	0.00022	0.013	0.0051	48	<0.000010	<0.0000050	<0.00050	0.00035	0.043	0.00605	0.0754	0.02275	<0.0000020	<0.0000020	131	<0.0010	<0.0010	<0.00020	<0.00020	130	<0.0050	<0.0050	0.0031			
		Median	0.00029	0.00024	0.0144	0.0107	48.4	<0.000010	<0.0000050	<0.00050	0.00041	0.05	0.01180	0.174	0.0506	<0.0000020	<0.0000020	134	<0.0010	<0.0010	<0.00020	<0.00020	132.0	<0.0050	<0.0050	0.0033			
		3rd Quartile	0.0003	0.00026	0.0201	0.0176	49.9	<0.000010	<0.0000050	0.00058	0.00046	0.06	0.02400	0.4845	0.361	<0.000002	<0.000002	143.5	<0.0010	<0.0010	<0.00020	<0.00020	132.5	<0.0050	<0.0050	0.004			
LLO	Long Lake Outlet	Average	0.00045	0.00043	0.0383	0.0241	29.1	0.0000056	0.00000250	0.000458	0.00051	0.0680	0.0397	0.0075	0.00198	0.00000149	0.00000165	64.7	0.0005	0.00050	0.000100	0.000100	57	0.00250	0.00250	0.00401	0.00530		
E219412		Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	52	15	15	7	2		
		Minimum	0.00034	0.0003	0.0088	0.0046	15	<0.000010	<0.0000050	<0.00050	<0.00020	0.015	0.0116	0.0033	<0.0010	<0.000002	<0.000002	18.3	<0.0010	<0.0010	<0.00020	<0.00020	10.7	<0.0050	<0.0050	<0.0020	0.0027		
		Maximum	0.00057	0.00057	0.102	0.0568	38.6	0.000014	<0.0000050	0.001	0.00108	0.158	0.087	0.0152	0.0052	0.0000047	0.000006	91.1	<0.0010	<0.0010	<0.00020	<0.00020	101	<0.0050	<0.0050	0.007	0.0079		
		Geometric Mean	0.00044	0.00042	0.0258	0.0177	27.9	0.0000054	0.0000025	0.000399	0.000443	0.055	0.0323	0.0067	0.00146	0.0000013	0.0000014	58.2	0.0005	0.00050	0.000100	0.000100	49.8	0.00250	0.00250	0.00346	0.00460		
		Count <DL	0	0	0	0	0	14	15	8	1	0	0	0	5	12	11	0	15	15	15	15	0	15	15	1	0		
		Standard Deviation	0.00007	0.00007	0.0345	0.0185	7.9	0.0000023	1E-13	0.000255	0.000272	0.046	0.0264	0.0035	0.00142	0.00000113	0.00000141	24.6	0	0.00000	0.000000	0.000000	26.2	4E-11	4E-11	0.00202	0.0037		
		1st Quartile	0.00039	0.00038	0.0113	0.0086	25.1	<0.000010	<0.0000050	<0.00050	0.00037	0.036	0.0199	0.0048	<0.0010	<0.0000020	<0.0000020	48.6	<0.0010	<0.0010	<0.00020	<0.00020	32.6	<0.0050	<0.0050	0.0028	0.004		
		Median	0.00043	0.00041	0.0209	0.016	32.9	<0.000010	<0.0000050	<0.00050	0.00042	0.043	0.0285	0.0072	0.0017	<0.000002	<0.000002	76.9	<0.0010	<0.0010	<0.00020	<0.00020	62.5	<0.0050	<0.0050	0.0039	0.0053		
		3rd Quartile	0.0005	0.00047	0.0712	0.04	34.2	<0.000010	<0.0000050	0.000605	0.00056	0.110	0.0635	0.0100	0.00295	<0.0000020	0.0000015	80.1	<0.0010	<0.0010	<0.00020	<0.00020	77.5	<0.0050	<0.0050	0.0053	0.0066		
WB	Middle Quinsam Lake Outlet	Average	0.00021	0.00021	0.0265	0.0202	30.9	0.000005	0.00000323	0.000641	0.00066	0.049	0.0265	0.0072	0.00185	0.0000013	0.0000011	35.3	0.00050	0.00050	0.000100	0.000100	28.6	0.00250	0.00250	0.00320			
E0900504		Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	4			
		Minimum	0.0001	0.00014	0.0137	0.0129	22.3	<0.000010	<0.0000050	<0.00050	0.00045	0.023	0.0114	0.0038	<0.0010	<0.000002	<0.000002	27.6	<0.0010	<0.0010	<0.00020	<0.00020	17.7	<0.0050	<0.0050	0.0021			
		Maximum	0.00037	0.00025	0.0506	0.0385	35.7	<0.000010	0.00001	0.00135	0.00147	0.099	0.0568	0.0103	0.0071	0.0000048	0.0000022	44.7	<0.0010	<0.0010	<0.00020	<0.00020	40.4	<0.0050	<0.0050	0.005			
		Geometric Mean	0.0002	0.000210	0.0237	0.019	30.7	0.000005	0.00000291	0.000591	0.00062	0.045	0.0241	0.007	0.00122	0.00000111	0.00000105	35.1	0.00050	0.00050	0.000100	0.000100	27.9	0.00250	0.00250	0.00310			
		Count <DL	0	0	0	0	0	15	13	2	0	0	0	0	7	14	14	0	15	15	15	15	0	15	15	0			
		Standard Deviation	0.00007	0.00004	0.0136	0.0078	3.8	1E-13	0.00000208	0.000267	0.00027	0.0230	0.013	0.0019	0.00182	0.00000098	0.00000031	4.3	0.00000	0.00000	0.000000	0.000000	6.3	4E-11	4E-11	0.0013			
		1st Quartile	0.00016	0.00018	0.0169	0.0152	30.4	<0.000010	<0.0000050	0.000535	0.00052	0.034	0.0174	0.0058	<0.0010	<0.0000020	<0.0000020	32.6	<0.0010	<0.0010	<0.00020	<0.00020	24.4	<0.0050	<0.0050	0.0025			
		Median	0.0002	0.000220	0.0182	0.0177	31.5	<0.000010	<0.0000050	0.00057	0.00054	0.044	0.0245	0.0075	0.0014	<0.0000020	<0.0000020	34.6	<0.0010	<0.0010	<0.00020	<0.00020	28.9	<0.0050	<0.0050	0.0029			
		3rd Quartile	0.00026	0.000240	0.0382	0.0227	33.5	<0.000010	<0.0000050	0.00073	0.00068	0.056	0.0286	0.0087	0.00285	<0.000002	<0.0000020	38.5	<0.0010	<0.0010	<0.00020	<0.00020	31.4	<0.0050	<0.0050	0.0036			
7SSD	Settling Pond at 7S- Discharge to Stream 1 -7S		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E292069		Average	0.00251	0.00204	0.1667	0.00909	141.8	0.0000064	0.00000368	0.00161	0.001	0.248	0.01791	0.0834	0.05288	0.00000119	0.000001	147	0.00059	0.0005	0.0001	0.0001	15.82	0.0025	0.0025				
		Count	17	17	17	17	17	17	17	17	17	17	17	17	17	16	17	17	17	17	17	17	17	17	17				
		Minimum	0.00063	0.00029	0.0228	<0.0030	50.7	<0.000010	<0.0000050	0.00055	0.00043	0.057	<0.0050	0.01	<0.0010	<0.0000020	<0.0000020	63.5	<0.0010	<0.0010	<0.00020	<0.00020	8.22	<0.0050	<0.0050				
		Maximum	0.0112	0.01	1.03	0.0298	219	0.000019	0.000009	0.00511	0.00347	1.37	0.085	0.479	0.423	0.0000029	<0.0000020	230	0.002	<0.0010	<0.00020	<0.00020	31	<0.0050	<0.0050				
		Geometric Mean	0.0016	0.00114	0.0823	0.00501	130.5	0.00000590	0.00000322	0.00128	0.00084	0.154	0.00975	0.0570	0.01442	0.00000112	0.000001	138.1	0.00054	0.0005	0.000100	0.000100	14.94	0.0025	0.00250				
		Count <DL	0	0	0	6	0	14	13	0	0	0	4	0	2	14	17	0	16	17	17	17	0	17	17				
		Standard Deviation	0.00284	0.00261	0.2564	0.01005	51.3	0.0000036	0.00000231	0.00127	0.00075	0.326	0.02177	0.1071	0.1006	0.00000054	0	49.7	0.00036	0	0	0.000000	5.7	4E-11	0.00000				
		1st Quartile	0.0007	0.0006	0.0443	<0.0030	114	<0.000010	<0.0000050	0.00077	0.0006	0.088	0.005	0.0382	0.0035	<0.0000020	<0.0000020	108.0	<0.0010	<0.0010	<0.00020	<0.00020	11.2	<0.0050	<0.0050				
		Median	0.0012	0.00073	0.0596	0.0046	154	<0.000010	<0.0000050	0.00105	0.00066	0.115	0.0073	0.054	0.024	<0.0000020	<0.0000020	155	<0.0010	<0.0010	<0.00020	<0.00020	15.7	<0.0050	<0.0050				
		3rd Quartile	0.00271	0.0023	0.194	0.0135	174	<0.000010	<0.0000050	0.00176	0.00114	0.293	0.0247	0.0784	0.0482	<0.0000020	<0.0000020	181.0	<0.0010	<0.0010	<0.00020	<0.00020	19.7	<0.0050	<0.0050				
7S	Stream 1-7S discharge to LWO	Average	0.000099	0.000086	0.0489	0.038	15.4	0.000005	0.00000329	0.000409	0.00039	0.0172	0.00975	0.0006	0.00054	0.00000109	0.00000146	16.5	0.00050	0.00050	0.000100	0.000100	2.990	0.00278	0.00250				
E292109		Count	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14				
		Minimum	<0.00010	<0.00010	0.0163	0.0177	10.3	<0.000010	<0.0000050	<0.00050	<0.00020	<0.010	<0.0050	<0.0010	<0.0010	<0.0000020	<0.0000020	12.1	<0.0010	<0.0010	<0.00020	<0.00020	1.26	<0.0050	<0.0050				
		Maximum	0.00018	0.00023	0.13	0.0776	26.8	<0.000010	0.00001	0.00112	0.00062	0.075	0.037	0.0014	0.0011	0.0000022	0.0000046	24.3	<0.0010	<0.0010	<0.00020	<0.00020	4.37	0.0064	<0.0050				
		Geometric Mean	0.00009	0.000073	0.0403	0.034	14.9	0.000005	0.00000294	0.000355	0.000349	0.0104	0.00589	0.00057	0.00053	0.00000106	0.00000127	16.1	0.00050	0.00050	0.000100	0.000100	2.87	0.00267	0.00250				
		Count <DL	5	9	0	0	0	14	12	9	2	8	6	12	13	13	11	0	14	14	14	14	0	13	14				
		Standard Deviation	0.000042	0.000057	0.034	0.0195	4.2	1E-13	0.00000215	0.00026	0.000164	0.0206	0.01134	0.00027	0.00016	0.00000032	0.00000104	3.7	0.00000	0.00000	0.000000	0.000000	0.8	0.00104	1E-10				
		1st Quartile	<0.00010	<0.00010	0.0257	0.0234	13.3	<0.000010	<0.0000050	<0.00050	0.00032	<0.010	<0.0050	<0.0010	<0.0010	<0.0000020	<0.0000020	13.8	<0.0010	<0.0010	<0.00020	<0.00020	2.48	<0.0050	<0.0050				
		Median	0.00011	<0.00010	0.0359	0.0326	14.3	<0.000010	<0.0000050	<0.00050	0.00041	<0.010	0.0051	<0.0010	<0.0010	<0.0000020	<0.0000020	15.5	<0.0010	<0.0010	<0.00020	<0.00020	2.98	<0.0050	<0.0050				
		3rd Quartile	0.000127	0.000108	0.0599	0.0465	16	<0.000010	<0.0000050	0.000568	0.000492	0.0172	0.01052	<0.0010	<0.0010	<0.0000020	<0.0000020	17.8	<0.0010	<0.0010	<0.00020	<0.00020	3.59	<0.0050	<0.0050				
QU0813A	Ex-situ 7-South groundwater well down gradient of the CCR backfill towards QR (No. 4 Seam)	Average	0.458	0.427	0.0178	0.00338	175.8	0.0000050	0.0000025	0.000250	0.000100	0.24	0.216	0.0492	0.0556		0.0000016		0.000500	0.000500	0.0001000	0.0001000	17.8	0.00250	0.00250		0.1480		
		Count	1	4	1	4	4	1	4	1	4	1	4	1	4		4		1	4	1	4	4	1	4		4		
		Minimum	0.458	0.405	0.0178	<0.0030	169	<0.000010	<0.0000050	<0.00050	<0.00020	0.24	0.205	0.0492	0.0431		<0.0000020		<0.0010	<0.0010	<0.00020	<0.00020	17	<0.0050	<0.0050		0.0931		
		Maximum	0.458	0.447	0.0178	0.0057	180	<0.000010	<0.0000050	<0.00050	<0.00020	0.24	0.222	0.0492	0.0813		0.0000034		<0.0010	<0.0010	<0.00020	<0.00020	19.2	<0.0050	<0.0050		0.174		
		Geometric Mean	0.458	0.426	0.0178	0.0028	175.7	0.0000050	0.0000025	0.00025	0.000100	0.24	0.216	0.0492	0.0538		0.0000014		0.000500	0.000500	0.0001000	0.0001000	17.8	0.0025	0.00250		0.1437		
		Count <DL	0	0	0	2	0	1	4	1	4	0	0	0	0		3		1	4	1	4	0	1	4		0		
		Standard Deviation	0	0.017	0	0.0022	5.0	0.0000000	0	0	0.000000	0.000	0.008	0	0.0175		0.0000012		0.000000	0.000000	0.0000000	0.0000000	1	0	0.00000		0.0375		
		1st Quartile	0.458	0.42	0.0178	<0.0030	173.5	<0.000010	<0.0000050	<0.00050	<0.00020	0.24	0.213	0.0492	0.0452		<0.0000020		<0.0010	<0.0010	<0.00020	<0.00020	17.2	<0.0050	<0.0050		0.1395		
		Median	0.458	0.427	0.0178	0.00315	177	<0.000010	<0.0000050	<0.00050	<0.00020	0.24	0.218	0.0492	0.049		<0.0000020		<0.0010	<0.0010	<0.00020	<0.00020	17.4	<0.0050	<0.0050		0.1625		
		3rd Quartile	0.458	0.434	0.0178	0.0050	179.2	<0.000010	<0.0000050	<0.00050	<0.00020	0.24	0.221	0.0492	0.0594		0.0000016		<0.0010	<0.0010	<0.00020	<0.00020	18.1	<0.0050	<0.0050		0.171		
QU0813B	Ex-situ 7-South groundwater well down gradient of the CCR backfill towards QR (Till & SST contact)	Average	0.519	0.497	0.248	0.0124	127.5	0.0000050	0.0000079	0.00086	0.000100	0.411	0.143	0.084	0.0832		0.0000056		0.0005	0.005000	0.0001	0.0001000	9.39	0.0025	0.00512		0.2370		
		Count	1	4	1	4	4	1	4	1	4	1	4	1	4		4		1	4	1	4	4	1	4		4		
		Minimum	0.519	0.469	0.248	0.0073	124	<0.000010	<0.0000050	0.00086	<0.00020	0.411	0.109	0.084	0.0749		0.0000021		<0.0010	<0.0010	<0.00020	<0.00020	9.05	<0.0050	<0.0050		0.213		
		Maximum	0.519	0.528	0.248	0.0201	131	<0.000010	0.000024	0.00086	<0.00020	0.411	0.228	0.084	0.0888		0.0000121		<0.0010	0.0185	<0.00020	<0.00020	9.62	<0.0050	0.013		0.299		
		Geometric Mean	0.519	0.496	0.248	0.0114	127.5	0.0000050	0.0000044	0.00086	0.000100	0.411	0.136	0.084	0.083		0.0000044		0.0005	0.001230	0.0001	0.0001000	9.39	0.0025	0.00378		0.2350		
		Count <DL	0	0	0	0	0	1	3	0	4	0	0	0	0		0		1	3	1	4	0	1	3		0		
		Standard Deviation	0.000	0.026	0.00	0.0059	3.1	0.0000000	0.0000108	0.00000	0.000000	0.00	0.057	0.000	0.0065		0.0000045		0.00000	0.009000	0.000000	0.0000000	0.3	0.0000	0.00525		0.0410		
		1st Quartile	0.519	0.479	0.248	0.0081	125.5	<0.000010	<0.0000050	0.00086	<0.00020	0.411	0.114	0.084	0.0794		0.0000028		<0.0010	<0.0010	<0.00020	<0.00020	9.28	<0.0050	<0.0050		0.215		
		Median	0.519	0.495	0.248	0.0111	127.5	<0.000010	<0.0000050	0.00086	<0.00020	0.411	0.118	0.084	0.0844		0.000004		<0.0010	<0.0010	<0.00020	<0.00020	9.44	<0.0050	<0.0050		0.218		
		3rd Quartile	0.519	0.513	0.248	0.0154	129.5	<0.000010	0.00000788	0.00086	<0.00020	0.411	0.147	0.084	0.0882		0.0000067		<0.0010	0.005	<0.00020	<0.00020	9.56	<0.0050	0.00512		0.24		

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 73
2016-2017 Annual Report

2016-17 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
QU0821GD	Ex-situ 2-North groundwater well down gradient of u/g tailings disposal, measures water quality & hydraulic gradients downstream of Forjan Fault (No. 4 Seam)	Average		0.158		0.0056	213.0		0.0000052		0.00013		0.934		0.1111		0.0000027			0.0005		0.0001	0.35		0.0025		0.082		
		Count		4		4	4		4		4		4		4		4			4		4	4		4		4		
		Minimum		0.111		0.0036	197		<0.0000050		<0.00020		0.303		0.0535		<0.0000020			<0.0010		<0.00020	<0.50		<0.0050		0.0579		
		Maximum		0.208		0.0084	220		0.0000133		0.00022		1.59		0.174		0.0000049			<0.0010		<0.00020	0.64		<0.0050		0.104		
		Geometric Mean		0.155		0.0053	212.8		0.0000038		0.000122		0.799		0.1023		0.0000021			0.0005		0.0001	0.316		0.0025		0.0794		
		Count <DL		0		0	0		3		3		0		0		2			4		4	3		4		0		
		Standard Deviation		0.04		0.00220	10.9		0.0000054		0.00006		0.529		0.0494		0.0000020			0		0	0.195		0.00000		0.0234		
		1st Quartile		0.143		0.004	210.5		<0.0000050		<0.00020		0.714		0.091		<0.0000020			<0.0010		<0.00020	<0.50		<0.0050		0.0639		
		Median		0.158		0.0052	217.5		<0.0000050		<0.00020		0.922		0.1085		0.00000245			<0.0010		<0.00020	<0.50		<0.0050		0.083		
		3rd Quartile		0.174		0.0067	220		0.0000052		0.00013		1.142		0.1282		0.00000415			<0.0010		<0.00020	0.35		<0.0050		0.101		
QU0821GS	Ex-situ 2-North groundwater well down gradient of u/g tailings disposal, measures water quality & hydraulic gradients downstream of Forjan Fault (No. 1 Seam)	Average		0.198		0.008	207.0		0.0000031		0.000125		0.546		0.0912		0.0000041			0.000620		0.0001250	0.512		0.00312		0.0899		
		Count		4		4	4		4		4		4		4		4			4		4	4		4		4		
		Minimum		0.153		0.0066	200		<0.0000050		<0.00020		0.314		0.0698		0.0000024			<0.0010		<0.00020	<0.50		<0.0050		0.0385		
		Maximum		0.218		0.0097	222		<0.000010		<0.00040		1.01		0.128		0.0000078			<0.0020		<0.00040	1.01		<0.010		0.154		
		Geometric Mean		0.196		0.0079	206.8		0.0000030		0.000119		0.483		0.0884		0.0000036			0.000590		0.0001190	0.43		0.00297		0.0793		
		Count <DL		0		0	0		4		4		0		0		0			4		4	2		4		0		
		Standard Deviation		0.03		0.0016	10.1		0.0000013		0.00005		0.327		0.027		0.0000025			0.000250		0.0000500	0.359		0.00125		0.0498		
		1st Quartile		0.194		0.0068	202.2		<0.0000050		<0.00020		0.316		0.0717		0.0000026			<0.0010		<0.00020	<0.50		<0.0050		0.0592		
		Median		0.21		0.0079	203		<0.0000050		<0.00020		0.43		0.0834		0.000003			<0.0010		<0.00020	0.395		<0.0050		0.0836		
		3rd Quartile		0.214		0.0092	207.8		0.00000312		0.000125		0.66		0.103		0.0000046			0.00062		0.000125	0.658		0.00312		0.1142		
QU1010D	Ex-situ 2-North deep groundwater well. Down gradient of u/g tailings disposal, measures water quality & hydraulic head downstream of 2-North workings. (No. 1 Seam / Mudstone).																												
		Average		0.0152		0.0129	92.3		0.000022		0.00085		10.2		0.433		0.0000023			0.00100		0.000430	0.25		0.0050		0.06650		
		Count		1		1	1		1		1		1		1		1			1		1	1		1		1		
		Minimum		0.0152		0.0129	92.3		0.000022		0.00085		10.2		0.433		0.0000023			<0.0020		0.00043	<0.50		<0.010		0.0665		
		Maximum		0.0152		0.0129	92.3		0.000022		0.00085		10.2		0.433		0.0000023			<0.0020		0.00043	<0.50		<0.010		0.0665		
		Geometric Mean		0.0152		0.0129	92.3		0.000022		0.00085		10.2		0.433		0.0000023			0.00100		0.000430	0.25		0.0050		0.06650		
		Count <DL		0		0	0		0		0		0		0		0			1		0	1		1		0		
		Standard Deviation		0.0000		0.0000	0		0.000000		0.00000		0.0		0.00		0.0000000			0.00000		0.000000	0.0		0.0000		0.00000		
		1st Quartile		0.0152		0.0129	92.3		0.000022		0.00085		10.2		0.433		0.0000023			<0.0020		0.00043	<0.50		<0.010		0.0665		
		Median		0.0152		0.0129	92.3		0.000022		0.00085		10.2		0.433		0.0000023			<0.0020		0.00043	<0.50		<0.010		0.0665		
		3rd Quartile		0.0152		0.0129	92.3		0.000022		0.00085		10.2		0.433		0.0000023			<0.0020		0.00043	<0.50		<0.010		0.0665		
QU1010S	Ex-situ 2-North shallow groundwater well. Down gradient of u/g tailings disposal, measures water quality & hydraulic head downstream of 2-North workings. (No. 1 Seam / Sandstone).	Average		0.133		0.0188	151.0		0.0000025		0.0001		0.351		0.0531		0.0000054			0.000500		0.0001000	49.8		0.00250		0.0686		
		Count		1		1	1		1		1		1		1		1			1		1	1		1		1		
		Minimum		0.133		0.0188	151		<0.0000050		<0.00020		0.351		0.0531		0.0000054			<0.0010		<0.00020	49.8		<0.0050		0.0686		
		Maximum		0.133		0.0188	151		<0.0000050		<0.00020		0.351		0.0531		0.0000054			<0.0010		<0.00020	49.8		<0.0050		0.0686		
		Geometric Mean		0.133		0.01880	151.0		0.0000025		0.0001		0.351		0.0531		0.0000054			0.000500		0.0001000	49.8		0.0025		0.0686		
		Count <DL		0		0	0		1		1		0		0		0			1		1	0		1		0		
		Standard Deviation		0		0	0.0		0.0000000		0		0		0		0.0000000			0.000000		0.0000000	0		0		0		
		1st Quartile		0.133		0.0188	151		<0.0000050		<0.00020		0.351		0.0531		0.0000054			<0.0010		<0.00020	49.8		<0.0050		0.0686		
		Median		0.133		0.0188	151		<0.0000050		<0.00020		0.351		0.0531		0.0000054			<0.0010		<0.00020	49.8		<0.0050		0.0686		
		3rd Quartile		0.133		0.0188	151		<0.0000050		<0.00020		0.351		0.0531		0.0000054			<0.0010		<0.00020	49.8		<0.0050		0.0686		
QU1011D	Ex-situ 2-North deep groundwater well. Measures water quality & hydraulic gradient in Forjian Fault (Fractured sandstone).	Average		0.00905		0.0215	360		0.0000025		0.0001		4.09		0.453		0.0000031			0.0005		0.0001	1.0		0.0025		0.076		
		Count		1		1	1		1		1		1		1		1			1		1	1		1		1		
		Minimum		0.00905		0.0215	360		<0.0000050		<0.00020		4.09		0.453		0.0000031			<0.0010		<0.00020	0.95		<0.0050		0.0764		
		Maximum		0.00905		0.0215	360		<0.0000050		<0.00020		4.09		0.453		0.0000031			<0.0010		<0.00020	0.95		<0.0050		0.0764		
		Geometric Mean		0.00905		0.0215	360		0.0000025		0.0001		4.09		0.453		0.0000031			0.0005		0.0001	1.0		0.0025		0.076		
		Count <DL		0		0	0		1		1		0		0		0			1		1	0		1		0		
		Standard Deviation		0.00000		0.0000	0		0.0000000		0.00000		0.00		0.000		0.0000000			0.00000		0.000000	0.0		0.0000		0.000		
		1st Quartile		0.00905		0.0215	360		<0.0000050		<0.00020		4.09		0.453		0.0000031			<0.0010		<0.00020	0.95		<0.0050		0.0764		
		Median		0.00905		0.0215	360		<0.0000050		<0.00020		4.09		0.453		0.0000031			<0.0010		<0.00020	0.95		<0.0050		0.0764		
		3rd Quartile		0.00905		0.0215	360		<0.0000050		<0.00020		4.09		0.453		0.0000031			<0.0010		<0.00020	0.95		<0.0050		0.0764		
QU1011S	Ex-situ 2-North shallow groundwater well. Measures water quality & hydraulic gradient in Forjian Fault (Fractured sandstone).	Average		0.00495		0.012	106.3		0.0000025		0.000175		0.265		0.0602		0.0000055			0.0005		0.0001000	5.84		0.00250		0.0125		
		Count		2		2	2		2		2		2		2		2			2		2	2		2		2		
		Minimum		0.00169		0.0056	59.6		<0.0000050		<0.00020		0.179		0.0488		0.0000048			<0.0010		<0.00020	3.94		<0.0050		0.0055		
		Maximum		0.0082		0.0183	153		<0.0000050		0.00025		0.352		0.0716		0.0000063			<0.0010		<0.00020	7.73		<0.0050		0.0195		
		Geometric Mean		0.00372		0.0101	95.5		0.0000025		0.000158		0.251		0.0591		0.0000055			0.0005		0.0001000	5.52		0.0025		0.0104		
		Count <DL		0		0	0		2		1		0		0		0			2		2	0		2		0		
		Standard Deviation		0.0046		0.009	66		0.0000000		0.000106		0.122		0.0161		0.0000011			0		0.0000000	2.68		0		0.0099		
		1st Quartile		0.00332		0.0088	83		<0.0000050		0.000138		0.222		0.0545		0.0000052			<0.0010		<0.00020	4.89		<0.0050		0.009		
		Median		0.00494		0.0119	106.3		<0.0000050		0.000175		0.265		0.0602		0.0000055			<0.0010		<0.00020	5.84		<0.0050		0.0125		
		3rd Quartile		0.00657		0.0151	129.6		<0.0000050		0.000213		0.309		0.0659		0.0000059			<0.0010		<0.00020	6.78		<0.0050		0.016		

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 74
2016-2017 Annual Report

2016-17 Statistics Stn.Code EMS. ID	Site Name & Description	Statistics	As-T	As-D	Al-T	Al-D	Alk-T	Cd-T	Cd-D	Cu-T	Cu-D	Fe-T	Fe-D	Mn-T	Mn-D	Hg-T	Hg-D	Hard-T	Ni-T	Ni-D	Pb-T	Pb-D	SO4-D	Zn-T	Zn-D	P-T	P-D	N-NO23	N-NH3
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
QU1105S	Ex-situ River Barrier Pillar (RBP) shallow groundwater well. Monitors water quality & gradients above the RBP & 2-North Mine. (Sandstone)	Average		0.0716		0.00562	207.8		0.0000033		0.000178		1.395		0.176		0.0000049			0.000500		0.0001000	92.9		0.00250		0.030		
		Count		4		4	4		4		4		4		4		4			4		4	4		4		4		
		Minimum		0.0362		<0.0030	82.8		<0.0000050		<0.00020		0.358		0.0988		0.0000024			<0.0010		<0.00020	42.3		<0.0050		0.0126		
		Maximum		0.103		0.0083	329		0.0000055		0.00027		2.46		0.254		0.0000108			<0.0010		<0.00020	156		<0.0050		0.0479		
		Geometric Mean		0.065		0.00472	170.7		0.0000030		0.000160		1.038		0.1629		0.0000040			0.000500		0.0001000	80.4		0.00250		0.027		
		Count <DL		0		1	0		3		2		0		0		0			4		4	0		4		0		
		Standard Deviation		0.0344		0.00295	136.6		0.0000015		0.000090		1.063		0.0765		0.0000040			0.000000		0.0000000	54.7		0.00000		0.015		
		1st Quartile		0.0452		0.00465	93.1		<0.0000050		<0.00020		0.549		0.117		0.000003			<0.0010		<0.00020	49.8		<0.0050		0.0222		
		Median		0.0737		0.00635	209.8		<0.0000050		0.00017		1.382		0.1755		0.0000032			<0.0010		<0.00020	86.6		<0.0050		0.0298		
		3rd Quartile		0.1001		0.00732	324.5		0.00000325		0.000248		2.228		0.2345		0.0000051			<0.0010		<0.00020	129.8		<0.0050		0.0377		
QU1109S	Ex-situ River Barrier Pillar (RBP) shallow groundwater well. Monitors water quality & gradients above the RBP & 2-North Mine. (Sandstone)	Average		0.077		0.006	512		0.0000054		0.0001		0.2270		0.0217		0.0000015			0.0005		0.0001	477		0.0025		0.029		
		Count		4		4	4		4		4		4		4		4			4		4	4		4		4		
		Minimum		0.067		0.0045	458		<0.0000050		<0.00020		0.171		0.0193		<0.0000020			<0.0010		<0.00020	435		<0.0050		<0.0020		
		Maximum		0.095		0.0097	554		0.000014		<0.00020		0.292		0.0233		0.0000028			<0.0010		<0.00020	540		<0.0050		0.0469		
		Geometric Mean		0.076		0.0057	510.5		0.0000039		0.0001		0.2220		0.0216		0.0000013			0.0005		0.0001	475		0.0025		0.015		
		Count <DL		0		0	0		3		4		0		0		3			4		4	0		4		1		
		Standard Deviation		0.013		0.0025	45.1		0.0000058		0.00000		0.0560		0.00170		0.0000009			0.00000		0.000000	50.0		0.0000		0.020		
		1st Quartile		0.068		0.0046	483.5		<0.0000050		<0.00020		0.186		0.0213		<0.0000020			<0.0010		<0.00020	436		<0.0050		0.02635		
		Median		0.072		0.0048	518		<0.0000050		<0.00020		0.223		0.0221		<0.0000020			<0.0010		<0.00020	467		<0.0050		0.03485		
		3rd Quartile		0.082		0.0062	546.5		0.00000538		<0.00020		0.264		0.0225		0.00000145			<0.0010		<0.00020	508		<0.0050		0.0379		
7SQR	7-South Quinsam River downstream of 7-South Mining Operation	Average	0.0008	0.00058	0.0419	0.0212	32.2	0.0000053	0.00000332	0.000781	0.00061	0.109	0.0484	0.0075	0.00245	0.00000156	0.00000109	35.9	0.00050	0.00050	0.000100	0.000100	28.9	0.0025	0.0025	0.00610			
E292113		Count	22	22	22	22	21	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	4			
		Minimum	0.00021	0.0002	0.0136	0.009	22.9	<0.000010	<0.0000050	<0.00050	0.00042	0.045	0.0211	0.0028	<0.0010	<0.000002	<0.000002	24.9	<0.0010	<0.0010	<0.00020	<0.00020	12.5	<0.0050	<0.0050	0.0038			
		Maximum	0.00558	0.00244	0.203	0.0448	37.8	0.000012	0.000012	0.00213	0.00089	0.465	0.0804	0.0359	0.0056	0.0000046	0.000003	44.4	<0.0010	<0.0010	<0.00020	<0.00020	39.3	<0.0050	<0.0050	0.0117			
		Geometric Mean	0.0005	0.00045	0.0307	0.0186	32	0.0000052	0.00000293	0.000701	0.0006	0.093	0.0459	0.0064	0.00192	0.00000129	0.00000105	35.6	0.00050	0.00050	0.000100	0.000100	28.2	0.0025	0.0025	0.00540			
		Count <DL	0	0	0	0	0	21	19	1	0	0	0	0	5	18	21	0	22	22	22	22	0	22	22	0			
		Standard Deviation	0.0013	0.00056	0.0432	0.0111	3.8	0.00000150	0.00000236	0.000432	0.00014	0.088	0.0159	0.0066	0.00142	0.00000122	0.00000043	4.8	0.00000	0.00000	0.000000	0.000000	5.7	0	0	0.0038			
		1st Quartile	0.00037	0.00033	0.0171	0.0121	29.6	<0.000010	<0.0000050	0.000552	0.00051	0.065	0.0381	0.0048	0.00142	<0.0000020	<0.0000020	33.2	<0.0010	<0.0010	<0.00020	<0.00020	25.8	<0.0050	<0.0050	0.004			
		Median	0.00042	0.00036	0.0242	0.0164	33.3	<0.000010	<0.0000050	0.00062	0.00058	0.085	0.0462	0.006	0.0028	<0.000002	<0.0000020	37	<0.0010	<0.0010	<0.00020	<0.00020	30	<0.0050	<0.0050	0.0044			
		3rd Quartile	0.00048	0.00046	0.0519	0.0292	34.8	<0.000010	<0.0000050	0.0008	0.00066	0.117	0.0554	0.0078	0.0031	<0.0000020	<0.0000020	38.8	<0.0010	<0.0010	<0.00020	<0.00020	32.60	<0.0050	<0.0050	0.0066			
LQL1	Lower Quinsam Lake 1 metre below surface	Average	0.00054	0.00051	0.0723	0.0321	29.6	0.0000075	0.00000434	0.000851	0.00070	0.133	0.0468	0.0069	0.00186	0.00000116	0.00000129	31.8	0.00091	0.00050	0.000100	0.000100	17.5	0.00250	0.00250	0.0117			
E292118		Count	16	16	16	16	4	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	3			
		Minimum	0.00032	0.00026	0.0069	0.0071	25.2	<0.000010	<0.0000050	<0.00050	0.00036	0.033	0.0161	0.0035	<0.0010	<0.0000020	<0.0000020	25.0	<0.0010	<0.0010	<0.00020	<0.00020	10.5	<0.0050	<0.0050	0.0044			
		Maximum	0.00071	0.00081	0.374	0.0813	34.3	0.000025	0.0000150	0.00195	0.00128	0.587	0.0862	0.0203	0.0053	0.0000024	0.0000028	42.3	0.0070	<0.0010	<0.00020	<0.00020	23.3	<0.0050	<0.0050	0.0220			
		Geometric Mean	0.00053	0.00049	0.0337	0.0241	29.4	0.0000063	0.00000358	0.000711	0.00066	0.092	0.0431	0.0062	0.00117	0.00000111	0.00000119	31.4	0.00059	0.00050	0.000100	0.000100	16.9	0.00250	0.00250	0.0094			
		Count <DL	0	0	0	0	0	13	11	3	0	0	0	0	8	14	13	0	15	16	16	16	0	16	16	0			
		Standard Deviation	0.00011	0.00015	0.1009	0.0245	3.7	0.0000058	0.00000343	0.000512	0.00024	0.145	0.0188	0.0040	0.00184	0.00000043	0.00000062	5.3	0.00162	0.00000	0.000000	0.000000	4.4	4E-11	4E-11	0.0092			
		1st Quartile	0.00045	0.00043	0.0118	0.0113	28.1	<0.000010	<0.0000050	0.000565	0.00049	0.052	0.0384	0.0049	<0.0010	<0.0000020	<0.0000020	28.0	<0.0010	<0.0010	<0.00020	<0.00020	14.5	<0.0050	<0.0050	0.0066			
		Median	0.00052	0.00048	0.0276	0.0244	29.4	<0.000010	<0.0000050	0.000700	0.00065	0.070	0.0435	0.0056	0.00080	<0.0000020	<0.0000020	29.6	<0.0010	<0.0010	<0.00020	<0.00020	16.8	<0.0050	<0.0050	0.0087			
		3rd Quartile	0.00064	0.00063	0.0888	0.0457	30.9	<0.000010	0.0000060	0.000990	0.00085	0.144	0.0516	0.0082	0.0034	<0.0000020	<0.0000020	36.1	<0.0010	<0.0010	<0.00020	<0.00020	21.8	<0.0050	<0.0050	0.0154			
LQLB	LQLB 1 metre from Bottom	Average	0.00119	0.00066	0.0840	0.0331	29.0	0.0000110	0.00000612	0.00100	0.00072	0.684	0.1917	0.2085	0.1350	0.00000107	0.00000134	29.1	0.00050	0.00050	0.000100	0.000100	12.8	0.00321	0.00250	0.0131			
E292118		Count	16	16	16	16	4	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	3			
		Minimum	0.00038	0.00028	0.0259	0.0095	26.7	<0.000010	<0.0000050	0.00062	0.00042	0.102	0.0461	0.0072	0.0016	<0.0000020	<0.0000020	24.5	<0.0010	<0.0010	<0.00020	<0.00020	10.3	<0.0050	<0.0050	0.0042			
		Maximum	0.00271	0.00128	0.437	0.0813	33.6	0.000026	0.0000120	0.00211	0.00119	2.36	0.498	0.689	0.392	0.0000021	0.0000027	34.0	<0.0010	<0.0010	<0.00020	<0.00020	15.2	0.0139	<0.0050	0.0267			
		Geometric Mean	0.00096	0.00061	0.0518	0.0265	28.9	0.0000090	0.00000543	0.00092	0.00069	0.396	0.1405	0.0650	0.0369	0.00000105	0.00000124	29.0	0.00050	0.00050	0.000100	0.000100	12.7	0.00278	0.00250	0.0098			
		Count <DL	0	0	0	0	0	8	4	0	0	0	0	0	0	15	12	0	16	16	16	16	0	15	16	0			
		Standard Deviation	0.00081	0.00028	0.1115	0.0237	3.1	0.0000072	0.00000287	0.00045	0.00021	0.693	0.1533	0.2557	0.1599	0.00000027	0.00000063	3.0	0.00000	0.00000	0.000000	0.000000	1.4	0.00285	4E-11	0.0120			
		1st Quartile	0.00060	0.00050	0.0290	0.0168	27.4	<0.000010	0.00000438	0.00066	0.00058	0.150	0.0789	0.0173	0.0054	<0.0000020	<0.0000020	27.3	<0.0010	<0.0010	<0.00020	<0.00020	12.0	<0.0050	<0.0050	0.0062			
		Median	0.00073	0.00060	0.0332	0.0230	28.0	0.0000085	0.00000590	0.00083	0.00072	0.270	0.0985	0.0438	0.0350	<0.0000020	<0.000002	27.8	<0.0010	<0.0010	<0.00020	<0.00020	12.7	<0.0050	<0.0050	0.0083			
		3rd Quartile	0.00193	0.00078	0.0752	0.0478	29.6	0.0000138	0.00000810	0.00120	0.00083	1.168	0.3492	0.4218	0.3062	<0.0000020	0.00000127	32.0	<0.0010	<0.0010	<0.00020	<0.00020	13.6	<0.0050	<0.0050	0.0175			

Notes:
Factor applied to less-than results when calculating statistics: 0.5
Factor applied to greater-than results when calculating statistics: 1.0

Table 75
2016-2017 Annual Report

Middle Point Barge Loading Facility

EMS ID: E17181 **Permit # 17181**

Stn.Code:	MP			
Site Name:	Middle Point Terminal			
Units	mg/L	mg/L	pH Units	Flow
Parameters:	O&G	TSS	pH-F	m3/h
Permit Limits:	10	50	6.5 - 8.5	
6-Apr-2016	<5.0	<4.0	8	2
12-Apr-2016	<5.0	<4.0	7.9	2
19-Apr-2016	<5.0	<4.0	8.1	2
25-Apr-2016	<5.0	<4.0	8.2	2
3-May-2016	<5.0	<4.0	7.7	2
10-May-2016	<5.0	<4.0	7.9	2
17-May-2016	<5.0	<4.0	8.1	2
26-May-2016	<5.0	<4.0	7.3	2
1-Jun-2016	<5.0	<4.0	7.4	2
7-Jun-2016	<5.0	<4.0	7.4	2
16-Jun-2016	<5.0	<4.0	7.5	2
22-Jun-2016	<5.0	<4.0	7.6	2
28-Jun-2016	<5.0	<4.0	7.1	2
7-Jul-2016	<5.0	<4.0	7.10	2
12-Jul-2016	<5.0	<4.0	7.20	2
19-Jul-2016	<5.0	<4.0	7.00	2
27-Jul-2016	<5.0	<4.0	7.40	2
4-Aug-2016	<5.0	<4.0	7.20	2
10-Aug-2016	<5.0	<4.0	7.70	2
17-Aug-2016	<5.0	<4.0	7.40	2
24-Aug-2016	<5.0	<4.0	7.70	2
31-Aug-2016	<5.0	<4.0	7.70	2
6-Sep-2016	<5.0	<4.0	7.70	2
15-Sep-2016	<5.0	<4.0	7.70	2
22-Sep-2016	<5.0	<4.0	7.60	2
28-Sep-2016	<5.0	<4.0	7.80	2
5-Oct-2016	<5.0	<4.0	7.8	2
11-Oct-2016	<5.0	<4.0	7.8	2
19-Oct-2016	<5.0	<4.0	7.6	2
26-Oct-2016	<5.0	<4.0	7.6	2
1-Nov-2016	<5.0	<4.0	8.1	2
1-Nov-2016	<5.0	<4.0	8	2
7-Nov-2016	<5.0	<4.0	8	2
14-Nov-2016	<5.0	<4.0	7.5	2
22-Nov-2016	<5.0	<4.0	7.6	2
1-Dec-2016	<5.0	<4.0	7.5	2
7-Dec-2016	<5.0	<4.0	7.9	2
12-Dec-2016	<5.0	<4.0	7.8	2
21-Dec-2016	<5.0	<4.0	7.9	2
27-Dec-2016	<5.0	<4.0	7.8	2
4-Jan-2017	<5.0	<4.0	7.7	2
9-Jan-2017	<5.0	<4.0	7.8	2
24-Jan-2017	<5.0	<4.0	7.9	2
1-Feb-2017	<5.0	<4.0	8	2
7-Feb-2017	<5.0	<4.0	7.8	2
14-Feb-2017	<5.0	<4.0	7.7	2
21-Feb-2017	<5.0	<4.0	8	2
2-Mar-2017	<5.0	<4.0	8	2
9-Mar-2017	<5.0	<4.0	8.1	2
14-Mar-2017	<5.0	<4.0	8	2
21-Mar-2017	<5.0	<4.0	8	2
30-Mar-2017	<5.0	<4.0	8	2

Table 76
2016-2017 Annual Report

EMS ID: E217018

Site NAME: NO NAME LAKE (NNL)

NO NAME LAKE DEPTH PROFILING SPRING

Sample Date	13-Apr						20-Apr						28-Apr						4-May						11-May					
Parameter	TEMP.	pH	COND. µS/cm	% Sat.	D.O.	ORP	TEMP.	pH	COND. µS/cm	% Sat.	D.O.	ORP	TEMP.	pH	COND. µS/cm	% Sat.	D.O.	ORP	TEMP.	pH	COND. µS/cm	% Sat.	D.O.	ORP	TEMP.	pH	COND. µS/cm	% Sat.	D.O.	ORP
Sample Depth (m)	Celsius				mg/L		Celsius				mg/L		Celcius				mg/L		Celcius				mg/L		Celcius				mg/L	
1	11.64	6.75	32	96.7	10.50	91.0	13.59	7.14	32	99.5	10.33	55.4	13.47	6.86	36	96.7	10.08	97.0	14.61	6.93	36	95.6	9.70	91.0	17.38	7.37	39	98.1	9.40	81.5
2	11.34	6.76	32	97.7	10.70	91.4	12.05	7.05	32	97.7	10.54	57.8	12.65	6.77	36	97.4	10.34	99.5	14.65	6.87	37	94.6	9.61	96.4	16.37	7.22	39	94.9	9.29	87.1
3	9.27	6.76	30	100.0	11.51	91.9	10.36	6.97	32	96.8	10.84	57.9	11.13	6.73	34	98.1	10.79	100.7	11.96	6.83	35	94.7	10.22	100.3	13.49	7.00	38	95.4	9.94	95.6
4	7.25	6.74	30	97.2	11.73	93.1	8.43	6.86	31	98.1	11.50	58.2	8.83	6.67	32	98.3	11.43	103.1	8.79	6.93	32	94.8	10.97	103.8	9.82	6.87	34	95.4	10.84	101.3
5	6.53	6.63	30	92.2	11.32	95.6	6.97	6.78	30	93.0	11.30	59.5	7.10	6.56	32	92.4	11.23	107.5	7.40	6.73	32	89.5	10.76	111.0	8.26	6.60	33	91.1	10.72	113.4
6	6.19	6.56	31	89.8	11.12	96.7	6.48	6.72	30	90.2	11.09	60.6	6.60	6.50	33	89.9	11.01	108.9	6.62	6.65	33	85.0	10.39	112.9	7.37	6.52	34	87.3	10.50	115.3
7	6.05	6.52	31	88.7	11.02	98.7	6.21	6.65	31	87.8	10.86	61.6	6.25	*6.39*	33	86.7	10.71	111.7	6.44	6.62	33	83.8	10.31	112.9	6.77	*6.38*	34	82.9	10.11	121.6
8	5.94	6.50	32	87.8	10.94	98.9	6.09	6.60	31	86.7	10.76	62.7	6.09	*6.30*	33	86.4	10.73	114.4	6.21	6.58	34	81.8	10.13	113.4	6.42	*6.38*	35	80.8	9.95	117.2
9	5.88	*6.47*	32	87.5	10.92	100.2	5.97	6.57	32	85.7	10.67	63.0	6.03	*6.20*	34	85.0	10.61	118.4	6.10	6.55	34	80.5	9.99	113.0	6.33	*6.36*	35	79.9	9.87	117.1
10	5.88	*6.46*	32	87.3	10.89	101.0	5.92	6.53	32	85.4	10.65	63.5	5.94	*6.18*	34	85.4	10.65	119.8	6.04	6.53	35	79.7	9.91	113.5	6.19	*6.30*	35	78.8	9.76	120.0
11	5.86	*6.45*	32	87.3	10.90	101.6	5.88	6.51	32	85.0	10.61	63.8	5.92	*6.16*	34	85.2	10.62	121.0	6.01	6.51	35	79.4	9.88	113.6	6.14	*6.25*	36	78.3	9.71	122.4
1m from Bottom (BS)	BS=11.00m						BS=11.30m						BS=11.00m						BS=11.00m						BS=11.20m					

NO NAME LAKE DEPTH PROFILING SUMMER

Sample Date	3-Aug						9-Aug						17-Aug						24-Aug						1-Sep					
Parameter	TEMP.	pH	COND. µS/cm	% Sat.	D.O.	ORP	TEMP.	pH	COND. µS/cm	% Sat.	D.O.	ORP	TEMP.	pH	COND. µS/cm	% Sat.	D.O.	ORP	TEMP.	pH	COND. µS/cm	% Sat.	D.O.	ORP	TEMP.	pH	COND. µS/cm	% Sat.	D.O.	ORP
Sample Depth (m)	Celcius				mg/L		Celcius				mg/L		Celcius				mg/L		Celcius				mg/L		Celcius				mg/L	
1	21.69	7.21	54	97.1	9.05	142.3	20.63	7.49	53	96.4	8.70	166.2	22.34	7.54	53	101.5	8.80	137.1	21.40	7.37	42	97.8	8.65	102.4	19.48	7.13	40	92.0	7.13	166.3
2	21.01	7.20	54	96.3	9.01	146.3	20.32	7.48	52	95.9	8.66	171.80	22.08	7.44	53	99.1	8.64	143.7	21.27	7.30	45	98.0	8.68	102.0	19.50	7.12	40	91.9	7.12	165.3
3	20.31	7.16	52	98.3	9.23	146.9	19.17	7.33	52	97.7	9.05	173.40	20.37	7.40	55	89.2	8.07	148.6	21.19	7.22	42	96.9	8.60	102.6	19.49	7.09	40	91.4	7.09	166.2
4	17.61	7.13	49	92.5	8.96	154.3	16.02	7.19	49	89.6	8.77	171.60	15.91	7.33	44	93.1	9.20	152.6	16.33	7.31	32	93.6	9.19	105.5	18.35	6.84	36	86.2	6.84	171.4
5	12.56	7.10	42	89.8	8.68	159.3	12.31	7.19	39	89.8	9.67	169.40	12.95	7.29	38	91.8	9.67	155.1	13.84	7.11	26	94..8	9.77	109.0	14.18	6.95	26	87.4	6.95	170.8
6	9.56	6.91	42	77.9	8.79	159.6	9.36	6.96	39	76.4	8.75	178.50	10.25	7.18	39	78.9	8.79	159.9	10..252	6.90	23	75.4	8.52	117.7	10.11	6.90	24	71.3	6.90	175.9
7	7.91	6.83	41	74.3	8.29	162.3	7.69	6.89	40	69.9	8.03	180.20	8.33	7.01	40	68.1	8.00	163.1	7.96	6.55	23	61.2	7.23	126.0	8.81	6.79	23	64.1	6.79	177.7
8	7.52	6.70	40	69.9	8.12	162.6	7.39	6.74	40	63.9	7.71	182.40	7.23	6.85	40	58.4	7.04	167.0	7.47	*6.42*	22	59.1	7.09	129.7	7.79	6.64	23	56.2	6.64	181.4
9	7.06	6.56	41	62.3	7.59	165.3	6.96	*6.49*	41	58.5	7.11	191.90	6.90	6.73	40	56.0	6.81	169.8	7.08	*6.34*	22	56.1	6.79	132.7	7.12	*6.41*	23	51.6	6.41	190.8
10	6.79	6.50	41	59.6	7.46	166.3	6.73	*6.40*	41	56.8	6.94	192.80	6.76	6.62	41	54.5	6.62	171.6	6.83	*6.24*	23	53.0	6.46	136.7	6.93	*6.03*	22	50.1	6.03	204.5
11	6.75	*6.49*	41	58.3	6.99	166.3							6.69	*6.49*	41	53.7	6.37	174.0	6.78	*6.17*	23	52.0	6.34	140.3	6.84	*5.90*	22	49.0	5.90	213.4
	6.68	*6.45*	41	56.8	6.93	151.3	6.71	*6.38*	41	56.4	6.89	191.40	6.61	*6.37*	41	53.0	6.50	177.0							6.73	*5.79*	22	48.4	5.79	216.7
1m from Bottom (BS)	BS=11.30m						BS=10.70m						BS=11.30m						BS=11.00m						BS=12.00m					

NO NAME LAKE DEPTH PROFILING FALL

Sample Date	27-Oct						3-Nov						9-Nov						17-Nov						22-Nov					
Parameter	TEMP.	pH	COND. µS/cm	% Sat.	D.O.	ORP	TEMP.	pH	COND. µS/cm	% Sat.	D.O.	ORP	TEMP.	pH	COND. µS/cm	% Sat.	D.O.	ORP	TEMP.	pH	COND. µS/cm	% Sat.	D.O.	ORP	TEMP.	pH	COND. µS/cm	% Sat.	D.O.	ORP
Sample Depth (m)	Celcius				mg/L		Celcius				mg/L		Celcius				mg/L		Celcius				mg/L		Celcius				mg/L	
1.0	8.71	6.94	33	84.4	9.82	179.8	8.55	*5.89*	32	83.8	9.79	231.2	9.20	*6.20*	27	89.4	10.29	182.4	7.91	7.44	22	82.3	9.76	196.50	7.14	6.74	33	82.2	9.95	185.1
2	8.71	6.89	33	84.2	9.80	179.6	8.53	*5.88*	32	84.2	9.84	233.5	8.98	*6.06*	27	90.9	10.51	192.7	7.91	7.13	22	82.2	9.75	207.70	7.14	6.70	33	82.7	10.01	191.9
3	8.69	6.79	33	83.7	9.74	177.7	8.52	*5.86*	32	84.3	9.86	234.1	8.86	*5.93*	29	88.8	10.30	202.4	7.91	7.00	22	82.2	9.77	212.30	7.14	6.70	33	82.6	10.00	199.6
4	8.69	6.71	34	83.8	9.76	176.4	8.52	*5.85*	32	84.0	9.83	234.0	8.75	*5.86*	29	88.3	10.27	207.1	7.91	6.87	22	82.3	9.76	217.30	7.14	6.69	33	82.5	9.98	205.8
5	8.67	6.69	34	83.7	9.74	174.1	8.52	*5.84*	32	84.1	9.84	234.5	8.64	*5.78*	29	87.9	10.25	212.2	7.92	6.73	21	82.0	9.73	224.50	7.14	6.69	33	82.7	10.00	209.5
6	8.65	6.64	34	82.6	9.63	174.0	8.52	*5.83*	32	84.3	9.86	235.1	8.55	*5.70*	30	87.3	10.20	216.8	7.90	6.64	21	82.0	9.73	229.60	7.14	6.68	33	82.5	9.98	214.1
7	8.64	6.60	34	82.6	9.63	172.9	8.51	*5.82*	32	84.2	9.84	236.6	8.47	*5.65*	30	86.6	10.13	220.3	7.84	6.61	21	81.7	9.71	234.00	7.13	6.68	33	82.4	9.97	217.8
8	8.62	6.53	34	81.6	9.52	172.5	8.49	*5.78*	32	83.5	9.76	239.7	8.42	*5.57*	31	85.7	10.04	224.4	7.78	6.59	21	82.6	9.84	237.60	7.11	6.68	33	82.3	9.97	220.8
9	8.57	*6.48*	35	80.3	9.36	172.4	8.45	*5.78*	31	83.0	9.73	240.4	8.40	*5.54*	31	85.2	10.00	226.9	7.77	6.59	21	83.3	9.93	239.90	7.07	6.68	33	82.5	10.00	225.0
10	8.52	*6.43*	38	78.1	9.14	172.4	8.44	*5.76*	30	83.3	9.77	242.2	8.33	*5.49*	32	83.5	9.82	229.1	7.69	6.60	21	84.2	10.05	245.50	7.05	6.68	33	82.5	10.00	227.0
11	7.73	*6.36*	38	54.0	6.44	173.9	8.39	*5.72*	32	77.6	9.13	245.0	8.24	*5.44*	34	81.1	9.55	232.0	7.44	6.59	21	82.6	9.93	248.30	7.05	6.68	33	82.6	10.03	229.3
12	7.44	*6.28*	38	44.8	5.38	174.7	7.82	*5.64*	37	59.1	6.98	248.0	8.22	*5.38*	36	79.8	9.40	234.8	7.38	6.50	23	75.9	9.13	260.7						
	7.45	*6.26*	39	44.7	5.36	174.90	7.69	*5.57*	39	52.0	6.17	250.6	8.21	*5.35*	36	79.5	9.37	235.4							7	6.7	33.00	83.80	10.16	232.5
1m from Bottom (BS)	BS=12.10m						BS=12.60m						BS=12.60m						BS=12.00m						BS=11.80m					

WQG-Max: **Max. 6.5 -9.0** **Hypolimnetic DO minimum 3 mg/L June -August**

Table 77
2016-2017 Annual Report

EMS ID: E206619
Site NAME: LONG LAKE (LLM)

LONG LAKE DEPTH PROFILING SPRING

Sample Date	13-Apr						20-Apr						28-Apr						4-May						11-May					
Parameter	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP
Sample Depth (m)	Celsius		µS/cm		mg/L	mV	Celsius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV
1	11.68	7.33	267	97.4	10.57	103.1	13.54	7.35	248	100.2	10.43	77.8	13.36	7.23	287	100.0	10.44	116.5	14.40	7.34	297	96.4	9.84	114.8	16.51	7.37	318	95.6	9.32	115.9
2	11.67	7.33	269	97.4	10.57	103.2	12.16	7.32	285	98.1	10.58	80.5	13.14	7.29	289	100.0	10.46	114.1	14.35	7.35	296	96.0	9.81	114.8	15.54	7.33	327	95.2	9.48	116.8
3	8.23	7.23	403	93.0	10.96	110.6	9.98	7.23	390	96.0	10.85	84.1	10.33	7.19	414	100.2	11.17	119.8	11.19	7.30	407	96.1	10.71	120.2	13.90	7.23	387	98.4	10.13	119.9
4	6.06	7.10	430	82.9	10.29	113.7	8.27	7.19	411	91.8	10.81	85.3	7.50	7.05	446	88.9	10.64	122.0	9.12	7.25	437	94.4	10.89	122.2	9.85	7.12	452	95.6	10.80	124.2
5	5.41	7.07	436	79.1	9.96	114.5	6.23	7.13	428	83.1	10.29	86.7	5.94	7.02	459	82.3	10.21	123.1	6.47	7.00	454	79.2	9.73	125.4	6.84	7.03	476	80.3	9.82	127.1
6	5.24	7.05	441	77.4	9.81	114.9	5.55	7.08	432	79.0	9.92	87.4	5.45	6.95	461	76.9	9.69	124.0	5.71	6.95	460	73.6	9.22	125.0	5.84	6.93	475	75.2	9.39	129.2
7	5.19	7.02	442	76.3	9.68	115.2	5.29	7.03	435	76.0	9.65	87.8	5.27	6.90	464	75.0	9.49	124.0	5.35	6.94	462	72.3	9.13	125.9	5.36	6.87	479	70.9	8.95	130.6
8	5.10	7.01	444	75.6	9.61	115.3	5.13	6.99	438	74.4	9.46	88.1	5.15	6.88	466	74.1	9.40	124.2	5.23	6.93	463	71.1	9.01	125.9	5.25	6.83	478	68.9	8.73	131.4
9	5.05	7.00	445	75.0	9.56	115.3	5.10	6.97	439	73.9	9.39	88.2	5.10	6.87	467	73.7	9.37	124.3	5.16	6.91	464	70.2	8.92	125.8	5.21	6.81	479	68.7	8.75	131.8
10	5.00	6.99	446	74.7	9.53	115.4	5.05	6.95	439	73.6	9.37	88.3	5.07	6.86	468	73.3	9.32	124.3	5.10	6.91	464	70.6	8.98	125.6	5.16	6.79	480	68.3	8.66	132.1
11	4.97	6.99	446	74.4	9.49	115.3	5.00	6.94	439	73.8	9.41	88.3	5.05	6.86	468	72.8	9.28	124.3	5.04	6.91	465	71.0	9.07	125.6	5.12	6.78	481	66.6	8.47	132.3
12	4.95	6.98	446	74.1	9.48	115.4	4.94	6.94	440	74.3	9.50	88.3	5.01	6.85	468	72.8	9.28	124.4	5.02	6.91	466	70.1	8.94	125.4	5.07	6.77	481	66.1	8.41	132.3
13	4.93	6.98	447	74.3	9.48	115.0	4.92	6.93	441	73.2	9.34	88.4	4.97	6.85	469	72.6	9.27	124.3	4.99	6.91	466	69.9	8.92	125.1	5.04	6.75	481	66.3	8.47	132.3
14	4.88	6.98	448	73.3	9.37	115.1	4.91	6.92	441	72.5	9.27	88.7	4.97	6.85	469	71.8	9.13	124.4	4.97	6.90	467	68.6	8.74	125.4	4.99	6.75	482	66.0	8.42	132.3
15	4.87	6.97	448	73.1	9.35	115.2	4.89	6.91	442	71.0	9.08	88.8	4.94	6.83	469	70.8	8.99	124.5	4.94	6.89	468	66.2	8.44	125.7	4.98	6.74	482	65.1	8.29	132.4
16	4.87	6.97	449	72.8	9.32	115.1	4.88	6.89	443	70.6	9.00	88.7	4.92	6.83	470	70.3	8.99	124.8	4.94	6.88	468	65.3	8.34	125.6	4.96	6.73	482	64.3	8.21	132.4
17	4.85	6.97	449	72.2	9.24	115.1	4.88	6.89	443	70.7	9.05	88.5	4.91	6.82	470	69.9	8.93	125.1	4.90	6.88	469	64.9	8.29	125.3	4.93	6.73	483	63.5	8.10	132.2
18	4.85	6.96	450	71.6	9.15	115.0	4.87	6.89	443	71.0	9.08	88.6	4.89	6.82	471	69.3	8.85	124.9	4.90	6.87	469	64.4	8.21	125.3	4.92	6.72	483	61.2	7.82	131.8
1m from Bottom (BS)	4.85	6.95	450	70.7	9.05	114.4	4.86	6.88	443	70.4	9.00	88.8	4.88	6.81	471	68.4	8.75	125.2	4.89	6.87	469	63.6	8.12	125.2	4.91	6.71	484	60.7	7.76	131.7
	BS=19.00m						BS=19.00m						BS=19.00m						BS=19.00m						BS=18.80m					

LONG LAKE DEPTH PROFILING SUMMER

Sample Date	3-Aug						9-Aug						17-Aug						25-Aug						30-Aug					
Parameter	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP
Sample Depth (m)	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV
1	21.36	7.35	289	94.8	8.56	149.5	20.38	7.39	287	95.5	8.61	145.5	21.83	7.38	284	97.8	8.58	131.1	21.16	7.41	235	96.1	8.54	173.4	19.97	7.35	255	94.1	8.56	68.4
2	21.12	7.33	289	94.3	8.53	150.0	20.25	7.42	287	94.3	8.51	145.9	21.72	7.42	283	96.9	8.52	133.5	20.94	7.42	235	95.7	8.54	173.7	19.97	7.28	255	94.0	8.54	71.0
3	21.01	7.33	288	94.5	8.55	150.3	20.22	7.43	285	94.0	8.50	145.9	20.98	7.44	289	94.6	8.43	137.0	20.76	7.42	236	94.0	8.41	174.0	19.97	7.28	254	93.7	8.52	74.2
4	16.56	7.29	499	102.3	10.26	159.3	16.53	7.29	496	106.2	10.49	153.5	19.87	7.37	345	93.0	8.46	143.2	19.73	7.32	335	100.0	9.17	180.5	19.97	7.32	255	93.6	8.51	78.3
5	13.69	7.29	502	99.6	10.56	161.3	13.59	7.28	508	96.3	10.53	154.6	14.91	7.41	497	106.9	10.73	151.2	15.39	7.32	401	105.9	10.69	183.0	15.71	7.31	415	106.4	10.56	92.1
6	12.53	7.27	511	99.6	10.63	162.0	12.28	7.26	516	99.0	10.63	155.0	11.49	7.41	503	95.0	10.36	155.3	12.16	7.31	401	97.1	10.40	184.6	11.23	7.30	428	90.3	9.91	100.4
7	8.63	7.27	518	80.9	9.36	163.3	8.22	7.18	520	78.4	9.21	159.2	9.02	7.39	511	82.5	9.53	157.8	8.74	7.31	411	78.6	9.11	187.0	8.38	7.22	421	73.1	8.52	107.8
8	7.54	7.11	519	72.3	8.59	164.0	7.22	7.09	519	68.5	8.38	161.2	7.23	7.21	512	69.9	8.40	160.4	7.40	7.22	410	67.3	8.11	189.9	7.18	6.97	424	62.3	7.53	118.5
9	6.42	7.06	518	62.3	7.69	165.3	6.24	7.02	517	60.0	7.41	163.2	6.69	7.11	511	64.0	7.84	162.3	6.47	7.13	408	59.6	7.33	193.0	6.54	6.89	423	58.9	7.24	121.7
10	6.13	7.00	516	60.0	7.23	166.0	6.07	6.96	519	56.4	7.00	164.2	6.31	7.05	510	58.8	7.28	163.9	6.19	7.03	407	55.2	6.84	195.6	6.19	6.80	423	55.5	6.86	124.6
11	6.01	6.95	516	58.3	6.86	166.6	5.91	6.92	519	54.0	6.73	164.8	5.89	6.96	511	52.4	6.53	166.2	5.91	6.96	407	51.3	6.40	197.0	5.94	6.75	424	50.3	6.26	126.4
12	5.91	6.92	516	55.6	6.80	167.2	5.75	6.89	519	52.9	6.68	165.5	5.69	6.89	511	49.4	6.19	167.4	5.77	6.91	407	48.0	6.01	197.9	5.74	6.72	423	46.5	5.82	127.6
13	5.63	6.90	515	53.6	6.50	168.5	5.57	6.87	519	50.2	6.22	166.0	5.56	6.84	511	47.3	5.95	168.7	5.62	6.87	407	45.6	5.74	198.6	5.56	6.69	424	42.8	5.39	128.6
14	5.48	6.87	516	48.0	6.00	169.0	5.48	6.84	519	47.2	5.94	166.5	5.39	6.79	511	43.3	5.47	170.0	5.43	6.81	407	42.0	5.30	200.5	5.47	6.66	424	40.4	5.10	129.4
15	5.39	6.85	516	47.3	5.92	170.1	5.35	6.81	519	45.5	5.74	166.7	5.27	6.75	511	38.4	4.86	171.1	5.40	6.77	407	40.5	5.11	200.8	5.38	6.64	424	35.8	4.52	130.3
16	5.28	6.81	516	42.1	5.36	170.5	5.32	6.80	519	43.5	5.50	167.2	5.22	6.70	511	34.2	4.34	172.8	5.32	6.75	407	36.9	4.67	200.8	5.29	6.61	424	33.3	4.22	130.8
17	5.26	6.80	516	40.0	5.06	170.9	5.20	6.78	519	38.6	4.88	167.5	5.23	6.67	511	33.3	4.20	173.6	5.27	6.74	407	34.1	4.32	200.7	5.26	6.59	424	31.0	4.00	131.2
18	5.18	6.76	516	34.6	4.44	171.5	5.20	6.76	519	37.1	4.75	168.0	5.21	6.65	511	31.9	4.04	174.4	5.24	6.72	408	30.5	3.86	201.2						
1m from Bottom (BS)	5.16	6.74	516	32.8	4.18	120.0	5.17	6.75	519	33.8	4.25	168.3	5.18	6.63	511	32.0	4.06	174.9	5.20	6.68	408	27.0	3.42	201.6	5.24	6.58	424	29.3	3.72	131.6
	BS=18.8m						BS=18.8m						BS=18.8m						BS=18.8m						BS=17.8m					

LONG LAKE DEPTH PROFILING FALL

Sample Date	27-Oct						3-Nov						9-Nov						17-Nov						22-Nov					
Parameter	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP
Sample Depth (m)	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV
1	8.78	*6.35*	66	89.9	10.45	313.6	8.46	*6.01*	62	91.2	10.68	213.0	8.93	*6.20*	37	91.1	10.55	181.5	7.24	6.83	148	89.6	10.82	220.2	6.91	6.99	136	89.4	10.86	266.6
2	8.92	*6.25*	108	88.8	10.29	317.1	8.46	*5.90*	70	90.1	10.55	215.2	8.91	*6.16*	37	91.1	10.55	183.5	8.29	6.75	197.8	84.7	9.94	224.6	7.67	6.94	282	86.0	10.24	270.3
3	8.94	*6.26*	127	87.8	10.23	317.6	8.80	*5.88*	188	87.9	10.20	219.2	8.75	*5.98*	109	90.2	10.48	193.2	8.51	7.03	221.2	84.9	9.91	224.4	7.73	6.99	319	84.4	10.06	271.1
4	8.96	*6.26*	166	87.3	10.09	317.6	8.85	*5.83*	240	86.4	10.01	219.1	8.77	*5.93*	228	88.3	10.37	197.4	8.42	7.06	231.5	85.3	9.99	224.6	7.91	7.03	354	82.8	9.81	271.6
5	8.96	*6.28*	212	85.7	9.91	317.8	8.72	*6.14*	237	88.0	10.23	216.6	8.64	*6.08*	307	86.4	10.07	198.5	8.26	7.10	228.8	85.6	10.07	224.9	7.73	7.07	362	81.4	9.70	271.9
6	8.93	*6.27*	263	83.7	9.66	317.4	8.74	*6.20*	273	88.3	10.25	215.9	8.47	*6.11*	314	84.1	9.82	199.5	8.26	7.11	239.3	83.7	9.81	227.6	7.67	7.09	364	81.9	9.77	271.4
7	8.94	*6.30*	278	85.9	9.93	314.8	8.73	*6.28*	292	84.2	9.78	215.0	8.39	*6.11*	322	83.3	9.76	200.5	8.17	7.09	230	78.5	9.21	231.2	7.49	7.12	362	83.3	9.99	270.0
8	8.96	*6.37*	297	87.2	10.08	312.5	8.70	*6.36*	304	83.8	9.75	212.6	8.33	*6.10*	343	81.7	9.57	201.6	8.14	7.05	264.9	75.2	8.87	233.4	7.59	7.12	388	79.4	9.48	272.3
9	8.24	*6.37*	385	61.8	7.27	316.6	8.54	*6.44*	323	78.5	9.17	211.9	8.25	*6.10*	360	79.1	9.30	202.3	7.74	6.99	276.1	65.7	7.81	237.4	7.52	7.09	407	74.1	8.88	274.8
10	7.57	*6.35*	429	50.2	5.93	317.2	7.74	*6.43*	412	52.4	6.20	214.2	7.75	*6.09*	399	65.4	7.73	204.5	7.44	6.93	281.3	52.2	6.19	242.7	7.22	6.98	430	55.2	6.60	281.1
11	6.81	*6.34*	438	45.0	5.49	317.6	6.85	*6.43*	420	46.0	5.59	213.6	6.91	*6.05*	434	45.0	5.47	206.0	7.04	6.85	281.5	43.2	5.23	245.1	6.85	6.83	440	43.5	5.30	284.5
12	6.54	*6.30*	438	42.6	5.22	319.6	6.54	*6.31*	421	41.8	5.12	220.7	6.58	*5.99*	437	40.8	5.00	206.5	6.53	6.76	280.4	38.5	4.70	246.8	6.66	6.75	443	37.5	4.64	287.1
13	6.25	*6.25*	438	41.4	5.12	322.3	6.31	*6.22*	421	39.8	4.90	223.3	6.41	*5.96*	437	39.0	4.77	206.1	6.32	6.73	280.1	36.1	4.45	248.1	6.24	6.73	446	36.3	4.48	288.4
14	6.13	*6.20*	439	39.2	4.84	324.6	6.11	*6.17*	421	35.9	4.46	223.7	6.09	*5.93*	438	34.6	4.29	202.9	5.90	6.69	276.9	28.8	3.59	250.0	6.02	6.72	445	33.0	4.09	289.4
15	5.83	*6.14*	438	35.2	4.37	326.8	5.88	*6.16*	421	33.5	4.17	222.5	5.74	*5.92*	439	29.3	3.67	201.9	5.79	6.67	276	26.2	3.27	250.8	5.94	6.71	445	29.5	3.68	290.4
16	5.55	*6.10*	439	28.1	3.47	325.8	5.87	*6.16*	421	31.8	3.97	219.6	5.60	*5.91*	437	24.3	3.02	201.0	5.66	*6.65*	275.5	21.4	2.66	251.9	5.76	6.69	444	24.9	3.11	291.3
17	5.43	*6.03*	439	21.7	2.70	324.2	5.57	*6.17*	421	25.5	3.21	218.3	5.58	*5.89*	436	22.5	2.80	200.5	5.58	*6.63*	273.9	19.3	2.42	252.3	5.65	6.68	445	22.3	2.79	292.0
18	5.39	*6.01*	439	18.8	2.36	322.6	5.47	*6.17*	420	21.0	2.64	217.0	5.52	*5.86*	436	20.0	2.41	198.0	5.55	*6.62*	274.2	16.3	2.34	252.2	5.59	6.66	444	19.0	2.39	292.7
19	5.39	*6.02*	439	17.7	2.22	321.2	5.42	*6.16*	420	16.2	2.04	215.3	5.49	*5.84*	436	17.0	2.15	196.3	5.51	*6.61*	273.1	15.2	1.91	252.6	5.54	6.65	444	16.7	2.11	293.2
20	5.38	*6.01*	439	16.5	2.07	319.8	5.43	*6.15*	420	16.2	2.04	214.2	5.46	*5.83*	436	15.7	1.95	195.6												
	5.30	*6.01*	440	15.7	1.99	318.4	5.41	*6.15*	420	14.4	1.82	213.0	5.45	*5.83*	436	14.2	1.79	195.1							5.54	*6.64*	444	15.6	1.95	293.3
1m from Bottom (BS)	BS=20.30m						BS=20.50m						BS=20.60m						BS=19.00m						BS=19.80m					

WQG-Max pH Max. 6.5 -9.0 Hypolimnetic DO minimum 3 mg/L June -August

Table 78
2016-2017 Annual Report

EMS ID E206618

Site NAME: MIDDLE QUINSAM LAKE (MQL)

MIDDLE QUINSAM LAKE DEPTH PROFILING SPRING

Sample Date	14-Apr						20-Apr						28-Apr						4-May						11-May					
Parameter	TEMP.	pH		% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP
Sample Depth (m)	Celsius		µS/cm		mg/L	mV	Celsius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV
1	10.74	7.41	163	98.0	10.89	110.6	14.02	7.52	157	101.9	10.50	70.4	13.57	7.44	167	99.9	10.37	114.1	14.93	7.47	171	97.5	9.84	103.2	17.34	7.51	200	99.3	9.52	96.8
2	10.62	7.40	163	97.2	10.81	109.3	12.10	7.51	159	99.9	10.75	71.5	12.87	7.40	169	99.2	10.47	112.7	14.89	7.47	172	97.1	9.81	103.1	16.74	7.49	199	98.3	9.55	98.0
3	10.45	7.38	162	97.2	10.85	106.8	11.40	7.51	157	98.7	10.78	72.1	12.00	7.38	167	100.7	10.81	112.2	14.85	7.48	172	97.0	9.81	103.2	15.97	7.48	201	97.7	9.63	98.3
4	9.70	7.36	155	97.8	11.12	105.0	10.81	7.47	159	97.7	10.80	74.2	11.23	7.39	167	100.1	11.00	111.9	12.96	7.48	172	96.9	10.28	103.9	15.54	7.47	201	96.8	9.65	98.3
5	9.20	7.34	152	98.2	11.29	103.7	10.04	7.46	157	97.4	11.00	74.8	10.39	7.39	162	101.3	11.35	112.0	11.53	7.47	166	97.5	10.59	104.2	12.42	7.46	183	99.1	10.53	97.7
6	8.69	7.32	150	98.3	11.44	102.9	9.14	7.46	147	98.7	11.38	74.7	9.55	7.39	156	100.8	11.55	112.0	9.36	7.49	153	97.9	11.23	103.8	10.38	7.43	161	99.9	11.14	98.5
7	8.01	7.31	149	96.8	11.46	102.2	8.08	7.44	142	97.4	11.54	75.1	8.52	7.37	151	99.7	11.64	112.8	8.37	7.48	149	96.1	11.28	103.9	8.95	7.39	155	97.3	11.26	99.4
8	7.25	7.27	144	94.3	11.37	102.7	7.52	7.41	139	95.2	11.39	76.0	7.71	7.34	148	96.2	11.43	113.3	7.75	7.44	148	91.2	10.83	104.7	8.34	7.36	153	94.3	11.08	99.9
9	7.05	7.24	144	92.3	11.19	102.5	7.20	7.37	138	93.1	11.24	76.8	7.27	7.30	147	92.4	11.13	113.7	7.38	7.32	148	86.6	10.41	107.3	7.49	7.25	153	85.6	10.26	101.3
10	6.85	7.20	143	90.3	10.99	102.2	7.02	7.33	138	90.9	11.02	77.4	7.16	7.23	148	89.4	10.80	114.5	7.27	7.19	148	83.8	10.10	107.5	7.34	7.16	154	80.9	9.73	102.3
11	6.74	7.14	143	89.1	10.88	102.0	6.92	7.30	138	88.2	10.71	77.5	6.98	7.17	148	86.1	10.45	115.3	7.12	7.17	149	81.5	9.85	107.9	7.26	7.11	155	79.6	9.58	103.0
12	6.69	7.12	143	88.0	10.76	101.9	6.85	7.25	138	87.3	10.63	77.9	6.94	7.12	148	85.1	10.34	115.4	7.05	7.15	150	79.2	9.58	108.1	7.22	7.06	155	77.3	9.32	103.6
13	6.68	7.10	144	87.1	10.65	102.2	6.84	7.22	138	87.1	10.61	78.3	6.91	7.10	149	84.1	10.22	115.8	7.03	7.12	150	77.6	9.41	108.3	7.18	7.02	156	75.3	9.07	103.9
	6.65	7.09	145	86.4	10.57	101.8	6.81	7.20	139	85.8	10.45	78.0							6.70	6.59	670	20.8	2.80	114.1	7.18	7.02	156	75.3	9.07	103.9
1m from Bottom (BS)	BS=13.4m						BS=13.3m						BS=13.0m						BS=13.5m						BS=13.2m					

MIDDLE QUINSAM LAKE DEPTH PROFILING SUMMER

Sample Date	3-Aug						9-Aug						17-Aug						25-Aug						1-Sep					
Parameter	TEMP.	pH		% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP
Sample Depth (m)	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV
1	21.13	7.67	179	99.6	8.92	132.9	20.97	7.73	178	99.7	8.89	132.3	23.05	7.80	159	104.7	8.97	148.7	22.21	7.75	132	102.9	8.96	105.2	19.88	6.83	119	97.7	8.91	140.2
2	21.06	7.65	177	99.9	8.99	134.0	20.93	7.71	178	99.8	8.91	132.9	22.95	7.79	159	104.5	8.98	150.3	22.13	7.75	132	101.7	8.87	106.3	19.88	7.30	119	98.0	8.93	138.0
3	21.06	7.65	177	99.8	9.01	133.6	20.89	7.71	178	99.7	8.90	132.6	22.69	7.79	160	103.0	8.90	150.4	21.93	7.75	132	101.5	8.91	107.8	19.88	7.41	119	97.5	8.88	137.5
4	21.00	7.64	177	99.5	8.96	134.0	20.85	7.71	178	99.4	8.88	132.8	21.91	7.79	155	103.5	9.07	151.4	21.71	7.76	132	101.2	8.90	108.5	19.88	7.45	119	97.3	8.86	137.7
5	20.92	7.61	177	99.2	8.94	134.3	20.75.	7.71	178	98.9	8.87	133.0	21.28	7.76	165	102.3	9.06	152.9	21.51	7.75	132	101.8	8.99	110.3	19.83	7.46	119	98.1	8.95	138.4
6	18.24	7.56	171	106.2	10.01	136.3	18.80	7.68	170	108.2	10.14	135.2	18.69	7.78	171	112.3	10.47	155.3	20.47	7.74	132	108.4	9.77	112.2	19.73	7.48	119	97.7	8.92	138.3
7	15.96	7.52	174	118.4	11.90	137.5	15.12	7.63	174	118.6	12.03	137.2	16.71	7.75	173	119.6	11.73	157.9	16.80	7.76	137	118.8	11.53	114.7	17.32	7.52	122	97.7	11.43	141.8
8	11.97	7.53	173	106.6	11.53	139.5	12.45	7.63	178	110.3	11.84	138.4	13.67	7.79	172	112.6	11.80	160.0	14.05	7.80	139	111.7	11.64	117.5	14.12	7.56	115	97.2	11.49	143.5
9	9.80	7.45	176	79.1	8.97	140.3	9.91	7.59	176	81.7	9.25	140.8	11.26	7.78	174	97.3	10.67	160.6	11.14	7.78	136	89.9	9.89	120.4	11.26	7.42	107	83.6	9.23	148.4
10	9.24	7.35	178	63.4	7.32	145.0	9.33	7.44	178	68.3	7.84	143.2	9.89	7.69	175	76.3	8.64	162.9	10.07	7.67	139	72.7	8.19	122.9	10.23	7.21	105	61.4	6.92	153.4
11	8.96	7.19	185	54.4	6.28	147.2	8.96	7.28	181	55.0	6.36	145.9	9.41	7.52	177	61.5	7.06	165.2	9.43	7.54	142	55.0	6.30	126.1	9.35	7.09	106	45.4	5.08	156.2
12	8.82	7.09	186	47.4	5.52	153.5	8.90	7.13	182	49.6	5.72	149.0	9.11	7.38	180	50.0	5.75	167.3	9.08	7.39	146	37.9	4.38	127.8	9.19	6.92	107	33.0	3.73	158.8
13	8.72	7.01	189	44.6	5.13	155.2	8.78	7.06	184	43.1	4.93	150.9	8.89	7.19	183	36.0	4.18	170.5	9.02	7.29	147	31.5	3.64	129.4	9.01	6.81	109	23.4	*2.73*	161.5
1m from Bottom (BS)	8.63	6.99	191	38.6	4.47	151.3	8.73	6.97	187	38.4	4.40	151.7	8.79	7.05	185	34.7	4.01	171.8	8.95	7.20	149	25.9	3.00	131.1	8.87	6.65	118	6.6	*0.73*	-14.8
	BS=13.4m						BS=13.4m						BS=13.4m						BS=13.5m						BS=13.5m					

MIDDLE QUINSAM LAKE DEPTH PROFILING FALL

Sample Date	27-Oct						3-Nov						9-Nov						17-Nov						22-Nov					
Parameter	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP
Sample Depth (m)	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV
1	9.82	6.93	189	88.9	10.07	287.3	9.52	7.28	131	91.2	10.41	198.8	9.71	6.70	74	95.4	10.84	181.2	8.50	7.26	91	132.2	10.56	222.2	7.79	7.40	165	90.6	10.78	185.9
2	9.81	6.92	189	88.9	10.08	287.3	9.54	7.27	164	90.3	10.30	201.8	9.58	6.70	76	95.0	10.82	185.0	8.68	7.29	90	90.7	10.56	221.9	7.79	7.40	166	90.5	10.77	189.4
3	9.81	6.92	189	88.9	10.07	287.2	9.55	7.26	165	90.2	10.29	202.3	9.57	6.72	75	94.7	10.80	185.9	8.67	7.29	90	90.7	10.56	221.3	7.78	7.41	166	90.4	10.76	193.2
4	9.80	6.91	189	88.5	10.04	287.2	9.57	7.24	175	89.6	10.21	203.0	9.56	6.73	79	94.7	10.79	185.3	8.67	7.29	91	90.7	10.56	220.7	7.78	7.41	166	90.4	10.76	195.4
5	9.80	6.90	190	88.6	10.04	286.9	9.57	7.23	175	89.6	10.21	204.0	9.57	6.74	80	94.5	10.78	185.1	8.66	7.29	91	90.7	10.56	219.5	7.78	7.41	166	90.5	10.77	197.5
6	9.79	6.89	190	88.6	10.04	286.7	9.56	7.23	175	89.8	10.23	205.6	9.60	6.72	94	94.0	10.71	185.9	8.63	7.29	91	90.8	10.59	217.8	7.78	7.41	166	90.5	10.77	200.0
7	9.79	6.88	191	88.6	10.04	286.7	9.57	7.22	176	89.9	10.23	206.8	9.58	6.72	102	93.9	10.69	187.1	8.63	7.29	92	90.7	10.57	216.6	7.78	7.41	167	90.6	10.78	202.3
8	9.79	6.87	191	88.6	10.04	286.6	9.58	7.20	176	90.0	10.24	208.0	9.57	6.72	101	93.8	10.69	187.4	8.64	7.29	91	90.7	10.57	215.5	7.78	7.41	167	90.6	10.78	204.0
9	9.78	6.86	191	88.6	10.05	286.5	9.58	7.19	176	90.0	10.24	209.2	9.51	6.71	103	93.5	10.67	188.1	8.58	7.29	92	90.8	10.59	213.9	7.77	7.41	167	90.6	10.78	206.0
10	9.78	6.84	191	88.7	10.06	286.2	9.57	7.18	174	90.0	10.25	210.6	9.48	6.71	104	93.2	10.65	188.9	8.54	7.28	91	90.8	10.61	212.2	7.78	7.41	167	90.6	10.78	208.4
11	9.77	6.82	191	88.7	10.06	286.2	9.57	7.16	177	90.0	10.24	211.9	9.41	6.72	103	93.5	10.68	189.7	8.51	7.28	91	90.7	10.60	210.6	7.77	7.41	167	90.6	10.79	209.7
12	9.77	6.79	191	88.8	10.07	286.1	9.58	7.13	177	90.0	10.25	214.3	9.40	6.73	102	93.3	10.68	190.5	8.52	7.28	91	90.8	10.62	208.9	7.76	7.41	168	90.6	10.79	211.8
13	9.77	6.76	192	89.0	10.09	285.9	9.57	7.08	177	90.0	10.25	218.5	9.39	6.74	103	92.9	10.65	191.2	8.49	7.28	91	90.8	10.62	2071.0						
14							9.57	7.04	176	90.0	10.26	221.9	9.40	6.74	108	92.2	10.56	193.2												
	9.77	6.73	192	89.0	10.09	286.2							9.39	6.74	110	92.1	10.54	196.7	8.50	7.26	91	132.2	10.63	202.1	7.79	7.38	174	90.4	10.77	198.3
1m from Bottom (BS)	BS=13.7m						BS=14.0m						BS=14.3m						BS=13.5m						BS=12.8m					

WQG-Max **pH Max. 6.5 -9.0** **Hypolimnetic DO minimum 3 mg/L June -August**

Table 79
2016-2017 Annual Report

EMS ID E292118

Site NAME: LOWER QUINSAM LAKE (LQL)

LOWER QUINSAM LAKE DEPTH PROFILING SPRING

Sample Date	14-Apr						20-Apr						28-Apr						4-May						11-May					
Parameter	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP
Sample Depth (m)	Celsius		µS/cm		mg/L	mV	Celsius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV
1	9.90	7.29	108	96.2	10.89	86.1	11.55	7.65	110	97.5	10.64	75.7	12.11	7.45	118	102.4	10.90	114.1	12.89	7.50	123	98.3	10.37	97.4	16.65	7.49	129	100.3	9.97	81.0
2	9.74	7.26	108	95.7	10.87	85.6	10.74	7.44	108	96.8	10.74	73.2	11.41	7.38	116	100.2	10.93	110.8	12.82	7.45	123	97.3	10.28	90.7	14.25	7.43	133	97.4	9.97	81.4
3	9.69	7.22	108	95.5	10.85	85.9	10.31	7.36	109	97.6	10.93	72.1	11.12	7.34	123	98.3	10.79	108.7	12.73	7.40	123	96.9	10.28	88.4	13.53	7.40	134	96.0	10.00	82.1
4	9.52	7.20	108	94.7	10.81	86.0	10.06	7.31	111	97.5	10.99	71.2	10.95	7.31	125	97.1	10.72	107.6	12.17	7.36	123	95.1	10.21	85.9	12.95	7.37	131	94.7	10.00	83.7
5	9.51	7.19	108	94.7	10.81	86.1	9.84	7.28	111	96.0	10.88	71.5	10.67	7.29	123	96.1	10.68	105.7	11.80	7.34	123	93.8	10.15	84.6	12.38	7.35	127	93.3	9.96	84.4
6	9.49	7.18	109	94.5	10.79	85.9	9.71	7.26	108	95.4	10.84	71.7	10.59	7.26	123	96.0	10.68	105.1	11.85	7.31	122	94.0	10.16	84.4	12.12	7.30	127	92.3	9.91	86.2
7	9.20	7.18	111	93.7	10.78	86.4	9.62	7.25	109	95.2	10.83	72.2	10.40	7.24	122	95.4	10.67	104.4	11.50	7.30	121	93.2	10.14	84.1	11.58	7.26	126	90.5	9.84	87.1
8	8.88	7.16	107	93.6	10.85	86.4	9.51	7.25	108	94.8	10.82	71.9	10.10	7.23	116	94.9	10.68	103.6	10.40	7.28	119	90.1	10.05	84.3	11.41	7.23	125	89.6	9.79	87.7
9	8.82	7.14	106	93.7	10.87	86.8	9.33	7.25	107	94.2	10.80	72.1	9.51	7.18	113	93.1	10.63	103.4	10.09	7.24	116	88.6	9.99	84.9	10.98	7.20	124	87.9	9.69	88.6
10	8.76	7.13	106	93.5	10.87	87.0	9.15	7.24	106	93.6	10.77	72.2	9.22	7.12	112	91.8	10.56	103.9	9.54	7.22	114	86.8	9.89	85.4	10.68	7.16	122	86.6	9.61	89.1
11	8.59	7.12	105	93.0	10.86	87.4	8.93	7.22	104	92.9	10.76	72.2	8.71	7.10	109	90.1	10.44	103.8	8.52	7.17	109	80.5	9.35	86.0	9.97	7.13	120	83.8	9.46	89.7
12	8.32	7.10	104	92.3	10.84	87.8	8.81	7.21	103	92.6	10.77	72.7	8.42	7.06	108	87.2	10.22	104.2	8.19	7.11	107	75.2	8.86	87.0	9.28	7.07	117	79.7	9.15	90.8
13	7.93	7.07	102	90.9	10.79	88.5	8.29	7.18	100	90.6	10.66	72.9	8.14	7.03	107	85.3	10.04	104.6	8.07	7.06	107	73.6	8.68	87.6	8.67	7.01	114	74.0	8.61	91.9
14	7.68	7.04	102	89.7	10.71	88.5	7.93	7.14	99	88.1	10.44	73.4	7.99	7.00	107	83.2	9.82	105.1	8.05	7.02	107	73.1	8.63	88.2	8.61	6.96	114	71.7	8.36	92.7
15	7.38	7.00	101	87.2	10.48	89.4	7.45	7.08	98	81.9	9.82	74.0	7.87	6.94	106	80.0	9.50	105.8	7.96	6.93	107	70.4	8.34	89.0	8.41	6.92	113	69.6	8.15	93.3
1m from Bottom (BS)	7.21	6.97	100	85.8	10.36	89.4	7.34	7.03	97	80.4	9.67	74.5	7.71	6.90	106	76.9	9.16	105.9	7.93	6.93	107	69.6	8.24	89.5	8.31	6.88	113	67.5	7.92	93.9
	BS: 16.3m						BS: 16.0m						BS: 16.0m						BS: 16.0m						BS: 15.3m					

LOWER QUINSAM LAKE DEPTH PROFILING SUMMER

Sample Date	3-Aug						9-Aug						17-Aug						25-Aug						31-Aug					
Parameter	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP
Sample Depth (m)	Celcius		µS/cm		mg/L	mV	Celcius.		µS/cm	101.1	8.64	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV
1	21.62	7.46	171	99.9	8.94	112.3	20.73	7.72	167	100.1	8.96	136.5	21.38	7.87	167	101.0	8.94	148.6	21.48	7.80	133	101.5	8.98	123.6	19.66	7.61	124	96.3	8.82	125.8
2	21.43	7.46	171	99.7	8.92	114.6	20.21	7.72	167	99.2	8.99	135.7	21.30	7.76	167	100.9	8.94	150.0	20.85	7.80	132	101.2	8.99	124.0	19.64	7.59	125	96.2	8.81	124.8
3	20.23	7.44	171	98.9	8.98	114.6	20.03	7.73	167	98.8	8.98	135.7	21.29	7.72	167	101.0	8.95	150.7	20.45	7.80	133	99.8	8.99	123.8	19.63	7.58	125	96.1	8.80	123.2
4	19.94	7.40	173	97.2	8.85	115.6	19.97	7.71	168	97.6	8.87	136.2	21.20	7.69	167	101.0	8.97	151.0	20.29	7.80	132	99.4	8.98	124.4	19.61	7.57	125	95.6	8.76	122.8
5	19.01	7.36	174	94.1	8.67	117.0	19.33	7.64	171	94.3	8.69	137.6	20.74	7.68	168	99.6	8.93	152.1	20.10	7.78	132	97.4	8.84	125.1	19.48	7.56	125	94.6	8.68	122.3
6	18.08	7.29	176	89.6	8.51	118.6	18.59	7.58	168	90.6	8.55	138.9	19.62	7.66	166	95.6	8.76	152.4	19.31	7.75	130	93.6	8.61	126.2	19.17	7.55	124	93.0	8.59	122.6
7	16.97	7.21	151	82.9	8.16	120.6	15.07	7.49	146	82.0	8.14	141.0	15.92	7.71	143	80.9	8.01	152.9	18.15	7.68	126	87.7	8.26	128.4	17.64	7.53	118	83.9	8.00	124.3
8	13.62	7.16	140	74.1	7.67	123.4	13.95	7.35	138	74.8	7.73	142.5	13.92	7.48	136	72.6	7.50	156.0	15.39	7.66	112	75.6	7.60	130.0	15.39	7.44	107	71.1	7.12	127.1
9	12.39	7.06	139	67.4	7.20	125.0	12.81	7.27	136	68.8	7.28	143.0	12.85	7.31	133	66.8	7.07	158.0	12.85	7.61	106	62.8	6.65	132.5	13.29	7.37	101	62.1	6.49	130.1
10	11.53	7.02	136	60.4	6.58	127.0	11.99	7.17	133	62.0	6.72	144.0	11.77	7.21	131	60.0	6.50	159.8	12.00	7.48	106	54.6	5.88	134.6	12.51	7.26	100	56.7	6.04	133.1
11	10.83	6.97	136	52.0	5.76	130.2	11.01	7.07	132	52.7	5.82	146.6	10.78	7.07	130	45.0	5.04	162.3	11.25	7.37	105	43.5	4.77	137.2	11.48	7.09	99	45.1	4.93	140.3
12	10.06	6.92	136	37.0	4.19	134.1	9.83	6.93	131	31.3	3.51	150.6	9.93	6.98	130	27.1	3.04	165.0	10.45	7.29	104	32.8	3.63	139.5	10.47	6.86	98	25.1	*2.81*	146.8
13	9.47	6.80	136	15.6	*1.82*	136.9	9.30	6.85	132	19.3	*2.14*	153.0	9.19	6.81	130	8.9	*1.02*	167.8	9.38	7.20	104	12.0	*1.37*	142.7	9.66	6.73	98	8.8	*1.00*	150.4
14	8.89	6.72	137	7.9	*0.90*	140.9	8.71	6.79	133	7.0	*0.78*	154.6	8.99	6.74	131	5.5	*0.63*	169.5	9.04	7.10	105	3.8	*0.44*	144.6	9.19	6.55	99	1.8	*0.20*	156.3
15	8.72	6.62	141	4.0	*0.43*	144.3	8.71	6.63	135	2.0	*0.23*	157.3	8.84	6.67	133	5.0	*0.05*	161.1	8.87	7.00	107	1.4	*0.17*	114.0	8.88	*6.38*	101	0.0	*0.00*	157.9
16	8.67	6.59	141	0.3	*0.02*	146.3	8.63	6.59	135	0.0	*0.00*	157.9	8.79	6.57	134	0.0	*0.00*	129.1							8.77	*6.28*	103	0.0	*0.00*	142.8
1m from Bottom (BS)																			8.76	6.87	108	0.0	*0.00*	71.2	8.64	*6.28*	107	0.0	*0.00*	99.2
	BS=16.0m						BS=16.0m						BS=16.0m						BS=15.80m						BS=16.40m					

LOWER QUINSAM LAKE DEPTH PROFILING FALL

Sample Date	27-Oct						3-Nov						9-Nov						17-Nov						21-Nov					
Parameter	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP	TEMP.	pH	COND.	% Sat.	D.O.	ORP
Sample Depth (m)	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV	Celcius		µS/cm		mg/L	mV
1	9.16	7.18	83	90.4	10.40	245.9	8.80	7.37	83	93.2	10.82	175.9	9.560	7.06	77	93.0	10.60	165.0	8.73	7.12	61	90.2	10.48	216.2	7.95	7.13	67	89.5	10.61	126.5
2	9.11	7.09	83	90.3	10.41	249.1	8.81	7.27	84	92.7	10.77	174.8	9.500	6.98	77	92.8	10.60	165.0	8.60	7.11	60	89.6	10.46	218.3	7.93	7.08	67	89.4	10.60	134.5
3	9.10	7.05	83	90.5	10.44	251.0	8.80	7.25	83	92.8	10.77	174.5	9.470	6.95	77	92.7	10.60	165.4	8.52	7.10	63	90.3	10.56	220.4	7.98	7.05	67	89.4	10.61	145.9
4	9.08	7.02	83	90.2	10.40	252.7	8.79	7.23	84	92.7	10.77	174.8	9.460	6.93	77	92.7	10.60	165.4	8.46	7.10	63	89.7	10.51	223.4	7.90	7.04	67	89.4	10.61	149.2
5	9.07	6.99	83	90.4	10.43	254.6	8.78	7.20	83	92.7	10.77	176.1	9.460	6.90	77	92.7	10.60	165.1	8.43	7.09	63	89.4	10.47	226.5	7.90	7.04	67	89.4	10.61	153.6
6	9.07	6.95	83	90.3	10.42	256.7	8.78	7.16	83	92.7	10.78	175.0	9.460	6.88	77	92.7	10.60	165.0	8.42	7.07	63	89.3	10.47	230.8	7.90	7.04	67	89.5	10.62	159.6
7	9.07	6.93	83	90.4	10.43	257.7	8.78	7.16	84	92.8	10.78	176.4	9.450	6.86	77	92.7	10.60	165.0	8.42	7.07	63	89.6	10.51	231.9	7.89	7.04	67	89.5	10.63	163.5
8	9.07	6.92	83	90.4	10.43	259.2	8.79	7.13	83	92.8	10.78	176.2	9.450	6.84	76	92.7	10.60	164.9	8.42	7.07	63	89.5	10.50	233.3	7.89	7.03	66	89.6	10.64	169.2
9	9.07	6.90	83	90.4	10.44	260.4	8.79	7.12	84	92.8	10.78	177.0	9.450	6.83	76	92.8	10.61	164.8	8.41	7.07	64	90.8	10.65	233.7	7.87	7.03	66	89.8	10.67	174.1
10	9.07	6.89	83	90.5	10.44	261.6	8.79	7.12	84	92.8	10.78	177.3	9.450	6.81	77	92.9	10.62	164.6	8.40	7.10	64	91.0	10.67	234.3	7.86	7.03	66	89.9	10.68	177.5
11	9.06	6.88	83	90.5	10.44	263.6	8.79	7.08	84	92.9	10.79	178.3	9.450	6.79	77	92.9	10.62	164.2	8.39	7.11	64	91.0	10.68	234.8	7.85	7.03	65	90.0	10.69	180.8
12	9.06	6.86	83	90.5	10.44	264.4	8.79	7.04	84	92.9	10.79	179.2	9.450	6.76	76	92.9	10.62	165.1	8.37	7.11	64	91.1	10.69	235.4	7.80	7.03	65	90.2	10.73	184.1
13	9.06	6.86	83	90.6	10.45	265.3	8.79	7.04	84	92.9	10.79	179.0	9.450	6.72	77	92.9	10.62	165.0	8.36	7.12	64	91.1	10.70	235.7	7.78	7.03	64	90.3	10.75	185.6
14	9.06	6.85	83	90.6	10.46	266.3	8.79	7.04	83	92.9	10.79	178.5	9.450	6.72	77	93.0	10.63	165.0	8.29	7.12	65	91.3	10.74	235.9	7.77	7.03	64	90.3	10.76	187.6
15	9.06	6.84	83	90.6	10.46	266.7	8.78	7.04	83	93.1	10.82	178.5	9.450	6.71	77	93.0	10.63	165.4	8.28	7.12	65	91.4	10.75	236.2	7.77	7.03	64	90.4	10.76	188.4
16	9.06	6.84	83	90.6	10.45	267.1	8.77	7.05	83	93.1	10.82	178.7	9.450	6.71	77	93.0	10.63	165.7	8.28	7.13	65	91.4	10.75	236.6	7.77	7.03	64	90	10.76	185.7
1m from Bottom (BS)	9.06	6.83	83	90.5	10.44	268.9	8.77	7.04	83	93.1	10.83	179.4	9.460	6.70	76	93.0	10.64	165.9												
	BS= 17.2						BS= 17.0						BS= 17.0						BS= 16.0						BS= 16.0					

WQG-Max **pH Max. 6.5 -9.0** **Hypolimnetic DO minimum 3 mg/L June -August**

Table 80
2016-2017 Annual Report

EMS ID	E217018	No Name Lake 1 Metre Depth							
Site Name	NNL1	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		13-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	1.42	1.67	1.86	1.42	1.95	2	**128**	-
Chloro-a	ug/L	<0.50	-	-	-	-	-	-	-
Turb	NTU	0.24	0.22	0.28	0.30	0.21	-	-	-
Alk-T	mg/L	11.6	-	12.2	-	-	-	-	-
P-T	mg/L	<0.0020	-	-	-	-	-	-	-
Al-T	mg/L	0.0395	0.0338	0.0305	0.0288	0.0294	-	-	-
As-T	mg/L	0.00018	0.00021	0.00022	0.00023	0.00026	-	-	**0.005**
Ba-T	mg/L	0.0011	<0.0010	0.0011	0.0012	0.0011	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	3.63	3.43	3.73	3.62	4.04	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	<0.00050	0.00057	<0.00050	<0.00050	0.00051	**0.002**	**0.007**
Hard-T	mg/L	12.3	11.8	12.6	12.2	13.7	12.52	-	-
Fe-T	mg/L	0.046	0.035	0.053	0.046	0.063	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	0.790	0.786	0.805	0.767	0.866	-	-	-
Mn-T	mg/L	0.0033	0.0032	0.0046	0.0046	0.0049	0.004	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.071	0.081	0.074	0.073	0.068	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	1.05	1.04	1.07	1.04	1.11	-	-	-
Sr-T	mg/L	0.0113	0.0108	0.0113	0.0112	0.0124	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0364	0.0317	0.0328	0.0286	0.0298	0.0319	**0.05**	**0.1**
As-D	mg/L	0.00032	0.00025	0.00026	0.00025	0.00039	-	-	-
Ba-D	mg/L	0.0017	0.0010	0.0012	0.0015	0.0014	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000127**	**0.000288**
Ca-D	mg/L	3.54	3.55	3.79	4.06	4.10	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00052	0.00100	0.00066	0.00044	0.00037	-	-	-
Hard-D	mg/L	12.0	11.9	13.5	13.6	13.9	-	-	-
Fe-D	mg/L	0.0327	0.0325	0.0434	0.0505	0.0500	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.758	0.735	0.966	0.844	0.877	-	-	-
Mn-D	mg/L	0.0031	0.0032	0.0048	0.0046	0.0044	-	-	-
Hg-D	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.075	0.076	0.082	0.102	0.072	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	1.05	0.943	1.25	1.09	1.09	-	-	-
Sr-D	mg/L	0.0108	0.0106	0.0130	0.0113	0.0124	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 81
2016-2017 Annual Report

EMS ID	E217018	No Name Lake 1 Metre Depth							
Site Name	NNL1	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	24-Aug-16	1-Sep-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	0.81	0.99	1.06	0.84	0.93	1	**128**	-
Chloro-a	ug/L	-	0.95	-	-	-	-	-	-
Turb	NTU	0.26	0.30	0.27	0.28	0.33	-	-	-
Alk-T	mg/L	-	16.3	-	16.8	-	-	-	-
P-T	mg/L	-	0.0163	-	-	-	-	-	-
Al-T	mg/L	0.0264	0.0236	0.0249	0.0221	0.0231	-	-	-
As-T	mg/L	0.00046	0.00047	0.00055	0.00049	0.00051	-	-	**0.005**
Ba-T	mg/L	0.0013	0.0014	0.0014	0.0013	0.0016	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	5.21	4.74	5.73	4.98	5.09	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	0.00056	<0.00050	0.00088	0.00056	0.00060	**0.002**	**0.007**
Hard-T	mg/L	17.6	16.4	19.4	17.2	17.4	17.60	-	-
Fe-T	mg/L	0.104	0.106	0.090	0.093	0.094	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.10	1.11	1.24	1.15	1.13	-	-	-
Mn-T	mg/L	0.0044	0.0046	0.0042	0.0053	0.0059	0.005	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.069	0.070	0.066	0.066	<0.050	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	1.28	1.25	1.39	1.35	1.24	-	-	-
Sr-T	mg/L	0.0167	0.0159	0.0181	0.0162	0.0156	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0241	0.0224	0.0222	0.0211	0.0170	0.0214	**0.05**	**0.1**
As-D	mg/L	0.00051	0.00046	0.00049	0.00052	0.00053	-	-	-
Ba-D	mg/L	0.0014	0.0012	0.0014	0.0014	0.0015	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	5.40	4.72	5.19	5.06	5.19	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00050	0.00045	0.00279	0.00055	0.00046	-	-	-
Hard-D	mg/L	18.1	16.2	17.6	17.7	17.8	-	-	-
Fe-D	mg/L	0.0765	0.0807	0.0719	0.0635	0.0709	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.11	1.07	1.13	1.22	1.17	-	-	-
Mn-D	mg/L	0.0041	0.0020	0.0019	0.0013	0.0031	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	0.0029	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.090	0.077	0.065	0.058	0.072	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	1.30	1.20	1.32	1.36	1.29	-	-	-
Sr-D	mg/L	0.0162	0.0149	0.0173	0.0180	0.0162	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 82
2016-2017 Annual Report

EMS ID	E217018								
		No Name Lake 1 Metre Depth							
Site Name	NNL1	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	22-Nov-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	<0.50	<0.50	<0.50	0.97	0.70	1	**128**	-
Chloro-a	ug/L	-	1.14	-	-	-	-	-	-
Turb	NTU	0.70	0.96	0.98	0.65	0.63	-	-	-
Alk-T	mg/L	-	11.3	-	-	-	-	-	-
P-T	mg/L	-	0.0088	-	-	-	-	-	-
Al-T	mg/L	0.0656	0.0716	0.0803	0.0659	0.0622	-	-	-
As-T	mg/L	0.00032	0.00029	0.00024	0.00028	0.00026	-	-	**0.005**
Ba-T	mg/L	0.0014	0.0014	0.0012	0.0013	0.0014	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	3.62	3.55	2.97	3.57	3.56	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00075	0.00058	0.00070	0.00112	0.00054	0.00074	**0.002**	**0.007**
Hard-T	mg/L	12.3	12.0	9.96	11.8	11.9	11.59	-	-
Fe-T	mg/L	0.114	0.120	0.087	0.108	0.127	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	0.804	0.754	0.618	0.698	0.742	-	-	-
Mn-T	mg/L	0.0056	0.0076	0.0032	0.0054	0.0081	0.006	**0.7**	**0.8**
Hg-T	mg/L	0.0000040	<0.0000020	0.0000022	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.142	0.137	0.136	0.123	0.109	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	1.07	0.980	0.823	0.883	0.932	-	-	-
Sr-T	mg/L	0.0115	0.0125	0.0096	0.0121	0.0123	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0491	0.0483	0.0603	0.0504	0.0512	**0.0519**	**0.05**	**0.1**
As-D	mg/L	0.00031	0.00027	0.00022	0.00024	0.00025	-	-	-
Ba-D	mg/L	0.0013	0.0017	0.0012	0.0013	0.0013	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	3.67	3.51	3.17	3.53	3.59	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00059	0.00066	0.00073	0.00074	0.00049	-	-	-
Hard-D	mg/L	12.6	11.9	10.5	11.7	12.0	-	-	-
Fe-D	mg/L	0.0717	0.0667	0.0502	0.0615	0.0817	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.822	0.771	0.623	0.707	0.746	-	-	-
Mn-D	mg/L	0.0020	<0.0010	0.0011	0.0023	0.0053	-	-	-
Hg-D	mg/L	0.0000023	<0.0000020	0.0000025	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.139	0.136	0.147	0.126	0.108	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	1.11	1.00	0.875	0.956	0.962	-	-	-
Sr-D	mg/L	0.0112	0.0112	0.0091	0.0115	0.0118	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 83
2016-2017 Annual Report

EMS ID	E217018								
		No Name Lake 4 Metre Depth							
Site Name	NNL4	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		13-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	1.94	2.13	2.38	1.26	1.72	2	**128**	-
Turb	NTU	0.38	0.29	0.24	0.22	0.27	-	-	-
Alk-T	mg/L	9.90	-	10.9	-	-	-	-	-
P-T	mg/L	0.0029	-	-	-	-	-	-	-
Al-T	mg/L	0.0404	0.0390	0.0350	0.0316	0.0319	-	-	-
As-T	mg/L	0.00018	0.00015	0.00019	0.00021	0.00023	-	-	**0.005**
Ba-T	mg/L	<0.0010	<0.0010	0.0011	0.0010	0.0011	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	3.37	3.56	3.48	3.41	3.65	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	**0.002**	**0.007**
Hard-T	mg/L	11.3	11.9	11.8	11.6	12.6	-	-	-
Fe-T	mg/L	0.029	0.031	0.034	0.032	0.050	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	0.706	0.738	0.761	0.745	0.852	-	-	-
Mn-T	mg/L	0.0016	0.0020	0.0017	0.0022	0.0033	0.002	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.070	0.075	0.070	0.072	0.075	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	0.939	1.09	1.00	1.02	1.14	-	-	-
Sr-T	mg/L	0.0115	0.0110	0.0107	0.0106	0.0116	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0361	0.0334	0.0345	0.0326	0.0311	0.0335	**0.05**	**0.1**
As-D	mg/L	0.00018	0.00016	0.00022	0.00020	0.00027	-	-	-
Ba-D	mg/L	0.0014	<0.0010	0.0011	0.0014	0.0011	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000127**	**0.000288**
Ca-D	mg/L	3.34	3.36	3.57	3.63	3.85	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00055	0.00044	0.00047	0.00023	0.00046	-	-	-
Hard-D	mg/L	11.2	11.2	12.4	12.3	13.0	-	-	-
Fe-D	mg/L	0.0203	0.0229	0.0300	0.0295	0.0399	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.702	0.688	0.852	0.789	0.835	-	-	-
Mn-D	mg/L	<0.0010	0.0010	0.0018	0.0017	0.0032	-	-	-
Hg-D	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.052	0.076	0.071	0.087	0.074	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	0.915	0.940	1.11	1.05	1.00	-	-	-
Sr-D	mg/L	0.0105	0.0098	0.0099	0.0108	0.0114	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 84
2016-2017 Annual Report

EMS ID	E217018								
		No Name Lake 4 Metre Depth							
Site Name	NNL4	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	24-Aug-16	1-Sep-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	0.71	<0.50	0.67	<0.50	0.57	1	**128**	-
Turb	NTU	0.44	0.49	0.36	0.32	0.32	-	-	-
Alk-T	mg/L	-	17.0	-	16.7	-	-	-	-
P-T	mg/L	-	0.0057	-	-	-	-	-	-
Al-T	mg/L	0.0371	0.0336	0.0354	0.0339	0.0267	-	-	-
As-T	mg/L	0.00057	0.00057	0.00069	0.00059	0.00049	-	-	**0.005**
Ba-T	mg/L	0.0015	0.0015	0.0018	0.0015	0.0014	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	4.88	4.85	5.79	5.14	5.04	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00058	0.00084	<0.00050	0.00064	<0.00050	0.00061	**0.002**	**0.007**
Hard-T	mg/L	17.6	16.8	19.7	17.6	17.1	-	-	-
Fe-T	mg/L	0.137	0.157	0.178	0.166	0.105	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.32	1.13	1.27	1.15	1.10	-	-	-
Mn-T	mg/L	0.0064	0.0065	0.0069	0.0074	0.0058	0.007	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.115	0.068	0.075	0.069	<0.050	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	1.42	1.19	1.36	1.22	1.20	-	-	-
Sr-T	mg/L	0.0165	0.0157	0.0180	0.0163	0.0157	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0317	0.0319	0.0315	0.0288	0.0191	0.0286	**0.05**	**0.1**
As-D	mg/L	0.00061	0.00060	0.00063	0.00061	0.00054	-	-	-
Ba-D	mg/L	0.0013	0.0015	0.0017	0.0016	0.0015	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	5.27	4.82	5.41	5.08	4.96	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00054	0.00059	0.00072	0.00102	0.00047	-	-	-
Hard-D	mg/L	17.6	16.5	18.7	17.4	17.2	-	-	-
Fe-D	mg/L	0.104	0.133	0.146	0.125	0.0715	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.08	1.09	1.26	1.13	1.17	-	-	-
Mn-D	mg/L	0.0034	0.0032	0.0054	0.0047	0.0025	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.098	0.087	0.082	0.052	0.080	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	1.21	1.17	1.34	1.19	1.28	-	-	-
Sr-D	mg/L	0.0145	0.0152	0.0190	0.0168	0.0159	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 85
2016-2017 Annual Report

EMS ID	E217018								
		No Name Lake 4 Metre Depth							
Site Name	NNL4	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	22-Nov-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	0.67	0.87	<0.50	1.22	0.75	1	**128**	-
Turb	NTU	0.73	1.09	0.89	0.65	0.67	-	-	-
Alk-T	mg/L	-	11.8	-	-	-	-	-	-
P-T	mg/L	-	0.0048	-	-	-	-	-	-
Al-T	mg/L	0.0708	0.0712	0.0797	0.0627	0.0599	-	-	-
As-T	mg/L	0.00033	0.00028	0.00018	0.00027	0.00024	-	-	**0.005**
Ba-T	mg/L	0.0016	0.0013	0.0013	0.0013	0.0014	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	0.000013	<0.000010	-	-	-
Ca-T	mg/L	3.64	3.68	2.93	3.51	3.62	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00073	0.00063	0.00073	0.00052	0.00068	0.00066	**0.002**	**0.007**
Hard-T	mg/L	12.3	12.4	9.96	11.7	12.2	-	-	-
Fe-T	mg/L	0.107	0.123	0.085	0.107	0.136	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	0.786	0.765	0.643	0.706	0.769	-	-	-
Mn-T	mg/L	0.0055	0.0071	0.0040	0.0055	0.0087	0.006	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	0.0000026	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.139	0.133	0.131	0.122	0.112	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	1.04	0.985	0.838	0.912	0.965	-	-	-
Sr-T	mg/L	0.0114	0.0122	0.0093	0.0112	0.0120	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0500	0.0509	0.0576	0.0508	0.0537	**0.0526**	**0.05**	**0.1**
As-D	mg/L	0.00032	0.00025	0.00020	0.00026	0.00025	-	-	-
Ba-D	mg/L	0.0014	0.0014	0.0012	0.0012	0.0013	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	3.81	3.57	3.21	3.48	3.57	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00057	0.00053	0.00070	0.00053	0.00063	-	-	-
Hard-D	mg/L	13.0	12.1	10.7	11.6	12.1	-	-	-
Fe-D	mg/L	0.0703	0.0719	0.0457	0.0620	0.0841	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.851	0.770	0.645	0.696	0.769	-	-	-
Mn-D	mg/L	0.0021	0.0010	<0.0010	0.0022	0.0054	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	0.0000024	<0.0000020	0.0000021	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.138	0.131	0.142	0.131	0.118	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	1.13	1.01	0.837	0.987	0.981	-	-	-
Sr-D	mg/L	0.0113	0.0115	0.0093	0.0118	0.0120	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 86
2016-2017 Annual Report

EMS ID	E217018	No Name Lake 9 Metre Depth							
Site Name	NNL9	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		13-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	2.29	2.70	2.94	2.41	2.85	3	**128**	-
Turb	NTU	0.41	0.50	0.41	0.26	0.32	-	-	-
Alk-T	mg/L	9.64	-	9.75	-	-	-	-	-
P-T	mg/L	0.0027	-	-	-	-	-	-	-
Al-T	mg/L	0.0457	0.0426	0.0397	0.0361	0.0351	-	-	-
As-T	mg/L	0.00020	0.00021	0.00015	0.00017	0.00019	-	-	**0.005**
Ba-T	mg/L	0.0011	<0.0010	0.0012	0.0011	0.0010	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	3.49	3.32	3.42	3.47	3.42	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	0.00066	<0.00050	<0.00050	<0.00050	0.00053	**0.002**	**0.007**
Hard-T	mg/L	11.8	11.3	11.5	11.6	11.5	-	-	-
Fe-T	mg/L	0.065	0.053	0.055	0.046	0.046	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	0.735	0.735	0.717	0.708	0.723	-	-	-
Mn-T	mg/L	0.0031	0.0037	0.0027	0.0021	0.0016	0.003	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.077	0.065	0.067	0.074	0.071	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	0.00014	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	0.964	0.983	0.917	0.917	0.964	-	-	-
Sr-T	mg/L	0.0122	0.0107	0.0111	0.0112	0.0118	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0354	0.0349	0.0362	0.0348	0.0359	0.0354	**0.05**	**0.1**
As-D	mg/L	0.00021	0.00020	0.00022	0.00019	0.00019	-	-	-
Ba-D	mg/L	0.0014	0.0011	0.0011	0.0012	0.0012	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000050	0.000005	**0.000127**	**0.000288**
Ca-D	mg/L	3.59	3.48	3.55	3.80	3.69	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00040	0.00051	0.00043	0.00029	0.00038	-	-	-
Hard-D	mg/L	11.8	11.6	11.9	12.7	12.2	-	-	-
Fe-D	mg/L	0.0308	0.0335	0.0310	0.0384	0.0343	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.698	0.694	0.734	0.784	0.725	-	-	-
Mn-D	mg/L	0.0011	0.0013	<0.0010	0.0011	0.0012	-	-	-
Hg-D	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.055	0.068	0.082	0.085	0.059	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	0.950	0.874	0.989	0.969	0.915	-	-	-
Sr-D	mg/L	0.0114	0.0108	0.0114	0.0108	0.0118	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 87
2016-2017 Annual Report

EMS ID	E217018	No Name Lake 9 Metre Depth							
Site Name	NNL9	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	24-Aug-16	1-Sep-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	2.65	2.88	2.97	2.48	2.45	3	**128**	-
Turb	NTU	0.45	0.52	0.45	0.37	0.54	-	-	-
Alk-T	mg/L	-	10.9	-	9.87	-	-	-	-
P-T	mg/L	-	0.0057	-	-	-	-	-	-
Al-T	mg/L	0.0406	0.0401	0.0410	0.0366	0.0388	-	-	-
As-T	mg/L	0.00023	0.00021	0.00021	0.00018	0.00020	-	-	**0.005**
Ba-T	mg/L	0.0012	0.0013	0.0013	0.0012	0.0013	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	3.86	3.66	4.23	3.79	3.76	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	0.00084	<0.00050	0.00065	<0.00050	0.00060	**0.002**	**0.007**
Hard-T	mg/L	12.8	12.4	13.9	12.6	12.6	-	-	-
Fe-T	mg/L	0.116	0.134	0.108	0.097	0.105	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	0.773	0.789	0.807	0.772	0.776	-	-	-
Mn-T	mg/L	0.0074	0.0083	0.0101	0.0094	0.0146	0.010	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	<0.050	0.078	0.076	0.077	0.056	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	1.02	1.02	0.988	0.990	0.986	-	-	-
Sr-T	mg/L	0.0137	0.0134	0.0147	0.0132	0.0135	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0320	0.0308	0.0334	0.0316	0.0293	0.0314	**0.05**	**0.1**
As-D	mg/L	0.00020	0.00022	0.00019	0.00017	0.00020	-	-	-
Ba-D	mg/L	0.0012	0.0013	0.0013	0.0013	0.0013	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	3.96	3.64	3.94	3.73	3.78	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00038	0.00033	0.00048	0.00048	0.00044	-	-	-
Hard-D	mg/L	13.2	12.1	13.0	12.4	12.9	-	-	-
Fe-D	mg/L	0.0531	0.0692	0.0586	0.0488	0.0714	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.807	0.722	0.770	0.755	0.830	-	-	-
Mn-D	mg/L	0.0044	0.0053	0.0078	0.0057	0.0107	-	-	-
Hg-D	mg/L	<0.0000020	0.0000034	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.101	0.081	0.078	0.057	0.085	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	1.06	0.972	0.970	0.942	1.01	-	-	-
Sr-D	mg/L	0.0126	0.0129	0.0137	0.0131	0.0131	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 88
2016-2017 Annual Report

EMS ID	E217018	No Name Lake 9 Metre Depth						Water Quality Guidelines	
Site Name	NNL9	5 in 30 Weekly Samples							
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	22-Nov-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	0.79	0.63	<0.50	0.88	0.70	1	**128**	-
Turb	NTU	0.75	1.08	0.84	0.63	0.63	-	-	-
Alk-T	mg/L	-	10.6	-	-	-	-	-	-
P-T	mg/L	-	0.0068	-	-	-	-	-	-
Al-T	mg/L	0.0660	0.0845	0.0785	0.0585	0.0652	-	-	-
As-T	mg/L	0.00031	0.00029	0.00031	0.00028	0.00033	-	-	**0.005**
Ba-T	mg/L	0.0014	0.0014	0.0013	0.0012	0.0013	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	0.000010	<0.000010	-	-	-
Ca-T	mg/L	3.77	3.62	3.29	3.43	3.52	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00068	0.00065	0.00073	0.00054	0.00321	0.00116	**0.002**	**0.007**
Hard-T	mg/L	12.6	12.2	11.2	11.4	12.0	-	-	-
Fe-T	mg/L	0.116	0.129	0.106	0.103	0.136	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	0.782	0.774	0.721	0.692	0.768	-	-	-
Mn-T	mg/L	0.0066	0.0082	0.0056	0.0055	0.0095	0.007	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.135	0.137	0.137	0.119	0.118	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	1.04	0.981	0.922	0.902	0.985	-	-	-
Sr-T	mg/L	0.0125	0.0123	0.0116	0.0119	0.0124	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0528	0.0511	0.0536	0.0490	0.0488	**0.0511**	**0.05**	**0.1**
As-D	mg/L	0.00029	0.00027	0.00025	0.00024	0.00027	-	-	-
Ba-D	mg/L	0.0014	0.0013	0.0012	0.0012	0.0013	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	4.02	3.39	3.41	3.65	3.68	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00064	0.00060	0.00060	0.00056	0.00051	-	-	-
Hard-D	mg/L	13.5	11.7	11.3	12.0	12.3	-	-	-
Fe-D	mg/L	0.0740	0.0690	0.0536	0.0627	0.0934	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.846	0.773	0.672	0.703	0.760	-	-	-
Mn-D	mg/L	0.0031	0.0010	0.0011	0.0026	0.0064	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	0.0000022	<0.0000020	0.0000021	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.152	0.135	0.132	0.115	0.108	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	1.12	0.998	0.911	0.947	0.972	-	-	-
Sr-D	mg/L	0.0127	0.0118	0.0110	0.0111	0.0124	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 89
2016-2017 Annual Report

EMS ID	E217018								
		No Name Lake 1 Metre From Bottom Depth							
Site Name	NNLB	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		13-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	3.5	3.06	3.61	2.48	2.78	3	**128**	-
Turb	NTU	0.44	0.55	0.46	0.35	0.39	-	-	-
Alk-T	mg/L	10.3	-	9.72	-	-	-	-	-
P-T	mg/L	0.0027	-	-	-	-	-	-	-
Al-T	mg/L	0.0412	0.0438	0.0444	0.0338	0.0363	-	-	-
As-T	mg/L	0.00018	0.00019	0.00018	0.00017	0.00021	-	-	**0.005**
Ba-T	mg/L	0.0011	<0.0010	0.0012	<0.0010	0.0011	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	3.57	3.26	3.54	3.27	3.61	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.050**
Cu-T	mg/L	<0.00050	0.00055	<0.00050	<0.00050	<0.00050	0.00051	**0.0020**	**0.0070**
Hard-T	mg/L	11.9	11.2	11.9	11	12.1	-	-	-
Fe-T	mg/L	0.049	0.055	0.064	0.057	0.066	-	-	**1.0**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.000200	**0.003**	**0.005**
Mg-T	mg/L	0.729	0.736	0.731	0.684	0.738	-	-	-
Mn-T	mg/L	0.003	0.004	0.0032	0.0029	0.0024	0.0031	**0.70**	**0.80**
Hg-T	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.073	0.078	0.07	0.068	0.08	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	0.941	0.939	0.932	0.911	0.98	-	-	-
Sr-T	mg/L	0.0119	0.0111	0.0117	0.0108	0.0124	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0379	0.0377	0.0357	0.0329	0.0358	0.036	**0.05**	**0.1**
As-D	mg/L	0.00019	0.00019	0.0002	0.00017	0.00017	-	-	-
Ba-D	mg/L	0.0011	<0.0010	0.0011	0.0016	0.0044	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000127**	**0.000288**
Ca-D	mg/L	3.55	3.54	3.69	3.91	3.61	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00048	0.00047	0.00048	0.00026	0.0004	-	-	-
Hard-D	mg/L	11.6	11.6	12.3	12.8	12.1	-	-	-
Fe-D	mg/L	0.0303	0.0421	0.0307	0.0548	0.0466	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.67	0.669	0.749	0.747	0.748	-	-	-
Mn-D	mg/L	0.0012	0.0016	<0.0010	0.0013	0.0013	-	-	-
Hg-D	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	0.0032	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.054	0.07	0.078	0.086	0.065	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	0.961	0.898	0.976	1.01	0.94	-	-	-
Sr-D	mg/L	0.0118	0.0111	0.0112	0.0114	0.0124	-	-	-
Zn-D	mg/L	0.0111	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 90
2016-2017 Annual Report

EMS ID	E217018								
		No Name Lake 1 Metre From Bottom Depth							
Site Name	NNLB	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	24-Aug-16	1-Sep-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	2.71	3.51	2.92	2.67	2.49	3	**128**	-
Turb	NTU	0.58	0.58	0.61	0.55	0.65	-	-	-
Alk-T	mg/L	-	10.6	-	10.1	-	-	-	-
P-T	mg/L	-	0.0059	-	-	-	-	-	-
Al-T	mg/L	0.0409	0.0431	0.045	0.0395	0.0408	-	-	-
As-T	mg/L	0.00023	0.00023	0.00029	0.00023	0.00025	-	-	**0.005**
Ba-T	mg/L	0.0013	0.0013	0.0015	0.0014	0.0014	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	4.05	3.64	4.41	3.83	3.84	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.050**
Cu-T	mg/L	<0.00050	0.00050	<0.00050	0.00111	<0.00050	0.00062	**0.0020**	**0.0070**
Hard-T	mg/L	13.6	12.4	14.5	12.7	12.8	-	-	-
Fe-T	mg/L	0.193	0.179	0.183	0.173	0.176	-	-	**1.0**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	0.844	0.795	0.849	0.767	0.783	-	-	-
Mn-T	mg/L	0.0093	0.01	0.0133	0.0143	0.0156	0.013	**0.70**	**0.80**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	<0.050	0.073	0.079	0.072	<0.050	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	1.04	0.992	1.04	0.971	0.992	-	-	-
Sr-T	mg/L	0.0144	0.0136	0.0158	0.0138	0.0145	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0325	0.0316	0.0319	0.0344	0.0309	0.0323	**0.05**	**0.1**
As-D	mg/L	0.00022	0.00018	0.00020	0.00022	0.0002	-	-	-
Ba-D	mg/L	0.0013	0.0013	0.0014	0.0014	0.0014	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	3.95	3.69	3.91	3.86	3.9	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00035	0.00033	0.00035	0.00053	0.00039	-	-	-
Hard-D	mg/L	13	12.3	12.9	12.8	12.8	-	-	-
Fe-D	mg/L	0.0907	0.0882	0.1	0.0914	0.115	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.76	0.746	0.77	0.774	0.748	-	-	-
Mn-D	mg/L	0.0062	0.0063	0.0098	0.0086	0.009	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.087	0.088	0.080	0.059	0.078	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	0.999	0.917	0.953	0.956	0.938	-	-	-
Sr-D	mg/L	0.0129	0.0126	0.0144	0.0142	0.0145	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 91
2016-2017 Annual Report

EMS ID	E217018								
		No Name Lake 1 Metre From Bottom Depth							
Site Name	NNLB	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	22-Nov-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	3.77	3.15	1.15	0.84	0.68	2	**128**	-
Turb	NTU	1.01	0.82	0.9	0.72	0.73	-	-	-
Alk-T	mg/L	-	11.300	-	-	-	-	-	-
P-T	mg/L	-	0.0065	-	-	-	-	-	-
Al-T	mg/L	0.0481	0.0576	0.0756	0.0629	0.0638	-	-	-
As-T	mg/L	0.00034	0.0003	0.0003	0.00037	0.00028	-	-	**0.005**
Ba-T	mg/L	0.002	0.002	0.001	0.001	0.001	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	4.2	4.2	3.7	3.4	3.8	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.050**
Cu-T	mg/L	0.00057	<0.00050	0.00063	0.00060	0.00065	0.00059	**0.0020**	**0.0070**
Hard-T	mg/L	14	14	12	11	13	-	-	-
Fe-T	mg/L	0.26	0.22	0.12	0.11	0.14	-	-	**1.0**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	0.82	0.83	0.76	0.70	0.77	-	-	-
Mn-T	mg/L	0.0364	0.0278	0.0075	0.0055	0.0092	0.017	**0.70**	**0.80**
Hg-T	mg/L	<0.0000020	<0.0000020	0.0000	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.1	0.11	0.14	0.111	0.119	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	1.02	1.02	0.97	0.89	0.99	-	-	-
Sr-T	mg/L	0.0158	0.0161	0.0131	0.0106	0.0122	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0376	0.0411	0.0549	0.0510	0.0495	0.0468	**0.05**	**0.1**
As-D	mg/L	0.00028	0.00028	0.00024	0.00029	0.00028	-	-	-
Ba-D	mg/L	0.002	0.002	0.001	0.001	0.001	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	4.3	4.0	4.0	3.5	3.4	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.0006	0.0009	0.0007	0.0005	0.0005	-	-	-
Hard-D	mg/L	14.40	13.40	13.10	11.60	11.70	-	-	-
Fe-D	mg/L	0.168	0.146	0.067	0.065	0.083	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.916	0.833	0.766	0.703	0.746	-	-	-
Mn-D	mg/L	0.029	0.016	0.002	0.002	0.006	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	0.0000	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.099	0.107	0.132	0.115	0.107	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	1.10	1.02	0.95	0.97	0.96	-	-	-
Sr-D	mg/L	0.0153	0.0156	0.0133	0.0106	0.0116	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 92
2016-2017 Annual Report

EMS ID	E206619								
Site Name	LLM1	Long Lake Middle 1 Metre Depth 5 in 30 Weekly Samples						Water Quality Guidelines	
Date		13-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	72.6	64.9	71.4	74.6	81.1	73	**128**	-
Chloro-a	ug/L	1.51	-	-	-	-	-	-	-
Turb	NTU	0.53	0.39	0.32	0.33	0.46	-	-	-
Alk-T	mg/L	35.7	-	35.1	37.8	37.1	-	-	-
P-T	mg/L	0.0033	-	-	0.003	0.0027	-	-	-
Al-T	mg/L	0.0257	0.0258	0.018	0.0163	0.0159	-	-	-
As-T	mg/L	0.00036	0.00039	0.0004	0.0004	0.00044	-	-	**0.005**
Ba-T	mg/L	0.0055	0.0051	0.0056	0.0062	0.0055	-	-	-
B-T	mg/L	0.072	0.074	0.067	0.082	0.085	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	24.7	25.8	25.5	28.8	30.8	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00051	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	**0.002**	**0.007**
Hard-T	mg/L	74.5	77.6	76.6	86.7	91.8	-	-	-
Fe-T	mg/L	0.059	0.052	0.044	0.061	0.039	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	3.14	3.23	3.16	3.6	3.62	-	-	-
Mn-T	mg/L	0.0204	0.0144	0.0075	0.0091	0.0085	0.012	**0.7**	**0.8**
Hg-T	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.409	0.388	0.382	0.421	0.422	-	-	-
S-T	mg/L	24.3	25.1	24.1	27.3	30.9	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	13.4	12.8	13.4	14.5	14.80	-	-	-
Sr-T	mg/L	0.194	0.179	0.193	0.213	0.212	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0243	0.0208	0.018	0.0167	0.0141	0.0188	**0.05**	**0.1**
As-D	mg/L	0.00034	0.0004	0.00041	0.00039	0.00041	-	-	-
Ba-D	mg/L	0.0056	0.0048	0.0059	0.0061	0.006	-	-	-
B-D	mg/L	0.078	0.069	0.081	0.069	0.082	-	-	-
Cd-D	mg/L	0.0000136	<0.0000050	0.000005	<0.0000050	<0.0000050	0.000007	**0.000127**	**0.000288**
Ca-D	mg/L	25.5	24.4	27.8	29.2	29	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00045	0.00058	0.00081	0.0006	0.00039	-	-	-
Hard-D	mg/L	76.8	73	82.3	87.7	86.1	-	-	-
Fe-D	mg/L	0.0268	0.0285	0.0251	0.033	0.0199	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	3.22	2.91	3.12	3.56	3.35	-	-	-
Mn-D	mg/L	0.0066	0.0035	<0.0010	0.0048	0.0029	-	-	-
Hg-D	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.392	0.331	0.41	0.43	0.411	-	-	-
S-D	mg/L	28.7	25.8	26.6	28.7	29.1	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	14.5	13.3	14.3	15.7	13.9	-	-	-
Sr-D	mg/L	0.183	0.175	0.198	0.206	0.222	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 93
2016-2017 Annual Report

EMS ID	E206619								
		Long Lake Middle 1 Metre Depth							
Site Name	LLM1	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	25-Aug-16	30-Aug-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	55.7	59.6	62.5	65.8	67.5	62	**128**	-
Chloro-a	ug/L	-	0.93	-	-	-	-	-	-
Turb	NTU	0.27	0.31	0.23	0.28	0.21	-	-	-
Alk-T	mg/L	-	32.5	-	-	-	-	-	-
P-T	mg/L	-	0.0043	-	-	-	-	**0.007**	-
Al-T	mg/L	0.0119	0.0108	0.0101	0.0086	0.0073	-	-	-
As-T	mg/L	0.00059	0.0006	0.00071	0.00061	0.00061	-	-	**0.005**
Ba-T	mg/L	0.0054	0.0058	0.0065	0.0061	0.0063	-	-	-
B-T	mg/L	0.063	0.066	0.085	0.066	0.07	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	25	25.1	29	29.3	27.4	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	<0.00050	<0.00050	0.00132	<0.00050	0.00066	**0.002**	**0.007**
Hard-T	mg/L	76.4	76.6	88	87.5	82.9	-	-	-
Fe-T	mg/L	0.061	0.048	0.044	0.038	0.032	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	3.38	3.39	3.81	3.48	3.51	-	-	-
Mn-T	mg/L	0.0086	0.0077	0.0047	0.0051	0.0043	0.006	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.339	0.363	0.353	0.304	0.352	-	-	-
S-T	mg/L	20.1	22.3	26.8	22.8	23.8	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	11	10.9	11.5	11.5	11.6	-	-	-
Sr-T	mg/L	0.163	0.164	0.19	0.172	0.184	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0137	0.0112	0.0093	0.0101	0.0066	0.0102	**0.05**	**0.1**
As-D	mg/L	0.00055	0.00055	0.00063	0.0006	0.00058	-	-	-
Ba-D	mg/L	0.0058	0.0054	0.0062	0.0059	0.0062	-	-	-
B-D	mg/L	0.069	0.062	0.060	0.071	0.068	-	-	-
Cd-D	mg/L	0.0000241	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000009	**0.000088**	**0.00017**
Ca-D	mg/L	24.4	22.4	25.5	27.4	27.4	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	<0.00020	0.00038	0.0003	0.00100	0.00033	-	-	-
Hard-D	mg/L	75	68.7	77.3	83.1	82.6	-	-	-
Fe-D	mg/L	0.0397	0.0296	0.0313	0.0363	0.0193	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	3.41	3.11	3.3	3.6	3.44	-	-	-
Mn-D	mg/L	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.267	0.309	0.336	0.324	0.353	-	-	-
S-D	mg/L	25.1	20.9	23.7	23.6	24.5	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	11.1	10	10.4	11.5	11.8	-	-	-
Sr-D	mg/L	0.159	0.159	0.172	0.169	0.182	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 94
2016-2017 Annual Report

EMS ID	E206619	Long Lake Middle 1 Metre Depth							
Site Name	LLM1	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	22-Nov-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	6.88	8.57	3.60	10.60	51.10	16	**128**	-
Chloro-a	ug/L	-	1.05	-	-	-	-	-	-
Turb	NTU	0.7	0.9	1.1	0.6	0.9	-	-	-
Alk-T	mg/L	-	13.4	-	-	-	-	-	-
P-T	mg/L	-	0.0057	-	-	-	-	-	-
Al-T	mg/L	0.0775	0.0652	0.0764	0.0564	0.0605	-	-	-
As-T	mg/L	0.00041	0.00037	0.00037	0.00034	0.00039	-	-	**0.005**
Ba-T	mg/L	0.0023	0.0022	0.0019	0.0024	0.0050	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	0.057	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	5.60	5.83	3.91	6.11	19.50	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00066	0.00055	0.00062	<0.00050	0.00058	0.00058	**0.002**	**0.007**
Hard-T	mg/L	17.9	18.6	12.8	19.4	58.6	-	-	-
Fe-T	mg/L	0.105	0.125	0.099	0.09	0.127	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	0.95	0.97	0.73	1.00	2.41	-	-	-
Mn-T	mg/L	0.0054	0.0082	0.0045	0.0055	0.0127	0.007	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	0.0000	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.15	0.15	0.13	0.13	0.35	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	3.1	17.5	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	1.9	1.9	1.1	2.3	9.9	-	-	-
Sr-T	mg/L	0.03	0.03	0.02	0.03	0.14	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0488	0.0501	0.0513	0.0464	0.0426	0.0478	**0.05**	**0.1**
As-D	mg/L	0.0004	0.0004	0.0003	0.0003	0.0004	-	-	-
Ba-D	mg/L	0.00260	0.00220	0.00170	0.00230	0.00520	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	0.052	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	5.8	5.6	3.8	6.4	18.6	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00076	0.00061	0.00062	0.00044	0.00050	-	-	-
Hard-D	mg/L	19	18	12	20	56	-	-	-
Fe-D	mg/L	0.066	0.071	0.054	0.059	0.072	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.06	0.98	0.69	1.04	2.31	-	-	-
Mn-D	mg/L	0.002	0.0024	<0.0010	0.0033	0.0107	-	-	-
Hg-D	mg/L	0.0000035	<0.0000020	0.000002	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.156	0.147	0.119	0.156	0.360	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	3.3	14.8	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	1.99	1.98	1.08	2.38	9.78	-	-	-
Sr-D	mg/L	0.025	0.027	0.014	0.032	0.137	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 95
2016-2017 Annual Report

EMS ID	E206619								
		Long Lake Middle 4 Metre Depth							
Site Name	LLM4	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		13-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	123	118	121	118	123	121	**128**	-
Turb	NTU	0.79	0.66	0.56	0.44	0.41	-	-	-
Alk-T	mg/L	48.6	-	48	49.2	47.9	-	-	-
P-T	mg/L	0.0028	-	-	0.0025	<0.0020	-	-	-
Al-T	mg/L	0.0313	0.0297	0.0176	0.0181	0.0156	-	-	-
As-T	mg/L	0.00033	0.00039	0.00031	0.00033	0.00033	-	-	**0.005**
Ba-T	mg/L	0.0072	0.007	0.0073	0.0068	0.0068	-	-	-
B-T	mg/L	0.117	0.125	0.109	0.12	0.113	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	40.7	42.6	37.9	41.6	43.1	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	**0.002**	**0.007**
Hard-T	mg/L	122	127	115	122	128	-	-	-
Fe-T	mg/L	0.068	0.085	0.032	0.04	0.034	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	4.88	4.96	4.89	4.51	4.96	-	-	-
Mn-T	mg/L	0.0405	0.035	0.0081	0.0118	0.0063	0.020	**0.7**	**0.8**
Hg-T	mg/L	0.0000021	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.574	0.672	0.591	0.577	0.634	-	-	-
S-T	mg/L	42	44	44.3	42.5	42.8	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	22.1	23.7	22.6	21.2	22.9	-	-	-
Sr-T	mg/L	0.325	0.315	0.308	0.313	0.34	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0217	0.0194	0.0162	0.016	0.0130	0.0173	**0.05**	**0.1**
As-D	mg/L	0.00032	0.00032	0.00036	0.00031	0.00031	-	-	-
Ba-D	mg/L	0.0072	0.0072	0.0071	0.0071	0.0072	-	-	-
B-D	mg/L	0.126	0.112	0.125	0.112	0.122	-	-	-
Cd-D	mg/L	0.0000145	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000007	**0.000127**	**0.000288**
Ca-D	mg/L	41.7	40.4	43.1	42.6	41.2	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00047	0.00063	0.00051	<0.00020	0.0004	-	-	-
Hard-D	mg/L	125	120	128	126	122	-	-	-
Fe-D	mg/L	0.0295	0.0257	0.0202	0.0217	0.018	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	4.99	4.62	4.85	4.9	4.74	-	-	-
Mn-D	mg/L	0.0239	0.0062	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.673	0.597	0.613	0.632	0.616	-	-	-
S-D	mg/L	43.3	44.5	42	44.5	43.3	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	23.6	21.8	22	25.4	20.8	-	-	-
Sr-D	mg/L	0.292	0.31	0.319	0.308	0.331	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 96
2016-2017 Annual Report

EMS ID	E206619								
		Long Lake Middle 4 Metre Depth							
Site Name	LLM4	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	25-Aug-16	30-Aug-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	86.3	59.3	69.7	68.8	67.2	70	**128**	-
Turb	NTU	0.25	0.36	0.27	0.25	0.22	-	-	-
Alk-T	mg/L	-	31.9	-	-	-	-	-	-
P-T	mg/L	-	0.0038	-	-	-	-	**0.007**	-
Al-T	mg/L	0.0092	0.014	0.0098	0.0102	0.0077	-	-	-
As-T	mg/L	0.00049	0.00058	0.00068	0.00056	0.00061	-	-	**0.005**
Ba-T	mg/L	0.0076	0.0056	0.0068	0.0062	0.0063	-	-	-
B-T	mg/L	0.09	0.07	0.081	0.069	0.069	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	36.2	22	30.5	30.5	27.7	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	<0.00050	<0.00050	0.00078	0.00131	0.00072	**0.002**	**0.007**
Hard-T	mg/L	110	69.2	92.4	89.8	83.8	-	-	-
Fe-T	mg/L	0.047	0.041	0.049	0.048	0.033	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	4.67	3.46	3.94	3.32	3.53	-	-	-
Mn-T	mg/L	0.0059	0.0073	0.0058	0.0055	0.0046	0.006	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.479	0.381	0.36	0.295	0.348	-	-	-
S-T	mg/L	37.7	22.6	28.4	22.1	24	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	17.4	10.8	11.8	11.4	11.8	-	-	-
Sr-T	mg/L	0.241	0.158	0.202	0.172	0.183	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0108	0.0110	0.0081	0.01	0.0066	0.0093	**0.05**	**0.1**
As-D	mg/L	0.00059	0.00053	0.00062	0.00067	0.00059	-	-	-
Ba-D	mg/L	0.0074	0.0055	0.0063	0.0062	0.0062	-	-	-
B-D	mg/L	0.094	0.063	0.063	0.073	0.069	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	34.8	23.1	26.8	28	28.2	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00022	0.00031	0.0003	0.00044	0.00032	-	-	-
Hard-D	mg/L	105	71.6	81.4	84.2	84.3	-	-	-
Fe-D	mg/L	0.0284	0.0307	0.0361	0.029	0.0192	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	4.49	3.38	3.52	3.48	3.38	-	-	-
Mn-D	mg/L	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.469	0.344	0.344	0.313	0.35	-	-	-
S-D	mg/L	33.2	22.9	24.9	23.7	24.4	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	16.9	10.5	10.9	11.6	11.6	-	-	-
Sr-D	mg/L	0.226	0.157	0.173	0.178	0.187	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 97
2016-2017 Annual Report

EMS ID	E206619								
		Long Lake Middle 4 Metre Depth							
Site Name	LLM4	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	22-Nov-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	26.50	49.40	34.70	84.20	93.60	58	**128**	-
Turb	NTU	1.04	1.59	1.85	1.78	1.12	-	-	-
Alk-T	mg/L	-	31.4	-	-	-	-	-	-
P-T	mg/L	-	0.005	-	-	-	-	-	-
Al-T	mg/L	0.0777	0.0661	0.0857	0.0524	0.0586	-	-	-
As-T	mg/L	0.00047	0.00048	0.00045	0.0004	0.00038	-	-	**0.005**
Ba-T	mg/L	0.0038	0.0050	0.0043	0.0053	0.0066	-	-	-
B-T	mg/L	<0.050	0.053	<0.050	0.059	0.091	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	11.6	18.8	15.5	21.8	33.9	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00066	0.00063	0.0011	0.00095	0.00069	0.00081	**0.002**	**0.007**
Hard-T	mg/L	36	57	47	66	100	-	-	-
Fe-T	mg/L	0.112	0.141	0.168	0.145	0.139	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.69	2.57	2.07	2.89	3.78	-	-	-
Mn-T	mg/L	0.009	0.013	0.011	0.013	0.020	0.013	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.255	0.399	0.318	0.425	0.508	-	-	-
S-T	mg/L	8.9	16.9	12.0	22.5	30.9	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	5.2	10.3	7.9	13.1	16.3	-	-	-
Sr-T	mg/L	0.0743	0.136	0.0917	0.1520	0.256	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0469	0.0475	0.0474	0.0422	0.0387	0.0445	**0.05**	**0.1**
As-D	mg/L	0.00039	0.00043	0.00035	0.00042	0.00035	-	-	-
Ba-D	mg/L	0.0039	0.0053	0.0042	0.007	0.0064	-	-	-
B-D	mg/L	<0.050	0.056	<0.050	0.086	0.080	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	12.7	18.60	13.7	29.40	32.9	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00086	0.00081	0.00064	0.00062	0.00062	-	-	-
Hard-D	mg/L	39	57	42	89	98	-	-	-
Fe-D	mg/L	0.0676	0.076	0.065	0.081	0.064	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.86	2.51	1.91	3.68	3.80	-	-	-
Mn-D	mg/L	0.0044	0.0074	0.0045	0.0120	0.0168	-	-	-
Hg-D	mg/L	0.0000033	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.283	0.366	0.297	0.573	0.511	-	-	-
S-D	mg/L	9.50	16.90	10.70	28.60	29.30	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	5.3	10.1	6.9	16.6	16.7	-	-	-
Sr-D	mg/L	0.071	0.130	0.094	0.203	0.256	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 98
2016-2017 Annual Report

EMS ID	E206619								
		Long Lake Middle 9 Metre Depth							
Site Name	LLM9	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		13-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	134	132	133	132	135	133	**128**	-
Turb	NTU	0.92	0.73	0.58	0.64	0.86	-	-	-
Alk-T	mg/L	48.1	-	48.6	50.6	46.1	-	-	-
P-T	mg/L	0.003	-	-	0.0052	0.0033	-	-	-
Al-T	mg/L	0.031	0.0291	0.0247	0.0229	0.023	-	-	-
As-T	mg/L	0.00033	0.00028	0.0003	0.00026	0.00027	-	-	**0.005**
Ba-T	mg/L	0.0078	0.0077	0.0079	0.0078	0.0075	-	-	-
B-T	mg/L	0.12	0.127	0.122	0.114	0.118	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	43.2	46.4	43.3	45.9	48	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00051	<0.00050	0.00074	<0.00050	<0.00050	0.00055	**0.002**	**0.007**
Hard-T	mg/L	130	140	131	135	144	-	-	-
Fe-T	mg/L	0.087	0.068	0.056	0.055	0.056	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	5.35	5.82	5.47	4.84	5.97	-	-	-
Mn-T	mg/L	0.065	0.0586	0.0468	0.0426	0.0456	0.052	**0.7**	**0.8**
Hg-T	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.643	0.706	0.66	0.628	0.706	-	-	-
S-T	mg/L	46.6	49.3	46.8	41.6	45.7	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	23.2	24.8	23.7	21.8	24.1	-	-	-
Sr-T	mg/L	0.335	0.316	0.327	0.331	0.355	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.025	0.021	0.021	0.0187	0.0178	0.0207	**0.05**	**0.1**
As-D	mg/L	0.00026	0.00024	0.00026	0.00023	0.00022	-	-	-
Ba-D	mg/L	0.0081	0.0077	0.0077	0.0082	0.0074	-	-	-
B-D	mg/L	0.127	0.116	0.129	0.109	0.129	-	-	-
Cd-D	mg/L	0.0000127	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000007	**0.000127**	**0.000288**
Ca-D	mg/L	45.1	45.8	45.6	45.9	43.7	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00049	0.00045	0.00039	0.0003	0.00037	-	-	-
Hard-D	mg/L	135	136	136	137	130	-	-	-
Fe-D	mg/L	0.0315	0.0317	0.0335	0.0266	0.0197	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	5.53	5.31	5.35	5.49	5.02	-	-	-
Mn-D	mg/L	0.05	0.044	0.0327	0.024	0.0133	-	-	-
Hg-D	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.657	0.612	0.7	0.678	0.654	-	-	-
S-D	mg/L	49	49.5	47.5	47.3	45.1	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	24.4	24.9	23.9	25.7	22	-	-	-
Sr-D	mg/L	0.323	0.326	0.33	0.334	0.342	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 99
2016-2017 Annual Report

EMS ID	E206619								
		Long Lake Middle 9 Metre Depth							
Site Name	LLM9	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	25-Aug-16	30-Aug-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	125	117	127	132	127	126	**128**	-
Turb	NTU	0.25	0.27	0.24	0.24	0.29	-	-	-
Alk-T	mg/L	-	47.6	-	-	-	-	-	-
P-T	mg/L	-	0.0040	-	-	-	-	**0.007**	-
Al-T	mg/L	0.0129	0.0165	0.0151	0.0144	0.0245	-	-	-
As-T	mg/L	0.00023	0.00036	0.00026	0.00024	0.00025	-	-	**0.005**
Ba-T	mg/L	0.0074	0.0076	0.0085	0.0078	0.0072	-	-	-
B-T	mg/L	0.133	0.117	0.132	0.127	0.133	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	47.3	38.4	51.0	47.8	44.8	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	0.00071	<0.00050	0.00067	<0.00050	0.00058	**0.002**	**0.007**
Hard-T	mg/L	141	118	153	142	135	-	-	-
Fe-T	mg/L	0.035	0.034	0.033	0.028	0.03	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	5.48	5.38	6.15	5.42	5.63	-	-	-
Mn-T	mg/L	0.0262	0.0182	0.0284	0.0242	0.0334	0.026	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.656	0.631	0.685	0.569	0.62	-	-	-
S-T	mg/L	48.3	37.9	51.9	44	43.7	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00018	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	24.6	22	26.3	23.8	25.3	-	-	-
Sr-T	mg/L	0.321	0.3	0.362	0.328	0.339	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0154	0.0135	0.0143	0.0136	0.0105	0.0135	**0.05**	**0.1**
As-D	mg/L	0.00026	0.00034	0.00023	0.00024	0.00019	-	-	-
Ba-D	mg/L	0.0079	0.0072	0.008	0.0085	0.0075	-	-	-
B-D	mg/L	0.118	0.107	0.118	0.12	0.119	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	46	37.3	45.7	45.4	48.2	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00037	0.00033	0.00036	0.00052	0.00035	-	-	-
Hard-D	mg/L	139	114	136	137	142	-	-	-
Fe-D	mg/L	0.0188	0.02	0.0164	0.015	0.0121	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	5.87	5.12	5.35	5.65	5.32	-	-	-
Mn-D	mg/L	0.0245	0.0114	0.0225	0.0193	0.027	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.717	0.575	0.687	0.658	0.647	-	-	-
S-D	mg/L	47.1	40.7	48.5	45.6	45.8	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	26.1	20.5	23	24.9	23.3	-	-	-
Sr-D	mg/L	0.334	0.301	0.346	0.331	0.35	-	-	-
Zn-D	mg/L	0.0069	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 100
2016-2017 Annual Report

EMS ID	E206619								
		Long Lake Middle 9 Metre Depth							
Site Name	LLM9	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	22-Nov-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	101	88	102	114	110	103	**128**	-
Turb	NTU	1.92	4.82	2.33	1.38	2.91	-	-	-
Alk-T	mg/L	-	42	-	-	-	-	-	-
P-T	mg/L	-	0.008	-	-	-	-	-	-
Al-T	mg/L	0.0644	0.088	0.0812	0.0481	0.0814	-	-	-
As-T	mg/L	0.00038	0.00056	0.0004	0.00036	0.00056	-	-	**0.005**
Ba-T	mg/L	0.0076	0.0078	0.0068	0.008	0.0079	-	-	-
B-T	mg/L	0.097	0.095	0.091	0.116	0.109	-	-	-
Cd-T	mg/L	0.000011	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	34.9	31.3	34.7	39.3	37.3	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00062	0.00073	0.00103	0.00058	0.00089	0.00077	**0.002**	**0.007**
Hard-T	mg/L	104	94	104	117	112	-	-	-
Fe-T	mg/L	0.116	0.237	0.196	0.116	0.218	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	4.19	3.82	4.27	4.65	4.48	-	-	-
Mn-T	mg/L	0.025	0.022	0.024	0.032	0.028	0.026	**0.7**	**0.8**
Hg-T	mg/L	0.0000046	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.545	0.626	0.568	0.571	0.689	-	-	-
S-T	mg/L	32.9	30.2	34.2	38.5	37.3	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	17.7	18.4	19.0	20.8	21.9	-	-	-
Sr-T	mg/L	0.251	0.223	0.251	0.310	0.294	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0279	0.0407	0.0397	0.0318	0.031	0.0342	**0.05**	**0.1**
As-D	mg/L	0.00035	0.00047	0.00034	0.00029	0.00042	-	-	-
Ba-D	mg/L	0.0072	0.0075	0.0069	0.0077	0.0078	-	-	-
B-D	mg/L	0.088	0.095	0.096	0.134	0.113	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	34.4	31.0	32.9	42.1	36.7	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00067	0.00068	0.00058	0.00047	0.00053	-	-	-
Hard-D	mg/L	105	93	97.4	124	111	-	-	-
Fe-D	mg/L	0.0449	0.087	0.058	0.043	0.072	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	4.63	3.80	3.72	4.58	4.74	-	-	-
Mn-D	mg/L	0.0201	0.0147	0.0160	0.0254	0.0242	-	-	-
Hg-D	mg/L	0.0000021	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.607	0.579	0.544	0.636	0.66	-	-	-
S-D	mg/L	35.90	30.00	29.80	39.70	35.10	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	18.80	18.30	16.60	20.60	23.30	-	-	-
Sr-D	mg/L	0.25	0.2140	0.2510	0.3160	0.2800	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 101
2016-2017 Annual Report

EMS ID	E206619								
		Long Lake Middle 1 Metre From Bottom Depth							
Site Name	LLMB	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		13-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	138	133	132	134	132	134	**128**	-
Turb	NTU	0.89	0.70	0.59	0.54	0.61	-	-	-
Alk-T	mg/L	48.2	-	48.6	50.3	47.1	-	-	-
P-T	mg/L	0.0033	-	-	0.0031	0.003	-	-	-
Al-T	mg/L	0.0264	0.0278	0.0173	0.0225	0.0237	-	-	-
As-T	mg/L	0.00031	0.00029	0.00017	0.00031	0.0003	-	-	**0.005**
Ba-T	mg/L	0.0078	0.0076	0.0052	0.0078	0.0079	-	-	-
B-T	mg/L	0.122	0.131	0.074	0.111	0.128	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	41	46.9	29.1	44.5	48.4	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	**0.002**	**0.007**
Hard-T	mg/L	123	140	87.6	133	143	-	-	-
Fe-T	mg/L	0.075	0.060	0.042	0.053	0.069	-	-	**1.0**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	5.06	5.6	3.61	5.36	5.48	-	-	-
Mn-T	mg/L	0.063	0.0584	0.0378	0.0692	0.0817	0.062	**0.7**	**0.8**
Hg-T	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.609	0.696	0.429	0.66	0.717	-	-	-
S-T	mg/L	48.5	50.7	29.6	47	47.1	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	23.2	24	16.2	23.6	24.2	-	-	-
Sr-T	mg/L	0.336	0.327	0.215	0.327	0.36	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0236	0.0216	0.0203	0.0181	0.0171	0.0201	**0.05**	**0.1**
As-D	mg/L	0.00023	0.00025	0.00027	0.00026	0.00025	-	-	-
Ba-D	mg/L	0.0081	0.008	0.0073	0.0078	0.008	-	-	-
B-D	mg/L	0.128	0.12	0.128	0.11	0.125	-	-	-
Cd-D	mg/L	0.0000105	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000006	**0.000127**	**0.000288**
Ca-D	mg/L	45.3	45.3	45.9	47.3	43.8	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00048	0.00042	0.00041	0.00027	0.00043	-	-	-
Hard-D	mg/L	137	135	137	141	131	-	-	-
Fe-D	mg/L	0.0308	0.0317	0.027	0.0301	0.021	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	5.72	5.4	5.31	5.65	5.26	-	-	-
Mn-D	mg/L	0.0545	0.0488	0.0441	0.0486	0.0506	-	-	-
Hg-D	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.712	0.63	0.664	0.68	0.653	-	-	-
S-D	mg/L	55.4	49.8	44.5	49.2	49	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	25.7	25.3	23.6	27.7	22.6	-	-	-
Sr-D	mg/L	0.331	0.326	0.329	0.338	0.349	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 102
2016-2017 Annual Report

EMS ID	E206619								
		Long Lake Middle 1 Metre From Bottom Depth							
Site Name	LLMB	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	25-Aug-16	30-Aug-16	5x30 Average	Average	Max
Parameter	Unit						-		
SO4-D	mg/L	123	127	132	132	128	128	**128**	-
Turb	NTU	0.8	0.5	0.62	0.63	0.68	-	-	-
Alk-T	mg/L	-	48	-	-	-	-	-	-
P-T	mg/L	-	0.0047	-	-	-	-	**0.007**	-
Al-T	mg/L	0.0118	0.0177	0.0156	0.0116	0.0144	-	-	-
As-T	mg/L	0.0003	0.00034	0.00034	0.00028	0.00029	-	-	**0.005**
Ba-T	mg/L	0.0112	0.0094	0.0132	0.0122	0.0111	-	-	-
B-T	mg/L	0.126	0.124	0.146	0.127	0.129	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	48.5	43.2	53.2	48.4	44.1	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	<0.00050	<0.00050	0.00060	<0.00050	0.00052	**0.002**	**0.007**
Hard-T	mg/L	144	131	158	144	134	-	-	-
Fe-T	mg/L	0.061	0.042	0.047	0.05	0.048	-	-	**1.0**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	5.55	5.53	6.10	5.59	5.68	-	-	-
Mn-T	mg/L	0.461	0.174	0.497	0.733	0.472	0.467	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.61	0.694	0.746	0.618	0.699	-	-	-
S-T	mg/L	39.9	47.3	56.2	45.9	41.2	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00013	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	25.7	23.5	27.1	24.7	26.2	-	-	-
Sr-T	mg/L	0.346	0.320	0.394	0.342	0.342	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0117	0.0135	0.0094	0.0107	0.0082	0.0107	**0.05**	**0.1**
As-D	mg/L	0.0002	0.00029	0.00024	0.00029	0.00024	-	-	-
Ba-D	mg/L	0.0114	0.0088	0.0115	0.0122	0.0111	-	-	-
B-D	mg/L	0.123	0.114	0.115	0.122	0.126	-	-	-
Cd-D	mg/L	0.0000186	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000008	**0.000088**	**0.00017**
Ca-D	mg/L	45	41	44.7	47.7	48.2	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	<0.00020	0.00053	0.00034	0.00091	0.00044	-	-	-
Hard-D	mg/L	136	124	134	142	142	-	-	-
Fe-D	mg/L	0.0161	0.0118	0.0134	0.0113	0.0083	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	5.69	5.32	5.34	5.62	5.36	-	-	-
Mn-D	mg/L	0.422	0.137	0.405	0.62	0.431	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.684	0.687	0.684	0.63	0.673	-	-	-
S-D	mg/L	50.8	48.5	48	45.4	46.9	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	25.9	22.6	24.4	24.3	23.8	-	-	-
Sr-D	mg/L	0.337	0.332	0.342	0.339	0.352	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 103
2016-2017 Annual Report

EMS ID	E206619	Long Lake Middle 1 Metre From Bottom Depth						Water Quality Guidelines	
Site Name	LLMB	5 in 30 Weekly Samples							
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	22-Nov-16	5x30 Average	Average	Max
Parameter	Unit						-		
SO4-D	mg/L	132	131	130	130	133	131	**128**	-
Turb	NTU	5.26	11.10	5.09	3.35	2.61	-	-	-
Alk-T	mg/L	-	50.30	-	-	-	-	-	-
P-T	mg/L	-	0.004	-	-	-	-	-	-
Al-T	mg/L	0.0139	0.0121	0.0138	0.0095	0.0139	-	-	-
As-T	mg/L	0.00029	0.00028	0.00026	0.0003	0.00027	-	-	**0.005**
Ba-T	mg/L	0.0119	0.0099	0.0072	0.0061	0.0073	-	-	-
B-T	mg/L	0.120	0.101	0.126	0.111	0.126	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	48.5	43.7	43.1	46	44.7	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00056	0.00062	0.00072	0.00085	<0.00050	0.00065	**0.002**	**0.007**
Hard-T	mg/L	144	131	128	135	134	-	-	-
Fe-T	mg/L	0.06	0.061	0.044	0.026	0.037	-	-	**1.0**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	5.41	5.34	4.95	4.86	5.30	-	-	-
Mn-T	mg/L	0.998	1.02	0.327	0.156	0.148	0.530	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.673	0.666	0.571	0.658	0.639	-	-	-
S-T	mg/L	43.9	46.7	44.3	46.1	46.8	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	23.60	22.40	22.00	21.90	23.30	-	-	-
Sr-T	mg/L	0.338	0.34	0.315	0.3590	0.361	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0048	0.0044	0.0049	0.005	0.0052	0.0049	**0.05**	**0.1**
As-D	mg/L	0.00022	0.00019	0.00021	0.0002	0.00026	-	-	-
Ba-D	mg/L	0.0062	0.004	0.0044	0.0049	0.0057	-	-	-
B-D	mg/L	0.127	0.116	0.113	0.134	0.132	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	46.5	44.4	40.7	46.1	42.5	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00038	0.00039	0.00036	0.00031	0.00052	-	-	-
Hard-D	mg/L	139	133	121	136	129	-	-	-
Fe-D	mg/L	0.0056	<0.0050	<0.0050	0.0065	0.0054	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	5.66	5.28	4.69	5.07	5.52	-	-	-
Mn-D	mg/L	0.32	0.00	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.72	0.609	0.596	0.631	0.676	-	-	-
S-D	mg/L	47.50	44.60	40.10	41.90	47.60	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	24.6	23.2	21.1	22.3	24.4	-	-	-
Sr-D	mg/L	0.334	0.342	0.326	0.344	0.348	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 104
2016-2017 Annual Report

EMS ID	E206618								
Site Description		Middle Quinsam Lake 1 Metre Depth							
Site Name	MQL1	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		14-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	29.3	28.3	32.1	30.7	38.7	32	**128**	-
Chloro-a	ug/L	1	-	-	-	-	-	-	-
Turb	NTU	0.29	0.33	0.21	0.2	0.24	-	-	-
Alk-T	mg/L	37.1	-	31.5	-	-	-	-	-
P-T	mg/L	0.0029	-	-	-	-	-	-	-
Al-T	mg/L	0.0208	0.0218	0.0177	0.0165	0.0184	-	-	-
As-T	mg/L	0.00013	0.00016	0.00012	0.00013	0.00015	-	-	**0.005**
Ba-T	mg/L	0.0021	0.0032	0.0022	0.0023	0.0023	-	-	-
B-T	mg/L	<0.050	0.051	<0.050	<0.050	0.053	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	11.7	11.6	12.3	12.6	13.1	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00061	0.00112	0.00054	0.00056	0.00064	0.00069	**0.002**	**0.007**
Hard-T	mg/L	34.8	35	36.2	37.4	39.5	-	-	-
Fe-T	mg/L	0.03	0.028	0.031	0.038	0.033	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.33	1.42	1.35	1.46	1.65	-	-	-
Mn-T	mg/L	0.0039	0.0046	0.0047	0.0056	0.0069	0.005	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.233	0.247	0.227	0.232	0.262	-	-	-
S-T	mg/L	11.1	11.5	11.3	11.4	15.2	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	15.0	15.1	13.5	14.2	17.6	-	-	-
Sr-T	mg/L	0.0657	0.061	0.0651	0.0668	0.0728	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0175	0.0192	0.0175	0.0173	0.0157	0.0174	**0.05**	**0.1**
As-D	mg/L	0.00014	0.00019	0.00017	0.00015	0.00013	-	-	-
Ba-D	mg/L	0.0019	0.0021	0.0029	0.0022	0.0019	-	-	-
B-D	mg/L	0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	0.000008	<0.0000050	0.000006	**0.000127**	**0.000288**
Ca-D	mg/L	11.8	10.9	12.5	13	11.3	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00053	0.00069	0.00053	0.0004	0.00048	-	-	-
Hard-D	mg/L	34.9	32.3	36.7	38.5	33.5	-	-	-
Fe-D	mg/L	0.0115	0.0186	0.0165	0.0228	0.0064	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.32	1.26	1.34	1.48	1.29	-	-	-
Mn-D	mg/L	<0.0010	0.0018	<0.0010	0.0035	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.24	0.202	0.227	0.28	0.191	-	-	-
S-D	mg/L	10.9	10.4	9.9	11.5	6.9	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	14.5	14.9	13.6	16.9	12.7	-	-	-
Sr-D	mg/L	0.057	0.0544	0.0616	0.0616	0.0475	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	0.0064	<0.0050	-	-	-

Table 105
2016-2017 Annual Report

EMS ID	E206618								
Site Description		Middle Quinsam Lake 1 Metre Depth							
Site Name	MQL1	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	25-Aug-16	1-Sep-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	29.8	26.9	23.3	24.3	21.9	25	**128**	-
Chloro-a	ug/L	-	0.58	-	-	-	-	-	-
Turb	NTU	0.29	0.36	0.23	0.25	0.25	-	-	-
Alk-T	mg/L	-	32.9	-	-	-	-	-	-
P-T	mg/L	-	0.0036	-	-	-	-	**0.006**	-
Al-T	mg/L	0.0165	0.0141	0.0203	0.0134	0.0142	-	-	-
As-T	mg/L	0.00018	0.00019	0.00012	0.00019	0.0008	-	-	**0.005**
Ba-T	mg/L	0.0021	0.0018	0.0019	0.0016	0.0016	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	12.7	11	10.5	11	10.3	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	0.00068	0.00053	0.00114	0.00074	0.00072	**0.002**	**0.007**
Hard-T	mg/L	38.3	33.5	31.9	33.2	30.7	-	-	-
Fe-T	mg/L	0.061	0.052	0.065	0.045	0.033	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.58	1.45	1.36	1.37	1.2	-	-	-
Mn-T	mg/L	0.0068	0.0061	0.0049	0.0052	0.0048	0.006	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	0.0000042	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.149	0.194	0.202	0.189	0.162	-	-	-
S-T	mg/L	8	8.9	9.1	8.5	8.6	-	-	-
Se-T	mg/L	<0.00010	<0.00010	0.00014	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	15.1	13	11	12	11.3	-	-	-
Sr-T	mg/L	0.0641	0.0587	0.0513	0.0529	0.0485	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0169	0.0147	0.0138	0.0138	0.0113	0.0141	**0.05**	**0.1**
As-D	mg/L	0.00017	0.00018	0.0002	0.00018	0.00018	-	-	-
Ba-D	mg/L	0.0021	0.0018	0.0017	0.0017	0.0017	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	12.4	10.4	11.1	10.4	10.1	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00042	0.00049	0.0005	0.00142	0.00048	-	-	-
Hard-D	mg/L	37.4	31.8	33.2	31.4	30.1	-	-	-
Fe-D	mg/L	0.0278	0.0198	0.0279	0.0148	0.0142	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.57	1.40	1.3	1.3	1.19	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.189	0.222	0.191	0.173	0.183	-	-	-
S-D	mg/L	11.4	9	8.8	8.7	7.3	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	15.4	11.6	10.5	12.2	10.6	-	-	-
Sr-D	mg/L	0.0624	0.0558	0.0540	0.0538	0.0481	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 106
2016-2017 Annual Report

EMS ID	E206618								
Site Description		Middle Quinsam Lake 1 Metre Depth							
Site Name	MQL1	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	22-Nov-16	5x30 Average	Average	Max
Parameter	Units								
SO4-D	mg/L	38.70	26.30	7.66	24.60	32.00	26	**128**	-
Chloro-a	ug/L	-	1.14	-	-	-	-	-	-
Turb	NTU	0.36	0.72	1.41	0.50	0.40	-	-	-
Alk-T	mg/L	-	29	-	-	-	-	-	-
P-T	mg/L	-	0.0042	-	-	-	-	-	-
Al-T	mg/L	0.0247	0.0446	0.0635	0.0372	0.0405	-	-	-
As-T	mg/L	0.00017	0.00015	0.00016	0.00011	0.00013	-	-	**0.005**
Ba-T	mg/L	0.0029	0.0022	0.0014	0.0017	0.0019	-	-	-
B-T	mg/L	0.055	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	12.5	10.6	7.54	10.9	12.7	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00057	0.00072	0.00105	0.00069	0.00071	0.00075	**0.002**	**0.007**
Hard-T	mg/L	38.1	31.8	22.8	33.0	38.0	-	-	-
Fe-T	mg/L	0.051	0.058	0.053	0.03	0.036	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.65	1.32	0.962	1.38	1.56	-	-	-
Mn-T	mg/L	0.0072	0.0066	0.0064	0.0072	0.0069	0.007	**0.7**	**0.8**
Hg-T	mg/L	0.0000029	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	0.0018	0.0017	-	-	**0.025**
K-T	mg/L	0.289	0.206	0.126	0.173	0.201	-	-	-
S-T	mg/L	13.8	8.2	3.5	8.3	11.3	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	18	10.40	3.25	8.74	12.9	-	-	-
Sr-T	mg/L	0.0757	0.0527	0.0245	0.0479	0.0595	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0203	0.0260	0.0323	0.027	0.0282	0.0268	**0.05**	**0.1**
As-D	mg/L	0.00019	0.00014	0.00014	0.00011	0.00013	-	-	-
Ba-D	mg/L	0.0029	0.0021	0.0013	0.0017	0.0021	-	-	-
B-D	mg/L	0.053	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	12.9	10.3	7.7	11.5	12.6	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00061	0.00062	0.00073	0.0006	0.00066	-	-	-
Hard-D	mg/L	39	31	23	35	38	-	-	-
Fe-D	mg/L	0.0309	0.0212	0.0149	0.0155	0.0176	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.69	1.34	0.88	1.43	1.58	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	0.0028	0.0048	0.0051	-	-	-
Hg-D	mg/L	0.0000028	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	0.0016	0.0017	-	-	-
K-D	mg/L	0.276	0.200	0.119	0.178	0.213	-	-	-
S-D	mg/L	13.2	8.5	<3.0	8.0	11.8	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	17.7	10.6	3.1	9.0	13.3	-	-	-
Sr-D	mg/L	0.0766	0.0532	0.0226	0.0477	0.0619	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 107
2016-2017 Annual Report

EMS ID	E206618								
Site Description		Middle Quinsam Lake 4 Metre Depth							
Site Name	MQL4	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		14-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	26.2	27.6	30.3	30.3	38	30	**128**	-
Turb	NTU	0.25	0.28	0.24	0.19	0.21	-	-	-
Alk-T	mg/L	36.3	-	33.6	-	-	-	-	-
P-T	mg/L	0.0033	-	-	-	-	-	-	-
Al-T	mg/L	0.0207	0.0196	0.0181	0.0163	0.0149	-	-	-
As-T	mg/L	0.00012	0.00018	0.00012	0.00012	0.00014	-	-	**0.005**
Ba-T	mg/L	0.0021	0.0023	0.0021	0.0019	0.0024	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	0.052	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	11.4	11.4	11.3	12	12.7	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00054	0.00061	0.0006	0.00055	0.00054	0.00057	**0.002**	**0.007**
Hard-T	mg/L	33.8	34.3	33.7	35.6	38.2	-	-	-
Fe-T	mg/L	0.025	0.026	0.027	0.027	0.021	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.27	1.43	1.32	1.39	1.58	-	-	-
Mn-T	mg/L	0.0032	0.0044	0.0039	0.0048	0.0044	0.004	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.228	0.29	0.23	0.224	0.242	-	-	-
S-T	mg/L	10.2	8.5	11	11.8	14.8	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	14.1	15.1	14.1	13.5	17.1	-	-	-
Sr-T	mg/L	0.0577	0.0613	0.0615	0.0653	0.0755	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0202	0.0183	0.0165	0.0171	0.0152	0.0175	**0.05**	**0.1**
As-D	mg/L	0.00013	0.00015	0.0001	0.00013	0.00019	-	-	-
Ba-D	mg/L	0.0019	0.0019	0.0027	0.0026	0.0023	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	0.053	-	-	-
Cd-D	mg/L	<0.0000050	0.0000190	<0.0000050	<0.0000050	<0.0000050	0.000008	**0.000127**	**0.000288**
Ca-D	mg/L	11.3	11.8	12.2	13.4	13.7	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00069	0.00063	0.00053	0.00037	0.00048	-	-	-
Hard-D	mg/L	33.5	34.4	35.6	39.6	40.9	-	-	-
Fe-D	mg/L	0.0118	0.0201	0.0147	0.0203	0.0168	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.25	1.17	1.27	1.46	1.61	-	-	-
Mn-D	mg/L	<0.0010	0.0010	<0.0010	0.0027	0.0018	-	-	-
Hg-D	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.243	0.23	0.242	0.232	0.248	-	-	-
S-D	mg/L	9.8	9.5	13.2	11.4	15.8	-	-	-
Se-D	mg/L	<0.00010	0.00016	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	14.5	14.3	14.3	15.4	17	-	-	-
Sr-D	mg/L	0.0558	0.0542	0.0589	0.0620	0.0767	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 108
2016-2017 Annual Report

EMS ID	E206618								
Site Description		Middle Quinsam Lake 4 Metre Depth							
Site Name	MQL4	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	25-Aug-16	1-Sep-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	30.3	28	22.8	24.1	21.8	25	**128**	-
Turb	NTU	0.32	0.23	0.24	0.21	0.23	-	-	-
Alk-T	mg/L	-	33.1	-	-	-	-	-	-
P-T	mg/L	-	0.0034	-	-	-	-	**0.006**	-
Al-T	mg/L	0.0159	0.0149	0.0168	0.0184	0.0134	-	-	-
As-T	mg/L	0.00022	0.00018	0.00016	0.00019	0.00061	-	-	**0.005**
Ba-T	mg/L	0.0021	0.0018	0.0018	0.0016	0.0017	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	12.4	11.1	10.7	11	10.2	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00058	0.00093	0.00055	0.00075	0.00061	0.00068	**0.002**	**0.007**
Hard-T	mg/L	37.4	33.4	32.4	33.1	30.5	-	-	-
Fe-T	mg/L	0.061	0.055	0.04	0.045	0.034	-	-	**1**
Pb-T	mg/L	<0.00020	0.00023	<0.00020	<0.00020	<0.00020	0.00021	**0.003**	**0.005**
Mg-T	mg/L	1.54	1.39	1.36	1.34	1.23	-	-	-
Mn-T	mg/L	0.0072	0.0063	0.0043	0.0055	0.0048	0.006	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.174	0.196	0.19	0.195	0.176	-	-	-
S-T	mg/L	11.7	9.5	8.5	8.6	7.7	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	15.2	12.5	11	11.6	11.6	-	-	-
Sr-T	mg/L	0.063	0.0585	0.0503	0.0548	0.0488	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0166	0.015	0.0128	0.0129	0.0105	0.0136	**0.05**	**0.1**
As-D	mg/L	0.00017	0.00016	0.00019	0.0002	0.00017	-	-	-
Ba-D	mg/L	0.0020	0.0018	0.0018	0.0017	0.0017	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	12.7	10.5	11.1	10.8	10.3	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00037	0.00053	0.00042	0.0009	0.00044	-	-	-
Hard-D	mg/L	38	31.6	33.2	32.4	30.6	-	-	-
Fe-D	mg/L	0.028	0.0185	0.0281	0.0156	0.0129	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.54	1.32	1.3	1.32	1.2	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.174	0.205	0.186	0.172	0.183	-	-	-
S-D	mg/L	14.4	9.8	9.2	8.4	7.6	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	15.7	11.7	10.7	12.5	10.7	-	-	-
Sr-D	mg/L	0.0632	0.0565	0.0527	0.0544	0.0499	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 109
2016-2017 Annual Report

EMS ID	E206618								
Site Description		Middle Quinsam Lake 4 Metre Depth							
Site Name	MQL4	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	22-Nov-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	40.20	36.90	10.20	24.60	32.20	29	**128**	-
Turb	NTU	0.420	0.560	1.060	0.420	0.430	-	-	-
Alk-T	mg/L	-	34	-	-	-	-	-	-
P-T	mg/L	-	0.004	-	-	-	-	-	-
Al-T	mg/L	0.0236	0.0291	0.0616	0.0357	0.0394	-	-	-
As-T	mg/L	0.00016	0.00015	0.00014	0.00011	0.00013	-	-	**0.005**
Ba-T	mg/L	0.003	0.0025	0.0015	0.0016	0.0019	-	-	-
B-T	mg/L	0.059	0.051	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	12.1	12.7	7.9	10.8	12.6	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00052	0.00053	0.00083	0.0007	0.00076	0.00067	**0.002**	**0.007**
Hard-T	mg/L	37.0	38.4	23.7	32.6	37.9	-	-	-
Fe-T	mg/L	0.051	0.046	0.048	0.029	0.037	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.66	1.63	0.944	1.38	1.59	-	-	-
Mn-T	mg/L	0.006	0.006	0.006	0.007	0.007	0.006	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	0.0017	0.0018	-	-	**0.025**
K-T	mg/L	0.272	0.259	0.123	0.171	0.210	-	-	-
S-T	mg/L	14	13	3	8	12	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	17.2	15.0	3.8	8.7	13.3	-	-	-
Sr-T	mg/L	0.0731	0.0719	0.0266	0.0475	0.0616	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0201	0.0229	0.0322	0.0285	0.0277	0.0263	**0.05**	**0.1**
As-D	mg/L	0.00018	0.00015	0.00011	0.00012	0.00012	-	-	-
Ba-D	mg/L	0.0029	0.0027	0.0013	0.0017	0.0019	-	-	-
B-D	mg/L	0.057	0.051	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	12.8	11.9	8.5	10.8	12.5	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00052	0.00061	0.00063	0.00060	0.00061	-	-	-
Hard-D	mg/L	40.0	36.5	25.1	32.7	37.6	-	-	-
Fe-D	mg/L	0.0299	0.0245	0.0148	0.0154	0.0185	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.92	1.63	0.93	1.41	1.56	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	0.0025	0.0048	0.005	-	-	-
Hg-D	mg/L	0.0000054	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	0.0017	0.0017	-	-	-
K-D	mg/L	0.316	0.244	0.115	0.194	0.207	-	-	-
S-D	mg/L	13.6	11.8	3.0	10.1	11.6	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	19.5	14.8	4.0	9.4	13.2	-	-	-
Sr-D	mg/L	0.077	0.069	0.026	0.047	0.061	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 110
2016-2017 Annual Report

EMS ID	E206618								
Site Description		Middle Quinsam Lake 9 Metre Depth							
Site Name	MQL9	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		14-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	24.6	22.9	24.3	21.8	23.9	24	**128**	-
Turb	NTU	0.43	0.26	0.24	0.29	0.24	-	-	-
Alk-T	mg/L	35.6	-	32.5	-	-	-	-	-
P-T	mg/L	0.0028	-	-	-	-	-	-	-
Al-T	mg/L	0.0209	0.0203	0.0168	0.0156	0.0141	-	-	-
As-T	mg/L	0.00013	0.00012	0.00012	0.00014	0.00013	-	-	**0.005**
Ba-T	mg/L	0.0019	0.002	0.002	0.0018	0.0021	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	11.1	10.4	10.0	10.4	10.3	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00057	0.0006	0.00052	0.00053	0.00054	0.00055	**0.002**	**0.007**
Hard-T	mg/L	33	31.4	30	31.3	31	-	-	-
Fe-T	mg/L	0.026	0.017	0.014	0.016	0.012	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.3	1.33	1.21	1.28	1.31	-	-	-
Mn-T	mg/L	0.0022	0.0023	0.0012	0.0021	0.0015	0.002	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.206	0.202	0.18	0.197	0.199	-	-	-
S-T	mg/L	8.6	8.5	8.4	8.3	9.7	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	13.3	13.1	11.9	12.4	12.6	-	-	-
Sr-T	mg/L	0.053	0.0483	0.0477	0.0479	0.0492	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0196	0.0192	0.0184	0.0167	0.0183	0.0184	**0.05**	**0.1**
As-D	mg/L	0.00019	0.00017	0.00012	0.00016	0.00017	-	-	-
Ba-D	mg/L	0.0019	0.0018	0.0026	0.0022	0.0025	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000127**	**0.000288**
Ca-D	mg/L	10.8	11.1	10.7	10.7	13.4	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00058	0.00055	0.00051	0.00047	0.00051	-	-	-
Hard-D	mg/L	32	32.3	31.7	32.5	41.4	-	-	-
Fe-D	mg/L	0.0105	0.0113	0.0099	0.0107	0.0252	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.25	1.12	1.21	1.37	1.52	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0041	-	-	-
Hg-D	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.229	0.17	0.197	0.234	0.253	-	-	-
S-D	mg/L	7.4	8.5	7.3	7.2	11.8	-	-	-
Se-D	mg/L	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	13	12.9	12.2	14.6	16.5	-	-	-
Sr-D	mg/L	0.0493	0.0437	0.047	0.0454	0.0754	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 111
2016-2017 Annual Report

EMS ID	E206618								
Site Description		Middle Quinsam Lake 9 Metre Depth							
Site Name	MQL9	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	25-Aug-16	1-Sep-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	23.7	24	23.7	23.8	23.1	24	**128**	-
Turb	NTU	0.34	0.33	0.43	0.51	0.32	-	-	-
Alk-T	mg/L	-	35.3	-	-	-	-	-	-
P-T	mg/L	-	0.0055	-	-	-	-	**0.006**	-
Al-T	mg/L	0.0123	0.0103	0.013	0.0093	0.0088	-	-	-
As-T	mg/L	0.00015	0.00013	0.00011	0.00015	0.00029	-	-	**0.005**
Ba-T	mg/L	0.0019	0.002	0.0019	0.002	0.0021	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	11.9	10.6	10.7	10.8	10.6	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00053	0.00064	<0.00050	0.00066	0.00081	0.00063	**0.002**	**0.007**
Hard-T	mg/L	35.4	31.9	32.4	32.5	31.9	-	-	-
Fe-T	mg/L	0.037	0.035	0.032	0.036	0.017	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.4	1.33	1.39	1.34	1.29	-	-	-
Mn-T	mg/L	0.0063	0.0067	0.0077	0.0073	0.0036	0.006	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.167	0.157	0.166	0.172	0.151	-	-	-
S-T	mg/L	10.3	8.6	7.9	8.8	10	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	14.2	12.6	13.2	12.3	14	-	-	-
Sr-T	mg/L	0.0542	0.0517	0.0503	0.053	0.0504	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.012	0.0098	0.0071	0.0091	0.0055	0.0087	**0.05**	**0.1**
As-D	mg/L	0.00017	<0.00010	0.00014	0.00015	0.00011	-	-	-
Ba-D	mg/L	0.0020	0.0018	0.0021	0.002	0.0021	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	11.9	10.1	11.5	11.4	11	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00031	0.0006	0.00044	0.00057	0.00049	-	-	-
Hard-D	mg/L	35.8	30.4	34.2	33.7	32.6	-	-	-
Fe-D	mg/L	0.0151	0.0054	0.0066	<0.0050	0.0058	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.5	1.24	1.36	1.3	1.26	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.119	0.165	0.173	0.15	0.166	-	-	-
S-D	mg/L	11	8.1	8.9	8.1	8.2	-	-	-
Se-D	mg/L	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	14.7	12.2	12.8	13.4	12.6	-	-	-
Sr-D	mg/L	0.0517	0.0499	0.054	0.0512	0.0522	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 112
2016-2017 Annual Report

EMS ID	E206618								
Site Description		Middle Quinsam Lake 9 Metre Depth							
Site Name	MQL9	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	22-Nov-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	40.50	40.50	15.90	25.00	32.20	31	**128**	-
Turb	NTU	0.460	0.390	0.730	0.450	0.420	-	-	-
Alk-T	mg/L	-	34.8	-	-	-	-	-	-
P-T	mg/L	-	0.003	-	-	-	-	-	-
Al-T	mg/L	0.0248	0.0265	0.0459	0.036	0.0395	-	-	-
As-T	mg/L	0.00017	0.00018	0.00014	0.00012	0.00012	-	-	**0.005**
Ba-T	mg/L	0.0029	0.0027	0.0016	0.0016	0.0019	-	-	-
B-T	mg/L	0.056	0.054	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	12.6	14.1	9.1	10.9	12.2	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00054	0.00065	0.00075	0.00066	0.00077	0.00067	**0.002**	**0.007**
Hard-T	mg/L	38.4	42.9	27.4	32.8	37.1	-	-	-
Fe-T	mg/L	0.056	0.05	0.035	0.032	0.036	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.68	1.88	1.12	1.37	1.61	-	-	-
Mn-T	mg/L	0.0078	0.007	0.0055	0.0068	0.0072	0.007	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	0.0018	0.0018	-	-	**0.025**
K-T	mg/L	0.285	0.303	0.146	0.171	0.208	-	-	-
S-T	mg/L	13.8	14.6	5.6	8.3	12.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	17.9	17.6	5.91	8.98	13.6	-	-	-
Sr-T	mg/L	0.0776	0.0845	0.0354	0.0486	0.0605	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0192	0.02	0.0258	0.0284	0.0281	0.0243	**0.05**	**0.1**
As-D	mg/L	0.00015	0.00017	0.00012	0.00012	0.00012	-	-	-
Ba-D	mg/L	0.0028	0.0026	0.0015	0.0017	0.002	-	-	-
B-D	mg/L	0.054	0.053	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	13.40	12.90	9.77	10.70	12.80	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00052	0.00062	0.0006	0.00061	0.0006	-	-	-
Hard-D	mg/L	40.7	39.1	28.9	32.9	38.3	-	-	-
Fe-D	mg/L	0.031	0.022	0.014	0.016	0.018	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.77	1.68	1.10	1.50	1.53	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	0.0018	0.0050	0.005	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	0.0018	0.0017	-	-	-
K-D	mg/L	0.294	0.259	0.141	0.187	0.203	-	-	-
S-D	mg/L	13.90	13.10	4.70	9.30	11.80	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	17.8	15.8	6.1	10.0	13.1	-	-	-
Sr-D	mg/L	0.075	0.072	0.036	0.051	0.059	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 113
2016-2017 Annual Report

EMS ID	E206618								
Site Description		Middle Quinsam Lake 1 Metre from Bottom Depth							
Site Name	MQLB	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		14-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	23.1	22.8	23.8	22.2	24.9	23	**128**	-
Turb	NTU	0.36	0.29	0.34	0.3	0.27	-	-	-
Alk-T	mg/L	33.9	-	32.6	-	-	-	-	-
P-T	mg/L	0.0031	-	-	-	-	-	-	-
Al-T	mg/L	0.0209	0.0214	0.0166	0.015	0.0126	-	-	-
As-T	mg/L	0.00012	0.00011	0.00011	0.00013	0.00014	-	-	**0.005**
Ba-T	mg/L	0.0021	0.0021	0.002	0.0022	0.0022	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	11.3	10.6	10.3	10.9	10.9	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00055	0.00052	0.00053	0.00055	0.00054	0.00054	**0.002**	**0.007**
Hard-T	mg/L	33.6	31.8	30.9	32.9	32.9	-	-	-
Fe-T	mg/L	0.03	0.023	0.02	0.028	0.016	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.32	1.27	1.27	1.36	1.38	-	-	-
Mn-T	mg/L	0.0038	0.0036	0.0027	0.0046	0.0017	0.003	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.193	0.173	0.18	0.211	0.202	-	-	-
S-T	mg/L	8	7.7	8.9	8.4	9.6	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	11.9	12.2	12	12.6	13.1	-	-	-
Sr-T	mg/L	0.0488	0.0491	0.0469	0.0499	0.0507	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.023	0.0184	0.0175	0.016	0.0154	0.0181	**0.05**	**0.1**
As-D	mg/L	0.00014	0.00015	0.00015	0.00017	0.0001	-	-	-
Ba-D	mg/L	0.0022	0.0019	0.0022	0.0026	0.0024	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000061	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000127**	**0.000288**
Ca-D	mg/L	11.4	10.6	10.8	11.9	11.2	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00064	0.00058	0.00057	0.00042	0.00051	-	-	-
Hard-D	mg/L	34	31.4	32.1	35.2	33.5	-	-	-
Fe-D	mg/L	0.0116	0.0137	0.012	0.0147	0.0082	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.36	1.20	1.27	1.34	1.34	-	-	-
Mn-D	mg/L	0.0014	0.0012	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.211	0.193	0.206	0.204	0.21	-	-	-
S-D	mg/L	9.3	11.6	9.2	9.0	9.3	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	0.00015	<0.00010	-	-	-
Na-D	mg/L	12.2	11.8	12.1	14.2	13.2	-	-	-
Sr-D	mg/L	0.0471	0.0444	0.0458	0.0461	0.0502	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 114
2016-2017 Annual Report

EMS ID	E206618								
Site Description		Middle Quinsam Lake 1 Metre from Bottom Depth							
Site Name	MQLB	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	25-Aug-16	1-Sep-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	22.3	24	23.6	24	23.7	24	**128**	-
Turb	NTU	0.64	1.2	1.29	1.33	0.65	-	-	-
Alk-T	mg/L	-	36	-	-	-	-	-	-
P-T	mg/L	-	0.0059	-	-	-	-	**0.006**	-
Al-T	mg/L	0.009	0.0081	0.0113	0.008	0.0076	-	-	-
As-T	mg/L	<0.00010	0.00019	0.00018	0.00019	0.00034	-	-	**0.005**
Ba-T	mg/L	0.0024	0.0027	0.0028	0.0029	0.0028	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	11.6	11.2	12.2	11.8	11.4	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	0.00063	<0.00050	0.00069	0.00062	0.00059	**0.002**	**0.007**
Hard-T	mg/L	34.8	34	36.6	36	34.5	-	-	-
Fe-T	mg/L	0.078	0.177	0.194	0.231	0.075	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.4	1.49	1.51	1.59	1.48	-	-	-
Mn-T	mg/L	0.0281	0.073	0.0976	0.159	0.0888	0.089	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.145	0.204	0.212	0.212	0.203	-	-	-
S-T	mg/L	6.7	8.9	8.6	8.6	7.5	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	14.2	13.7	13.8	14.2	14	-	-	-
Sr-T	mg/L	0.052	0.0533	0.0531	0.0546	0.0530	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0093	0.0078	0.0079	0.0063	0.0047	0.0072	**0.05**	**0.1**
As-D	mg/L	0.00016	0.00012	0.00016	0.00014	0.00011	-	-	-
Ba-D	mg/L	0.0024	0.0026	0.0029	0.0029	0.0027	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	11.5	10.3	11.8	11.9	11.6	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00032	0.00063	0.00049	0.00093	0.00052	-	-	-
Hard-D	mg/L	35.2	31.7	35.6	35.9	34.9	-	-	-
Fe-D	mg/L	0.0293	0.0453	0.0498	0.0316	0.0319	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.57	1.44	1.47	1.5	1.46	-	-	-
Mn-D	mg/L	0.0233	0.0568	0.0858	0.131	0.0706	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.164	0.191	0.219	0.187	0.209	-	-	-
S-D	mg/L	9.7	7.4	10.2	8.1	8.2	-	-	-
Se-D	mg/L	<0.00010	0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	14.9	12.8	13.2	14.6	13.6	-	-	-
Sr-D	mg/L	0.0506	0.0514	0.0551	0.0557	0.054	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 115
2016-2017 Annual Report

EMS ID	E206618								
Site Description		Middle Quinsam Lake 1 Metre from Bottom Depth							
Site Name	MQLB	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	22-Nov-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	38.40	40.00	17.00	24.40	32.50	30	**128**	-
Turb	NTU	0.36	0.35	0.72	0.47	0.42	-	-	-
Alk-T	mg/L	-	35.7	-	-	-	-	-	-
P-T	mg/L	-	0.004	-	-	-	-	-	-
Al-T	mg/L	0.0242	0.0255	0.0430	0.0419	0.0379	-	-	-
As-T	mg/L	0.00019	0.00017	0.00015	0.00013	0.00011	-	-	**0.005**
Ba-T	mg/L	0.003	0.0027	0.0017	0.0016	0.0019	-	-	-
B-T	mg/L	0.059	0.056	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	12.4	13.0	9.5	10.5	12.4	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00051	0.00056	0.00074	0.00065	0.00079	0.00065	**0.002**	**0.007**
Hard-T	mg/L	38	40	29	32	38	-	-	-
Fe-T	mg/L	0.049	0.045	0.037	0.030	0.038	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.71	1.73	1.17	1.34	1.62	-	-	-
Mn-T	mg/L	0.006	0.007	0.005	0.007	0.007	0.006	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	0.0018	0.0019	-	-	**0.025**
K-T	mg/L	0.275	0.272	0.154	0.172	0.224	-	-	-
S-T	mg/L	13.7	12.7	5.8	8.2	11.5	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	17.5	16.2	6.4	8.87	13.4	-	-	-
Sr-T	mg/L	0.0761	0.0767	0.0377	0.0476	0.0632	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0187	0.0210	0.0241	0.0291	0.0275	0.0241	**0.05**	**0.1**
As-D	mg/L	0.00017	0.00016	<0.00010	0.00011	0.00011	-	-	-
Ba-D	mg/L	0.0029	0.0027	0.0016	0.0016	0.002	-	-	-
B-D	mg/L	0.052	0.053	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	14.2	12.7	10.4	11.0	12.7	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00047	0.00070	0.00067	0.00063	0.00066	-	-	-
Hard-D	mg/L	43	39	31	33	38	-	-	-
Fe-D	mg/L	0.032	0.026	0.016	0.017	0.017	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.82	1.73	1.19	1.42	1.59	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	0.00	0.00	0.01	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	0.0018	0.0018	-	-	-
K-D	mg/L	0.295	0.257	0.160	0.18	0.213	-	-	-
S-D	mg/L	14.4	13.0	5.8	9.3	12.2	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	18.0	16.2	6.7	9.6	13.4	-	-	-
Sr-D	mg/L	0.0757	0.0743	0.0362	0.0480	0.0620	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 116
2016-2017 Annual Report

EMS ID	E292118								
Site Description		Lower Quinsam Lake 1 Metre Depth							
Site Name	LQL1	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		14-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	15.6	15.0	16.8	16.9	20.4	17	**128**	-
Chloro-a	ug/L	1.04					-	-	-
Turb	NTU	0.52	0.41	0.3	0.29	0.39	-	-	-
Alk-T	mg/L	29.8	-	29.1	-	-	-	-	-
P-T	mg/L	0.0044	-	-	-	-	-	-	-
Al-T	mg/L	0.0359	0.0412	0.0292	0.026	0.0226	-	-	-
As-T	mg/L	0.00044	0.00049	0.00045	0.00045	0.00052	-	-	**0.0050**
Ba-T	mg/L	0.0032	0.0033	0.0033	0.0032	0.0033	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	9.3	10.5	9.99	9.73	9.8	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00068	0.00072	0.00067	0.00067	0.00083	0.00071	**0.002**	**0.007**
Hard-T	mg/L	27.9	30.9	29.5	28.9	29.6	-	-	-
Fe-T	mg/L	0.07	0.078	0.064	0.071	0.063	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.13	1.17	1.11	1.11	1.23	-	-	-
Mn-T	mg/L	0.0063	0.0061	0.0043	0.0049	0.0051	0.005	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.184	0.233	0.202	0.2	0.217	-	-	-
S-T	mg/L	5.9	6.1	6.1	6.7	6.8	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	7.1	8.16	7.87	7.5	8.79	-	-	-
Sr-T	mg/L	0.0442	0.0472	0.0452	0.0479	0.0506	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0309	0.0306	0.0258	0.023	0.0228	0.0266	**0.05**	**0.1**
As-D	mg/L	0.00048	0.00044	0.00047	0.00049	0.00051	-	-	-
Ba-D	mg/L	0.0029	0.003	0.0033	0.0036	0.0034	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000073	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000127**	**0.000288**
Ca-D	mg/L	10.4	9.9	10.4	10.40	10.8	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00063	0.00065	0.00065	0.00045	0.00058	-	-	-
Hard-D	mg/L	30.5	29.1	30.3	31	32.1	-	-	-
Fe-D	mg/L	0.0413	0.0545	0.0507	0.0507	0.0401	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.09	1.07	1.07	1.24	1.26	-	-	-
Mn-D	mg/L	0.0012	0.0034	<0.0010	0.0011	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.204	0.192	0.218	0.222	0.228	-	-	-
S-D	mg/L	5	8.2	6.3	6.5	6.6	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	-	-	-
Na-D	mg/L	6.89	8.12	7.74	8.98	8.38	-	-	-
Sr-D	mg/L	0.0421	0.0401	0.0451	0.0451	0.0501	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 117
2016-2017 Annual Report

EMS ID	E292118								
Site Description		Lower Quinsam Lake 1 Metre Depth							
Site Name	LQL1	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	25-Aug-16	31-Aug-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	20.7	22	23.3	22.6	21.8	22	**128.0**	-
Chloro-a	ug/L		0.97				-	-	-
Turb	NTU	0.30	0.27	0.27	0.26	0.27	-	-	-
Alk-T	mg/L	-	34.3	-	-	-	-	-	-
P-T	mg/L	-	0.0087	-	-	-	-	**0.006**	-
Al-T	mg/L	0.0123	0.0181	0.0101	0.0091	0.0069	-	-	-
As-T	mg/L	0.00064	0.00057	0.0007	0.00066	0.00063	-	-	**0.0050**
Ba-T	mg/L	0.0038	0.0037	0.0042	0.0036	0.0036	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	13.2	12.7	14.2	12	12	-	-	-
Cr-T	mg/L	0.0027	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00052	<0.00050	<0.00050	0.00132	0.00058	0.00068	**0.002**	**0.007**
Hard-T	mg/L	39.2	37.8	42.3	35.8	35.8	-	-	-
Fe-T	mg/L	0.254	0.053	0.051	0.043	0.033	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.49	1.49	1.67	1.43	1.4	-	-	-
Mn-T	mg/L	0.0087	0.0049	0.0049	0.0049	0.0035	0.005	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	0.0000024	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	0.0070	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.2	0.223	0.244	0.19	0.224	-	-	-
S-T	mg/L	5.3	8.8	9.2	7.3	8.2	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	10.2	9.67	10.9	10.4	10.2	-	-	-
Sr-T	mg/L	0.0571	0.0575	0.0697	0.0589	0.0597	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0099	0.017	0.0116	0.0082	0.0103	0.0114	**0.05**	**0.1**
As-D	mg/L	0.00068	0.00066	0.00081	0.00062	0.00063	-	-	-
Ba-D	mg/L	0.0039	0.0038	0.0039	0.004	0.0036	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	0.053	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	0.0000060	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	12.7	11.8	13.1	12.6	12.2	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00046	0.00093	0.00088	0.0005	0.00036	-	-	-
Hard-D	mg/L	38.4	35.5	39	37.4	36.9	-	-	-
Fe-D	mg/L	0.0386	0.038	0.0405	0.0161	0.0204	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.59	1.47	1.52	1.41	1.53	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.234	0.214	0.195	0.191	0.083	-	-	-
S-D	mg/L	8.6	5	9.6	6.9	8.1	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	10.3	9.53	10.3	10.3	10.8	-	-	-
Sr-D	mg/L	0.0598	0.059	0.061	0.0585	0.0537	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 118
2016-2017 Annual Report

EMS ID	E292118								
Site Description		Lower Quinsam Lake 1 Metre Depth							
Site Name	LQL1	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	21-Nov-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	11.00	12.60	10.50	12.90	15.80	13	**128.0**	-
Chloro-a	ug/L		1.02				-	-	-
Turb	NTU	2.65	10.80	5.37	1.49	1.23	-	-	-
Alk-T	mg/L	-	25.200	-	-	-	-	-	-
P-T	mg/L	-	0.022	-	-	-	-	-	-
Al-T	mg/L	0.1490	0.3740	0.2220	0.1130	0.0808	-	-	-
As-T	mg/L	0.0005	0.0007	0.0005	0.0003	0.0004	-	-	**0.0050**
Ba-T	mg/L	0.0046	0.0048	0.0041	0.0046	0.0032	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	0.000016	0.000025	0.000014	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	9.24	8.19	8.93	8.43	9.59	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00141	0.00195	0.00175	0.00088	0.00088	0.00137	**0.002**	**0.007**
Hard-T	mg/L	28.1	25	26.6	25.5	28.8	-	-	-
Fe-T	mg/L	0.205	0.587	0.295	0.094	0.123	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.22	1.10	1.04	1.07	1.18	-	-	-
Mn-T	mg/L	0.009	0.0203	0.0092	0.0062	0.0081	0.011	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	0.0000021	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.282	0.269	0.215	0.164	0.198	-	-	-
S-T	mg/L	4.3	3.8	3.1	4.5	5.4	-	-	-
Se-T	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	5.3	4.9	4.3	4.6	5.6	-	-	-
Sr-T	mg/L	0.0384	0.0365	0.0338	0.0348	0.0409	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.079	0.0813	0.0636	0.0463	0.0455	**0.0631**	**0.05**	**0.1**
As-D	mg/L	0.00047	0.00041	0.00026	0.00028	0.00037	-	-	-
Ba-D	mg/L	0.0037	0.004	0.0032	0.0026	0.0032	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000077	0.0000150	0.0000060	<0.0000050	<0.0000050	0.000008	**0.000088**	**0.00017**
Ca-D	mg/L	8.9	8.0	7.5	9.0	9.4	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00097	0.00128	0.00084	0.00075	0.00082	-	-	-
Hard-D	mg/L	26.9	24.4	22.4	26.8	28.3	-	-	-
Fe-D	mg/L	0.0862	0.083	0.046	0.048	0.063	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.16	1.04	0.89	1.09	1.21	-	-	-
Mn-D	mg/L	0.0052	0.0045	0.0016	0.0034	0.0053	-	-	-
Hg-D	mg/L	0.0000028	0.0000024	0.0000024	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.269	0.238	0.175	0.176	0.221	-	-	-
S-D	mg/L	3.80	3.90	<3.0	4.50	5.70	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	4.8	5.2	3.6	4.9	5.7	-	-	-
Sr-D	mg/L	0.0373	0.0369	0.0298	0.0326	0.0415	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 119
2016-2017 Annual Report

EMS ID	E292118								
Site Description		Lower Quinsam Lake 4 Metre Depth							
Site Name	LQL4	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		14-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	14.6	15.8	18.9	16.4	19.6	17	**128**	-
Turb	NTU	0.48	0.52	0.38	0.29	0.35	-	-	-
Alk-T	mg/L	29.1	-	30.2	-	-	-	-	-
P-T	mg/L	0.0034	-	-	-	-	-	-	-
Al-T	mg/L	0.0504	0.0374	0.0289	0.0257	0.0246	-	-	-
As-T	mg/L	0.00046	0.00057	0.00047	0.00048	0.00053	-	-	**0.005**
Ba-T	mg/L	0.0031	0.0029	0.0032	0.0031	0.0035	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	0.000017	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	9.18	10.2	10.4	10.3	10.6	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.0007	<0.00050	0.0006	0.00072	0.0007	0.00064	**0.002**	**0.007**
Hard-T	mg/L	27.6	30.9	30.8	30.5	31.5	-	-	-
Fe-T	mg/L	0.07	0.062	0.073	0.069	0.068	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.13	1.3	1.20	1.16	1.24	-	-	-
Mn-T	mg/L	0.0063	0.006	0.0042	0.0047	0.0052	0.005	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.173	0.205	0.203	0.210	0.216	-	-	-
S-T	mg/L	4.8	5.4	7.9	6.3	7.4	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	7.05	8.48	8.51	8.01	9.13	-	-	-
Sr-T	mg/L	0.0437	0.0469	0.048	0.0474	0.0516	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.03	0.0272	0.0262	0.024	0.0235	0.0262	**0.05**	**0.1**
As-D	mg/L	0.00045	0.00049	0.00048	0.00046	0.00044	-	-	-
Ba-D	mg/L	0.0028	0.0033	0.0036	0.0035	0.0038	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000059	<0.0000050	0.0000060	<0.0000050	0.0000050	0.000005	**0.000127**	**0.000288**
Ca-D	mg/L	9.84	9.9	10.9	10.3	11.2	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00065	0.00058	0.00062	0.00053	0.00052	-	-	-
Hard-D	mg/L	29.2	29.1	31.6	30.7	33	-	-	-
Fe-D	mg/L	0.0406	0.0438	0.0507	0.0531	0.0382	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.13	1.07	1.07	1.17	1.2	-	-	-
Mn-D	mg/L	0.0014	0.0023	<0.0010	0.0015	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.219	0.205	0.218	0.229	0.229	-	-	-
S-D	mg/L	7.2	6.4	6.6	6.4	4.9	-	-	-
Se-D	mg/L	<0.00010	0.00014	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	7.26	8.16	8.58	8.82	9.0	-	-	-
Sr-D	mg/L	0.0416	0.0399	0.0462	0.0441	0.0493	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 120
2016-2017 Annual Report

EMS ID	E292118								
Site Description		Lower Quinsam Lake 4 Metre Depth							
Site Name	LQL4	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	25-Aug-16	31-Aug-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	21.1	21.6	22.9	23	21.8	22	**128**	-
Turb	NTU	0.31	0.33	0.28	0.29	0.31	-	-	-
Alk-T	mg/L	-	34.1	-	-	-	-	-	-
P-T	mg/L	-	0.0047	-	-	-	-	-	-
Al-T	mg/L	0.0113	0.0156	0.0101	0.0089	0.0067	-	-	-
As-T	mg/L	0.00063	0.00056	0.00073	0.00061	0.0007	-	-	**0.005**
Ba-T	mg/L	0.0039	0.0038	0.0042	0.0036	0.0036	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	13.2	12.6	14.9	12.3	12.1	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	0.00066	<0.00050	0.00060	<0.00050	0.00055	**0.002**	**0.007**
Hard-T	mg/L	39.1	37.6	44.4	36.5	35.9	-	-	-
Fe-T	mg/L	0.116	0.048	0.051	0.044	0.032	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.47	1.5	1.73	1.42	1.42	-	-	-
Mn-T	mg/L	0.0071	0.0039	0.0048	0.0046	0.0036	0.005	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	0.0017	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.229	0.225	0.242	0.189	0.223	-	-	-
S-T	mg/L	4.8	9	9.5	7.1	8.2	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	10.8	9.97	11.4	10.5	10.3	-	-	-
Sr-T	mg/L	0.0584	0.0576	0.0712	0.0575	0.0598	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0124	0.0123	0.0104	0.0066	0.0105	0.0104	**0.05**	**0.1**
As-D	mg/L	0.00058	0.00068	0.00076	0.00062	0.00064	-	-	-
Ba-D	mg/L	0.0039	0.0039	0.0038	0.0037	0.0037	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	0.054	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	13	12	12.7	12.2	12.2	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00031	0.00055	0.00076	0.0005	0.00032	-	-	-
Hard-D	mg/L	39.2	36.1	38.1	36.5	36.6	-	-	-
Fe-D	mg/L	0.0527	0.0319	0.0408	0.0161	0.0208	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.62	1.46	1.56	1.48	1.5	-	-	-
Mn-D	mg/L	0.0023	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.193	0.205	0.212	0.202	0.095	-	-	-
S-D	mg/L	9.3	6.9	7.6	8	9.7	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	10.8	9.48	10.4	10.8	10.7	-	-	-
Sr-D	mg/L	0.0595	0.0589	0.0599	0.0611	0.0564	-	-	-
Zn-D	mg/L	0.0051	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 121
2016-2017 Annual Report

EMS ID	E292118								
Site Description		Lower Quinsam Lake 4 Metre Depth							
Site Name	LQL4	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	21-Nov-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	11.20	12.60	10.10	14.00	16.30	13	**128**	-
Turb	NTU	2.730	12.000	5.820	1.310	1.160	-	-	-
Alk-T	mg/L	-	23.300	-	-	-	-	-	-
P-T	mg/L	-	0.025	-	-	-	-	-	-
Al-T	mg/L	0.163	0.46	0.2250	0.0691	0.0796	-	-	-
As-T	mg/L	0.00054	0.00085	0.00049	0.00035	0.00045	-	-	**0.005**
Ba-T	mg/L	0.0043	0.0055	0.0039	0.003	0.0031	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	0.000012	0.000028	0.000012	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	9.16	8.64	8.31	9.22	9.57	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00122	0.00207	0.00152	0.00082	0.00126	0.00138	**0.002**	**0.007**
Hard-T	mg/L	27.6	26.3	24.8	27.6	28.9	-	-	-
Fe-T	mg/L	0.235	0.748	0.285	0.106	0.131	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.14	1.14	0.99	1.11	1.22	-	-	-
Mn-T	mg/L	0.0094	0.0236	0.0093	0.0064	0.0084	0.011	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	0.0000022	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.276	0.3	0.192	0.164	0.198	-	-	-
S-T	mg/L	4.3	4.7	3.2	4.8	5.3	-	-	-
Se-T	mg/L	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	4.7	4.99	3.92	4.95	5.61	-	-	-
Sr-T	mg/L	0.0383	0.0399	0.0316	0.0358	0.0412	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0797	0.081	0.0604	0.0461	0.0453	0.0625	**0.05**	**0.1**
As-D	mg/L	0.00046	0.00044	0.00032	0.00034	0.0004	-	-	-
Ba-D	mg/L	0.0037	0.004	0.0029	0.0026	0.0032	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000103	0.0000130	0.0000070	<0.0000050	0.0000050	0.000008	**0.000088**	**0.00017**
Ca-D	mg/L	8.86	8.05	7.24	9.43	8.92	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00096	0.00096	0.00094	0.00077	0.00072	-	-	-
Hard-D	mg/L	26.7	24.3	22.3	28.3	27.2	-	-	-
Fe-D	mg/L	0.0913	0.085	0.050	0.052	0.059	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.11	1.02	1.03	1.15	1.19	-	-	-
Mn-D	mg/L	0.005	0.0046	0.0023	0.0034	0.0054	-	-	-
Hg-D	mg/L	<0.0000020	0.0000020	0.0000024	<0.0000020	0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.247	0.240	0.207	0.184	0.185	-	-	-
S-D	mg/L	4.20	4.20	3.60	5.00	5.40	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	4.5	5.1	4.1	5.3	5.7	-	-	-
Sr-D	mg/L	0.0362	0.0374	0.0342	0.0331	0.0400	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 122
2016-2017 Annual Report

EMS ID	E292118								
Site Description		Lower Quinsam Lake 9 Metre Depth							
Site Name	LQL9	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		14-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	14.4	15.2	16.6	16.2	18.1	16	**128**	-
Turb	NTU	0.5	0.47	0.28	0.25	0.37	-	-	-
Alk-T	mg/L	28.8	-	29.2	-	-	-	-	-
P-T	mg/L	0.0028	-	-	-	-	-	-	-
Al-T	mg/L	0.0346	0.0376	0.0278	0.026	0.0241	-	-	-
As-T	mg/L	0.00044	0.00051	0.00045	0.0005	0.00053	-	-	**0.005**
Ba-T	mg/L	0.0030	0.0029	0.003	0.0031	0.0033	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	9.2	10.1	9.57	10.4	9.95	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00067	0.00054	0.00057	0.00062	0.00065	0.00061	**0.002**	**0.007**
Hard-T	mg/L	27.6	29.9	28.4	30.9	29.8	-	-	-
Fe-T	mg/L	0.074	0.06	0.052	0.055	0.07	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.12	1.12	1.08	1.18	1.2	-	-	-
Mn-T	mg/L	0.0065	0.006	0.0032	0.0052	0.0068	0.006	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.183	0.234	0.194	0.205	0.201	-	-	-
S-T	mg/L	4.5	5.8	7	6.3	6.8	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	6.77	8.24	7.34	8.17	8.42	-	-	-
Sr-T	mg/L	0.0442	0.0435	0.0435	0.0472	0.0489	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0315	0.0269	0.0287	0.0247	0.0226	0.0269	**0.05**	**0.1**
As-D	mg/L	0.00041	0.00045	0.00051	0.00047	0.00046	-	-	-
Ba-D	mg/L	0.0029	0.0031	0.0032	0.0034	0.0033	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000068	0.0000050	0.0000070	0.000006	<0.0000050	0.000006	**0.000127**	**0.000288**
Ca-D	mg/L	10.1	9.89	10.3	11	10.5	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00078	0.00073	0.00063	0.00052	0.00053	-	-	-
Hard-D	mg/L	30.2	29.3	30.1	32.3	31.1	-	-	-
Fe-D	mg/L	0.04	0.046	0.0424	0.0481	0.0416	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.19	1.13	1.05	1.16	1.17	-	-	-
Mn-D	mg/L	0.0028	0.0033	0.0012	0.0016	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.208	0.19	0.222	0.244	0.205	-	-	-
S-D	mg/L	5.4	5.8	7.3	6.7	5.5	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	7.27	7.59	7.41	8.91	7.94	-	-	-
Sr-D	mg/L	0.0419	0.0389	0.0425	0.044	0.0462	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 123
2016-2017 Annual Report

EMS ID	E292118								
Site Description		Lower Quinsam Lake 9 Metre Depth							
Site Name	LQL9	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	25-Aug-16	31-Aug-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	16.6	17.4	17.9	17.5	17.1	17	**128**	-
Turb	NTU	0.53	0.44	0.36	0.42	0.34	-	-	-
Alk-T	mg/L	-	30.5	-	-	-	-	-	-
P-T	mg/L	-	0.0049	-	-	-	-	-	-
Al-T	mg/L	0.0159	0.015	0.0161	0.0124	0.0114	-	-	-
As-T	mg/L	0.00055	0.00042	0.0006	0.00053	0.00055	-	-	**0.005**
Ba-T	mg/L	0.0033	0.0035	0.0039	0.0034	0.0034	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	11.4	10.8	12.7	10.5	10.6	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	0.00082	0.00093	0.00089	0.00059	0.00075	**0.002**	**0.007**
Hard-T	mg/L	34.0	32.3	37.3	31.5	31.4	-	-	-
Fe-T	mg/L	0.087	0.068	0.078	0.074	0.062	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.34	1.26	1.36	1.26	1.22	-	-	-
Mn-T	mg/L	0.0116	0.0083	0.0123	0.0136	0.0091	0.011	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.196	0.225	0.234	0.208	0.222	-	-	-
S-T	mg/L	5.7	8.4	7.6	6.4	6.7	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	9.06	8.6	8.63	9.11	8.59	-	-	-
Sr-T	mg/L	0.0494	0.0479	0.0592	0.0505	0.0489	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0158	0.0136	0.013	0.0112	0.0107	0.0129	**0.05**	**0.1**
As-D	mg/L	0.00051	0.00053	0.00058	0.0005	0.00057	-	-	-
Ba-D	mg/L	0.0033	0.0034	0.0035	0.0035	0.0034	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	11.1	10.1	11.3	11	10.7	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.0003	0.00072	0.00085	0.00066	0.00044	-	-	-
Hard-D	mg/L	33.6	30.3	33.3	32.5	32.1	-	-	-
Fe-D	mg/L	0.0504	0.0419	0.0519	0.035	0.0443	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.42	1.24	1.23	1.25	1.29	-	-	-
Mn-D	mg/L	0.0027	0.0011	0.0011	<0.0010	0.0024	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.185	0.199	0.201	0.195	0.107	-	-	-
S-D	mg/L	7.8	3.2	5.7	5.8	7.8	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	9.53	8.17	8.39	8.73	8.82	-	-	-
Sr-D	mg/L	0.0484	0.0487	0.0490	0.0511	0.0475	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 124
2016-2017 Annual Report

EMS ID	E292118								
Site Description		Lower Quinsam Lake 9 Metre Depth							
Site Name	LQL9	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	21-Nov-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	11.30	12.80	10.10	14.10	15.50	13	**128**	-
Turb	NTU	2.8	13.2	5.4	1.4	1.2	-	-	-
Alk-T	mg/L	-	25.2	-	-	-	-	-	-
P-T	mg/L	-	0.0256	-	-	-	-	-	-
Al-T	mg/L	0.145	0.445	0.2350	0.105	0.0815	-	-	-
As-T	mg/L	0.00053	0.00085	0.00045	0.00035	0.0004	-	-	**0.005**
Ba-T	mg/L	0.0042	0.0056	0.0035	0.0031	0.0032	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	0.00001	0.000031	0.000013	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	10.00	9.01	7.97	8.71	9.17	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.0012	0.00212	0.00158	0.00084	0.00097	0.00134	**0.002**	**0.007**
Hard-T	mg/L	29.5	27.4	23.8	26.4	28.0	-	-	-
Fe-T	mg/L	0.231	0.768	0.321	0.093	0.128	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.08	1.20	0.96	1.12	1.23	-	-	-
Mn-T	mg/L	0.0084	0.0254	0.0095	0.0065	0.0085	0.012	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	0.0000022	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.254	0.292	0.175	0.165	0.201	-	-	-
S-T	mg/L	3.90	4.30	<3.0	5.00	5.30	-	-	-
Se-T	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	4.39	5.23	3.84	5.09	5.65	-	-	-
Sr-T	mg/L	0.0353	0.0406	0.0301	0.0357	0.0408	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0809	0.083	0.0601	0.0444	0.0469	**0.0631**	**0.05**	**0.1**
As-D	mg/L	0.00047	0.0004	0.00027	0.00039	0.00038	-	-	-
Ba-D	mg/L	0.0038	0.004	0.0028	0.0026	0.0032	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000071	0.0000100	0.0000070	<0.0000050	0.0000060	0.000007	**0.000088**	**0.00017**
Ca-D	mg/L	9.8	8.0	7.2	8.4	9.2	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00096	0.00099	0.00085	0.00071	0.00077	-	-	-
Hard-D	mg/L	29.2	24.2	21.6	25.7	27.8	-	-	-
Fe-D	mg/L	0.097	0.082	0.046	0.043	0.062	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.15	1.04	0.89	1.14	1.21	-	-	-
Mn-D	mg/L	0.0049	0.0040	0.0018	0.0033	0.0058	-	-	-
Hg-D	mg/L	0.000002	0.0000027	0.0000026	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.236	0.240	0.172	0.182	0.191	-	-	-
S-D	mg/L	3.6	4.1	<3.0	5.0	5.6	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	4.63	5.16	3.52	5.29	5.78	-	-	-
Sr-D	mg/L	0.0375	0.0377	0.0302	0.0348	0.0405	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 125
2016-2017 Annual Report

EMS ID	E292118								
Site Description		Lower Quinsam Lake 1 Metre from Bottom							
Site Name	LQLB	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		14-Apr-16	20-Apr-16	28-Apr-16	4-May-16	11-May-16	5x30 Average	Average	Max
Parameters	Units								
SO4-D	mg/L	13.2	13.5	13.9	12.9	15.2	14	**128**	-
Turb	NTU	0.78	0.97	0.83	0.84	0.98	-	-	-
Alk-T	mg/L	27.7	-	28.2	-	-	-	-	-
P-T	mg/L	0.0042	-	-	-	-	-	-	-
Al-T	mg/L	0.0457	0.0327	0.0259	0.0264	0.0283	-	-	-
As-T	mg/L	0.00055	0.00073	0.00063	0.00073	0.00067	-	-	**0.005**
Ba-T	mg/L	0.0033	0.0032	0.0033	0.0037	0.0037	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	9.21	9.09	9.12	9.72	9.18	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00072	0.00063	0.00062	0.00066	0.00065	0.00066	**0.002**	**0.007**
Hard-T	mg/L	27.4	27.8	27.1	29.3	27.7	-	-	-
Fe-T	mg/L	0.14	0.153	0.131	0.186	0.169	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.08	1.23	1.05	1.21	1.15	-	-	-
Mn-T	mg/L	0.0198	0.0265	0.0315	0.0566	0.056	0.038	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.172	0.171	0.181	0.212	0.198	-	-	-
S-T	mg/L	4.6	3.9	5.3	4.6	5.9	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	5.92	6.8	6.2	6.77	7.38	-	-	-
Sr-T	mg/L	0.0412	0.0414	0.0405	0.0431	0.0446	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0285	0.0277	0.0235	0.0226	0.0222	0.0249	**0.05**	**0.1**
As-D	mg/L	0.00051	0.00062	0.00059	0.00056	0.0006	-	-	-
Ba-D	mg/L	0.0028	0.0033	0.0043	0.004	0.0038	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000068	0.0000050	0.0000080	0.000005	0.0000070	0.000006	**0.000127**	**0.000288**
Ca-D	mg/L	9.41	9.23	9.79	10	10.1	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00062	0.00062	0.00074	0.00042	0.00072	-	-	-
Hard-D	mg/L	28.3	27.4	28.7	29.7	30.0	-	-	-
Fe-D	mg/L	0.0681	0.101	0.0958	0.127	0.0959	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.16	1.05	1.03	1.15	1.17	-	-	-
Mn-D	mg/L	0.0121	0.0224	0.0256	0.0473	0.0443	-	-	-
Hg-D	mg/L	<0.0000020	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.205	0.198	0.203	0.215	0.168	-	-	-
S-D	mg/L	3.1	6.2	5.5	4.8	4.3	-	-	-
Se-D	mg/L	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	6.43	6.43	6.27	6.95	6.83	-	-	-
Sr-D	mg/L	0.038	0.0363	0.0389	0.0382	0.0433	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 126
2016-2017 Annual Report

EMS ID	E292118								
Site Description		Lower Quinsam Lake 1 Metre from Bottom							
Site Name	LQLB	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		3-Aug-16	9-Aug-16	17-Aug-16	25-Aug-16	31-Aug-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	12	12.6	12.8	11.8	12.1	12	**128**	-
Turb	NTU	5.53	5.36	5.1	7.22	7.41	-	-	-
Alk-T	mg/L	-	33.6	-	-	-	-	-	-
P-T	mg/L	-	0.0083	-	-	-	-	-	-
Al-T	mg/L	0.0365	0.0265	0.0302	0.0302	0.0293	-	-	-
As-T	mg/L	0.00233	0.00168	0.00186	0.00215	0.00271	-	-	**0.005**
Ba-T	mg/L	0.0077	0.0069	0.0073	0.0091	0.0088	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	0.000013	0.000021	0.000013	<0.000010	0.000016	-	-	-
Ca-T	mg/L	11.4	10.7	10.2	10.9	11	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	0.00073	0.00072	-	-	**0.05**
Cu-T	mg/L	0.00172	0.00081	0.00085	0.001	0.00073	0.00102	**0.002**	**0.007**
Hard-T	mg/L	33.5	31.9	30.6	32.8	32.5	-	-	-
Fe-T	mg/L	1.22	0.976	1.15	1.65	1.37	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.24	1.25	1.26	1.34	1.23	-	-	-
Mn-T	mg/L	0.424	0.380	0.421	0.610	0.565	0.480	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.22	0.232	0.253	0.269	0.116	-	-	-
S-T	mg/L	4	6.6	4.4	4.2	4.8	-	-	-
Se-T	mg/L	0.00080	<0.00010	<0.00010	0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	7.4	6.93	7.7	7.63	7.05	-	-	-
Sr-T	mg/L	0.0496	0.0462	0.0473	0.0507	0.0461	-	-	-
Zn-T	mg/L	<0.0050	0.0139	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0186	0.0172	0.0154	0.0095	0.0112	0.0144	**0.05**	**0.1**
As-D	mg/L	0.00128	0.00104	0.00112	0.00078	0.00074	-	-	-
Ba-D	mg/L	0.0067	0.0063	0.0065	0.0067	0.0069	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000097	<0.0000050	<0.0000050	0.0000050	<0.0000050	0.000006	**0.000088**	**0.00017**
Ca-D	mg/L	11.5	9.56	10.9	10.9	10.8	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00048	0.00067	0.00081	0.00119	0.00047	-	-	-
Hard-D	mg/L	33.9	28.9	32.6	32.4	32.3	-	-	-
Fe-D	mg/L	0.498	0.380	0.382	0.261	0.339	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.29	1.22	1.28	1.26	1.28	-	-	-
Mn-D	mg/L	0.352	0.325	0.3	0.356	0.264	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.186	0.254	0.222	0.221	0.121	-	-	-
S-D	mg/L	6.1	<3.0	4.9	4.3	5.9	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	7.63	6.73	7.4	7.59	7.07	-	-	-
Sr-D	mg/L	0.0456	0.0464	0.0479	0.0492	0.0489	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 127
2016-2017 Annual Report

EMS ID	E292118								
Site Description		Lower Quinsam Lake 1 Metre from Bottom							
Site Name	LQLB	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		27-Oct-16	3-Nov-16	9-Nov-16	17-Nov-16	21-Nov-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	11.00	12.50	10.30	15.00	14.60	13	**128**	-
Turb	NTU	2.9	13.0	5.6	1.2	1.1	-	-	-
Alk-T	mg/L	-	26.7	-	-	-	-	-	-
P-T	mg/L	-	0.0267	-	-	-	-	-	-
Al-T	mg/L	0.16	0.437	0.2420	0.0707	0.0889	-	-	-
As-T	mg/L	0.00062	0.00081	0.00049	0.00038	0.00046	-	-	**0.005**
Ba-T	mg/L	0.0044	0.0053	0.0036	0.0031	0.0032	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	0.000012	0.000026	0.000013	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	9.1	8.2	8.2	9.1	8.7	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00132	0.00211	0.00152	0.00085	0.00116	0.00139	**0.002**	**0.007**
Hard-T	mg/L	27.5	25.1	24.5	27.4	26.5	-	-	-
Fe-T	mg/L	0.22	0.69	0.32	0.10	0.12	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.16	1.12	1.01	1.16	1.18	-	-	-
Mn-T	mg/L	0.0094	0.023	0.010	0.007	0.008	0.011	**0.7**	**0.8**
Hg-T	mg/L	0.0000021	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.00010**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.269	0.283	0.207	0.167	0.186	-	-	-
S-T	mg/L	3.6	3.8	3.1	5	5.3	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	4.81	4.85	4.13	5.43	5.40	-	-	-
Sr-T	mg/L	0.0389	0.0368	0.0313	0.0383	0.0393	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0797	0.0813	0.0615	0.0464	0.0518	**0.0641**	**0.05**	**0.1**
As-D	mg/L	0.00051	0.00045	0.00028	0.00034	0.00037	-	-	-
Ba-D	mg/L	0.0037	0.0038	0.0029	0.0027	0.0032	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000084	0.0000120	0.0000070	<0.0000050	0.0000050	0.000007	**0.000088**	**0.00017**
Ca-D	mg/L	8.83	8.04	7.4	8.96	9.06	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00095	0.00088	0.00094	0.00071	0.00077	-	-	-
Hard-D	mg/L	26.9	24.3	22.1	27.2	27.3	-	-	-
Fe-D	mg/L	0.094	0.083	0.051	0.046	0.065	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.18	1.03	0.88	1.16	1.15	-	-	-
Mn-D	mg/L	0.0052	0.0044	0.0016	0.0032	0.0055	-	-	-
Hg-D	mg/L	0.0000021	0.0000027	0.0000024	<0.0000020	0.0000023	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.261	0.240	0.172	0.180	0.187	-	-	-
S-D	mg/L	3.7	4.1	<3.0	5.0	5.2	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	4.89	5.16	3.44	5.51	5.45	-	-	-
Sr-D	mg/L	0.0387	0.0375	0.0300	0.0343	0.0389	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 128
2016-2017 Annual Report

EMS ID	E0126402								
Site Description		Middle Quinsam Lake Inlet							
Site Name	WA	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		12-Apr-16	19-Apr-16	27-Apr-16	3-May-16	10-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	0.97	1.26	2.12	1.31	1.07	1	**128**	-
Alk-T	mg/L	21.7	20.2	20.7	21.2	21.8	-	-	-
Acidity 8.3	mg/L	0.50	<0.50	<0.50	0.64	1.15	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	3	**5**	**25**
Al-T	mg/L	0.0242	0.0258	0.0225	0.0238	0.0221	-	-	-
As-T	mg/L	0.00013	0.00012	<0.00010	<0.00010	0.0001	-	-	**0.005**
Ba-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
B-T	mg/L	<0.050	0.053	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	0.000014	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	7.3	7.16	6.71	6.9	7.27	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00356	0.00083	0.00059	0.00065	0.00066	0.00126	**0.002**	**0.007**
Hard-T	mg/L	21.3	20.9	19.9	20.2	21.3	-	-	-
Fe-T	mg/L	0.016	0.01	0.011	0.014	0.01	-	-	**1**
Pb-T	mg/L	0.00039	<0.00020	<0.00020	<0.00020	<0.00020	0.00024	**0.003**	**0.005**
Mg-T	mg/L	0.748	0.739	0.761	0.719	0.761	-	-	-
Mn-T	mg/L	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	0.001	**0.7**	**0.8**
Hg-T	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.062	0.068	0.07	0.069	0.064	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	0.596	0.653	0.633	0.634	0.624	-	-	-
Sr-T	mg/L	0.0119	0.011	0.0108	0.0107	0.0115	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0238	0.0215	0.0221	0.0235	0.0225	0.0227	**0.05**	**0.1**
As-D	mg/L	0.00015	<0.00010	0.00012	0.00014	0.00026	-	-	-
Ba-D	mg/L	<0.0010	<0.0010	<0.0010	0.0011	0.0018	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000060	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000127**	**0.000288**
Ca-D	mg/L	6.84	6.96	7.07	7.01	6.94	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.0017	0.0007	0.00051	0.00035	0.00097	-	-	-
Hard-D	mg/L	20	20.4	20.7	20.5	20.5	-	-	-
Fe-D	mg/L	0.0095	0.0068	0.0141	<0.0050	0.0148	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.714	0.742	0.733	0.735	0.781	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0018	-	-	-
Hg-D	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	-	-	-
K-D	mg/L	0.068	0.064	0.082	0.051	0.084	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	0.612	0.61	0.7	0.645	0.627	-	-	-
Sr-D	mg/L	0.0112	0.0113	0.0109	0.0114	0.0119	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 129
2016-2017 Annual Report

EMS ID	E0126402								
Site Description		Middle Quinsam Lake Inlet							
Site Name	WA	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		4-Aug-16	11-Aug-16	16-Aug-16	22-Aug-16	29-Aug-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	1.11	1.68	1.31	1.49	1.24	1	**128**	-
Alk-T	mg/L	21.8	20.6	20.3	24.2	20.2	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	0.90	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4	**5**	**25**
Al-T	mg/L	0.0202	0.0176	0.0189	0.0221	0.0187	-	-	-
As-T	mg/L	0.00011	0.00012	0.00014	0.00019	0.00012	-	-	**0.005**
Ba-T	mg/L	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	7.46	6.80	7.40	7.34	6.89	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	0.00081	0.00068	0.00073	0.00066	0.00068	**0.002**	**0.007**
Hard-T	mg/L	22.2	20.2	21.7	21.7	20.4	-	-	-
Fe-T	mg/L	0.020	0.017	0.023	0.025	0.020	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	0.865	0.776	0.775	0.824	0.769	-	-	-
Mn-T	mg/L	0.0024	0.0014	0.0014	0.0013	0.0015	0.002	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	<0.050	0.054	<0.050	0.071	0.063	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	0.688	0.617	0.618	0.815	0.619	-	-	-
Sr-T	mg/L	0.0119	0.0106	0.0109	0.0124	0.0115	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0190	0.0160	0.0159	0.0159	0.0179	0.0169	**0.05**	**0.1**
As-D	mg/L	0.00017	0.00028	0.00015	0.00014	0.00019	-	-	-
Ba-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	7.31	6.76	6.94	6.86	7.18	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00054	0.00055	0.00054	0.00054	0.00070	-	-	-
Hard-D	mg/L	21.9	20.0	20.5	20.3	21.2	-	-	-
Fe-D	mg/L	0.0131	0.0238	0.0155	0.0160	0.0218	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00037	-	-	-
Mg-D	mg/L	0.877	0.764	0.774	0.760	0.784	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	0.0000024	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.093	0.062	0.064	0.063	0.088	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	0.723	0.705	0.644	0.654	0.684	-	-	-
Sr-D	mg/L	0.0118	0.0118	0.0112	0.0116	0.0116	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 130
2016-2017 Annual Report

EMS ID	E0126402								
Site Description		Middle Quinsam Lake Inlet							
Site Name	WA	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		12-Oct-16	18-Oct-16	26-Oct-16	31-Oct-16	10-Nov-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	1.42	1.06	1.29	1.25	1.33	1	**128**	-
Alk-T	mg/L	21.0	17.2	20.2	21.7	22.0	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4	**5**	**25**
Al-T	mg/L	0.0298	0.0269	0.0536	0.0288	0.0529	-	-	-
As-T	mg/L	0.00029	0.00013	0.00014	0.00012	<0.00010	-	-	**0.005**
Ba-T	mg/L	0.0012	0.0013	0.0013	<0.0010	<0.0010	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	6.20	6.22	6.33	6.55	6.54	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00073	0.00065	0.00074	0.00068	0.00108	0.00078	**0.002**	**0.007**
Hard-T	mg/L	18.4	18.5	18.8	19.5	19.4	-	-	-
Fe-T	mg/L	0.020	0.024	0.046	0.026	0.031	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	0.698	0.716	0.722	0.756	0.740	-	-	-
Mn-T	mg/L	0.0012	0.0015	0.0042	0.0016	0.0026	0.002	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	0.0000032	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	<0.050	0.073	0.070	0.076	0.073	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	0.595	0.747	0.635	0.677	0.649	-	-	-
Sr-T	mg/L	0.0108	0.0113	0.0115	0.0124	0.0114	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0204	0.0245	0.0252	0.0225	0.0343	0.0254	**0.05**	**0.1**
As-D	mg/L	0.00015	0.00013	0.00015	0.00010	0.00012	-	-	-
Ba-D	mg/L	0.0012	0.0013	0.0012	<0.0010	<0.0010	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	6.03	5.96	6.85	6.36	6.61	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00058	0.00058	0.00060	0.00064	0.00082	-	-	-
Hard-D	mg/L	18.0	17.8	20.0	18.9	19.4	-	-	-
Fe-D	mg/L	0.0100	0.0108	0.0117	0.0086	0.0131	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.707	0.707	0.712	0.731	0.712	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	0.0000031	0.0000029	0.0000025	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.077	0.073	0.079	0.072	0.074	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	0.688	0.676	0.676	0.646	0.599	-	-	-
Sr-D	mg/L	0.0116	0.0124	0.0118	0.0122	0.0121	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 131
2016-2017 Annual Report

EMS ID	E0900504								
Site Description		Middle Quinsam Lake Outlet						Water Quality Guidelines	
Site Name	WB	5 in 30 Weekly Samples							
Date		12-Apr-16	19-Apr-16	27-Apr-16	3-May-16	10-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	23.6	28.9	31.4	31.3	40.4	31	**128**	-
Alk-T	mg/L	34.4	34.6	31.5	33.5	35.7	-	-	-
Acidity 8.3	mg/L	0.85	<0.50	<0.50	0.76	1.31	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4	**5**	**25**
Al-T	mg/L	0.0242	0.0237	0.0169	0.0181	0.0173	-	-	-
As-T	mg/L	0.0001	0.00014	0.00015	0.00016	0.00016	-	-	**0.005**
Ba-T	mg/L	0.0024	0.0020	0.0023	0.0024	0.0025	-	-	-
B-T	mg/L	<0.050	0.082	<0.050	0.057	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	11.7	12.1	11.6	12.9	15.1	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00084	0.00072	0.00057	<0.00050	0.00054	0.00063	**0.002**	**0.007**
Hard-T	mg/L	34.3	36.2	34.6	38	44.7	-	-	-
Fe-T	mg/L	0.023	0.025	0.029	0.036	0.034	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.22	1.44	1.38	1.43	1.69	-	-	-
Mn-T	mg/L	0.0038	0.0044	0.0052	0.0072	0.0103	0.006	**0.7**	**0.8**
Hg-T	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.221	0.248	0.234	0.245	0.275	-	-	-
S-T	mg/L	10.7	11.5	12.1	12.7	15.2	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	12.4	15.2	13.9	13.1	15.9	-	-	-
Sr-T	mg/L	0.0572	0.0598	0.0659	0.0718	0.0858	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0182	0.0194	0.0168	0.0183	0.0177	0.0181	**0.05**	**0.1**
As-D	mg/L	0.0002	0.00014	0.00018	0.00018	0.00018	-	-	-
Ba-D	mg/L	0.002	0.0023	0.003	0.0026	0.0026	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	0.062	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000127**	**0.000288**
Ca-D	mg/L	11.3	11.1	12	13.6	14	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00053	0.00094	0.00051	0.00053	0.00062	-	-	-
Hard-D	mg/L	33.1	33.4	35.5	40.1	41.8	-	-	-
Fe-D	mg/L	0.0166	0.0177	0.0167	0.0114	0.0259	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.2	1.36	1.31	1.48	1.69	-	-	-
Mn-D	mg/L	0.0014	0.0017	<0.0010	0.0033	0.0071	-	-	-
Hg-D	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.199	0.25	0.236	0.242	0.243	-	-	-
S-D	mg/L	9.1	9.8	9.2	12.6	16.2	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	12.8	16	13.1	13.4	17.1	-	-	-
Sr-D	mg/L	0.0525	0.0667	0.0587	0.0747	0.0851	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 132
2016-2017 Annual Report

EMS ID	E0900504								
Site Description		Middle Quinsam Lake Outlet							
Site Name	WB	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		4-Aug-16	11-Aug-16	16-Aug-16	22-Aug-16	29-Aug-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	31.3	29.8	25.0	25.0	23.9	27	**128**	-
Alk-T	mg/L	33.5	32.0	31.2	30.6	30.3	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	0.76	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4	**5**	**25**
Al-T	mg/L	0.0169	0.0141	0.0145	0.0182	0.0137	-	-	-
As-T	mg/L	0.00022	0.00020	0.00022	0.00027	0.00018	-	-	**0.005**
Ba-T	mg/L	0.0022	0.0020	0.0019	0.0018	0.0019	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	12.9	11.5	11.3	11.3	10.4	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	0.00074	0.00053	0.00055	0.00135	0.00073	**0.002**	**0.007**
Hard-T	mg/L	39.1	34.8	33.9	33.7	31.2	-	-	-
Fe-T	mg/L	0.044	0.042	0.045	0.049	0.033	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.69	1.48	1.37	1.31	1.24	-	-	-
Mn-T	mg/L	0.0087	0.0069	0.0079	0.0087	0.0084	0.008	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.228	0.184	0.185	0.190	0.178	-	-	-
S-T	mg/L	15.1	9.6	9.4	9.5	8.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	15.5	13.2	11.3	11.0	11.3	-	-	-
Sr-T	mg/L	0.0647	0.0557	0.0549	0.0553	0.0489	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0157	0.0131	0.0148	0.0129	0.0133	0.0140	**0.05**	**0.1**
As-D	mg/L	0.00025	0.00024	0.00020	0.00022	0.00022	-	-	-
Ba-D	mg/L	0.0020	0.0021	0.0016	0.0018	0.0017	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	13.0	10.8	11.2	10.7	11.3	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00052	0.00075	0.00086	0.00045	0.00049	-	-	-
Hard-D	mg/L	39.5	33.0	33.9	32.5	33.9	-	-	-
Fe-D	mg/L	0.0217	0.0180	0.0246	0.0297	0.0276	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.70	1.44	1.46	1.40	1.41	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.232	0.192	0.183	0.190	0.241	-	-	-
S-D	mg/L	14.4	10.7	8.0	7.8	9.1	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	15.3	12.3	11.7	12.2	12.8	-	-	-
Sr-D	mg/L	0.0638	0.0601	0.0546	0.0539	0.0507	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 133
2016-2017 Annual Report

EMS ID	E0900504								
Site Description		Middle Quinsam Lake Outlet							
Site Name	WB	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		12-Oct-16	18-Oct-16	26-Oct-16	31-Oct-16	10-Nov-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	38.5	21.1	34.9	26.2	17.7	28	**128**	-
Alk-T	mg/L	32.0	22.3	30.4	28.2	23.4	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4	**5**	**25**
Al-T	mg/L	0.0357	0.0506	0.0429	0.0406	0.0506	-	-	-
As-T	mg/L	0.00037	0.00031	0.00027	0.00025	0.00013	-	-	**0.005**
Ba-T	mg/L	0.0031	0.0028	0.0036	0.0026	0.0022	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	13.0	8.91	12.8	10.1	10.3	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00072	0.00057	0.00053	0.00056	0.00090	0.00066	**0.002**	**0.007**
Hard-T	mg/L	39.5	27.6	39.0	31.4	31.5	-	-	-
Fe-T	mg/L	0.061	0.089	0.099	0.072	0.052	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.73	1.31	1.70	1.49	1.39	-	-	-
Mn-T	mg/L	0.0091	0.0075	0.0091	0.0063	0.0051	0.007	**0.7**	**0.8**
Hg-T	mg/L	0.0000048	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.278	0.243	0.280	0.226	0.169	-	-	-
S-T	mg/L	11.5	7.5	12.2	8.6	5.9	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	14.0	8.26	12.8	10.5	4.49	-	-	-
Sr-T	mg/L	0.0752	0.0512	0.0751	0.0570	0.0373	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0165	0.0385	0.0260	0.0286	0.0331	0.0285	**0.05**	**0.1**
As-D	mg/L	0.00024	0.00025	0.00025	0.00023	0.00015	-	-	-
Ba-D	mg/L	0.0030	0.0027	0.0034	0.0025	0.0022	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000100	<0.0000050	<0.0000050	<0.0000050	0.0000060	0.000006	**0.000088**	**0.00017**
Ca-D	mg/L	12.7	8.86	13.4	9.93	10.4	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00057	0.00054	0.00052	0.00057	0.00147	-	-	-
Hard-D	mg/L	38.5	27.4	40.6	30.8	31.4	-	-	-
Fe-D	mg/L	0.0245	0.0568	0.0504	0.0393	0.0172	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.65	1.29	1.72	1.45	1.34	-	-	-
Mn-D	mg/L	<0.0010	0.0031	0.0027	0.0019	0.0030	-	-	-
Hg-D	mg/L	<0.0000020	0.0000022	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.307	0.229	0.311	0.224	0.170	-	-	-
S-D	mg/L	13.0	7.3	11.8	8.7	5.8	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	13.3	7.75	13.6	10.3	4.20	-	-	-
Sr-D	mg/L	0.0752	0.0511	0.0737	0.0579	0.0402	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 134
2016-2017 Annual Report

EMS ID	E219412								
Site Description		Long Lake Outlet						Water Quality Guidelines	
Site Name	LLO	5 in 30 Weekly Samples							
Date		12-Apr-16	19-Apr-16	27-Apr-16	3-May-16	10-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	73.2	68.8	71.8	75.0	79.2	74	**128**	-
Alk-T	mg/L	33.7	33.3	34.4	36.4	38.6	-	-	-
Acidity 8.3	mg/L	0.59	<0.50	<0.50	1.04	2.13	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4	**5**	**25**
Al-T	mg/L	0.0258	0.0248	0.0174	0.0209	0.0149	-	-	-
As-T	mg/L	0.00034	0.00043	0.00040	0.00043	0.00045	-	-	**0.005**
Ba-T	mg/L	0.0059	0.0049	0.0061	0.0058	0.0059	-	-	-
B-T	mg/L	0.073	0.088	0.069	0.092	0.075	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	25.5	26.1	27.0	28.0	30.3	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00100	<0.00050	<0.00050	<0.00050	<0.00050	0.00060	**0.002**	**0.007**
Hard-T	mg/L	76.1	79.0	81.2	83.1	91.1	-	-	-
Fe-T	mg/L	0.044	0.042	0.042	0.065	0.034	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	3.00	3.38	3.33	3.18	3.75	-	-	-
Mn-T	mg/L	0.0125	0.0102	0.0072	0.0152	0.0072	0.010	**0.7**	**0.8**
Hg-T	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.431	0.411	0.410	0.417	0.467	-	-	-
S-T	mg/L	26.1	24.1	26.3	28.2	29.6	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	13.0	14.5	13.9	14.0	15.3	-	-	-
Sr-T	mg/L	0.185	0.185	0.196	0.194	0.215	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0276	0.0169	0.0160	0.0158	0.0140	0.0181	**0.05**	**0.1**
As-D	mg/L	0.00041	0.00030	0.00038	0.00040	0.00041	-	-	-
Ba-D	mg/L	0.0054	0.0048	0.0055	0.0056	0.0060	-	-	-
B-D	mg/L	0.061	0.065	0.078	0.097	0.089	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000127**	**0.000288**
Ca-D	mg/L	25.3	24.3	27.3	29.1	29.4	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00037	0.00039	0.00037	<0.00020	0.00042	-	-	-
Hard-D	mg/L	76.0	73.4	81.8	86.6	88.3	-	-	-
Fe-D	mg/L	0.0312	0.0404	0.0285	0.0189	0.0218	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	3.09	3.10	3.28	3.38	3.64	-	-	-
Mn-D	mg/L	0.0033	0.0012	<0.0010	0.0028	0.0024	-	-	-
Hg-D	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.379	0.381	0.434	0.378	0.391	-	-	-
S-D	mg/L	23.5	28.8	27.2	27.9	27.6	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	13.5	13.0	14.2	14.1	15.3	-	-	-
Sr-D	mg/L	0.178	0.181	0.190	0.204	0.212	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 135
2016-2017 Annual Report

EMS ID	E219412								
Site Description		Long Lake Outlet							
Site Name	LLO	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		4-Aug-16	11-Aug-16	16-Aug-16	22-Aug-16	29-Aug-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	57.3	66.8	62.5	63.2	65.4	63	**128**	-
Alk-T	mg/L	30.7	32.9	31.4	34.7	34.1	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	0.97	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4	**5**	**25**
Al-T	mg/L	0.0118	0.0109	0.0088	0.0107	0.0091	-	-	-
As-T	mg/L	0.00041	0.00054	0.00057	0.00052	0.00043	-	-	**0.005**
Ba-T	mg/L	0.0058	0.0061	0.0061	0.0058	0.0062	-	-	-
B-T	mg/L	0.066	0.064	0.064	0.053	0.074	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	25.2	25.5	24.1	25.6	28.4	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	0.00055	<0.00050	<0.00050	<0.00050	0.00051	**0.002**	**0.007**
Hard-T	mg/L	76.9	78.9	73.5	77.9	84.9	-	-	-
Fe-T	mg/L	0.037	0.043	0.030	0.031	0.015	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	3.37	3.67	3.23	3.37	3.42	-	-	-
Mn-T	mg/L	0.0042	0.0083	0.0034	0.0046	0.0033	0.005	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.304	0.325	0.330	0.350	0.355	-	-	-
S-T	mg/L	28.0	21.2	23.2	23.7	22.2	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	11.0	11.5	10.4	11.1	10.9	-	-	-
Sr-T	mg/L	0.161	0.151	0.165	0.166	0.175	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0092	0.0079	0.0074	0.0046	0.0059	0.0070	**0.05**	**0.1**
As-D	mg/L	0.00054	0.00057	0.00048	0.00049	0.00046	-	-	-
Ba-D	mg/L	0.0054	0.0058	0.0056	0.0058	0.0058	-	-	-
B-D	mg/L	0.063	0.073	0.058	0.056	0.069	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	24.8	23.3	24.6	25.0	27.2	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00030	0.00037	0.00047	0.00029	0.00096	-	-	-
Hard-D	mg/L	76.2	71.5	75.7	76.5	82.0	-	-	-
Fe-D	mg/L	0.0212	0.0168	0.0209	0.0163	0.0116	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	3.47	3.24	3.43	3.39	3.40	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	0.0015	0.0017	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.345	0.375	0.333	0.339	0.342	-	-	-
S-D	mg/L	22.1	23.3	20.2	20.5	22.1	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	11.1	10.5	11.5	10.9	10.9	-	-	-
Sr-D	mg/L	0.157	0.161	0.166	0.167	0.170	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 136
2016-2017 Annual Report

EMS ID	E219412								
Site Description		Long Lake Outlet							
Site Name	LLO	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		12-Oct-16	18-Oct-16	26-Oct-16	31-Oct-16	10-Nov-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	47.5	10.7	30.9	11.2	21.3	24	**128**	-
Alk-T	mg/L	27.0	15.0	23.2	15.2	16.6	-	-	-
Acidity 8.3	mg/L	1.07	<0.50	<0.50	0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4	**5**	**25**
Al-T	mg/L	0.0733	0.0690	0.102	0.0849	0.0899	-	-	-
As-T	mg/L	0.00057	0.00036	0.00047	0.00038	0.00038	-	-	**0.005**
Ba-T	mg/L	0.0054	0.0023	0.0050	0.0028	0.0031	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	0.000014	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	18.2	5.69	13.2	6.78	9.68	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00058	0.00075	0.00063	0.00055	0.00081	0.00066	**0.002**	**0.007**
Hard-T	mg/L	56.3	18.3	40.9	21.7	30.1	-	-	-
Fe-T	mg/L	0.130	0.116	0.158	0.103	0.125	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	2.61	0.988	1.95	1.16	1.44	-	-	-
Mn-T	mg/L	0.0104	0.0050	0.0098	0.0053	0.0056	0.007	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	0.0000047	0.0000035	<0.0000020	0.0000022	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.290	0.176	0.303	0.178	0.222	-	-	-
S-T	mg/L	14.4	<3.0	10.8	3.7	7.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	6.78	2.48	6.47	3.28	4.41	-	-	-
Sr-T	mg/L	0.114	0.0287	0.0822	0.0368	0.0531	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0337	0.0568	0.0472	0.0463	0.0527	0.0473	**0.05**	**0.1**
As-D	mg/L	0.00046	0.00039	0.00045	0.00035	0.00036	-	-	-
Ba-D	mg/L	0.0051	0.0026	0.0042	0.0025	0.0030	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	17.5	6.94	13.3	6.66	9.35	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00050	0.00056	0.00056	0.00091	0.00108	-	-	-
Hard-D	mg/L	54.1	22.1	41.1	21.4	29.1	-	-	-
Fe-D	mg/L	0.0610	0.0829	0.0867	0.0659	0.0716	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	2.55	1.16	1.90	1.15	1.39	-	-	-
Mn-D	mg/L	<0.0010	0.0031	0.0052	0.0027	0.0033	-	-	-
Hg-D	mg/L	<0.0000020	0.0000020	0.0000036	0.0000060	0.0000022	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.321	0.203	0.309	0.178	0.242	-	-	-
S-D	mg/L	15.4	4.0	10.2	3.9	7.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	6.81	2.98	6.73	3.21	4.26	-	-	-
Sr-D	mg/L	0.117	0.0346	0.0785	0.0357	0.0547	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 137
2016-2017 Annual Report

EMS ID	E217017								
Site Description		No Name Lake Outlet						Water Quality Guidelines	
Site Name	NNO	5 in 30 Weekly Samples							
Date		12-Apr-16	19-Apr-16	27-Apr-16	3-May-16	10-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	1.62	1.73	2.04	2.06	1.75	2	**128**	-
Alk-T	mg/L	10.9	11.0	11.2	12.5	13.1	-	-	-
Acidity 8.3	mg/L	1.05	0.54	<0.50	0.68	1.49	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4	**5**	**25**
Al-T	mg/L	0.0374	0.0366	0.0304	0.0314	0.0315	-	-	-
As-T	mg/L	0.00017	0.00017	0.00023	0.00022	0.00027	-	-	**0.005**
Ba-T	mg/L	0.0012	<0.0010	0.0011	0.0012	0.0013	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	3.61	3.68	3.53	3.79	4.07	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	**0.002**	**0.007**
Hard-T	mg/L	12.2	12.6	12.0	12.7	13.7	-	-	-
Fe-T	mg/L	0.030	0.035	0.049	0.059	0.054	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	0.766	0.826	0.778	0.777	0.860	-	-	-
Mn-T	mg/L	0.0033	0.0033	0.0042	0.0051	0.0054	0.004	**0.7**	**0.8**
Hg-T	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.057	0.080	0.070	0.073	0.087	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	0.96	1.03	1.03	1.05	1.09	-	-	-
Sr-T	mg/L	0.0119	0.0109	0.0110	0.0116	0.0130	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0334	0.0307	0.0297	0.0302	0.0312	0.0310	**0.05**	**0.1**
As-D	mg/L	0.00026	0.00023	0.00025	0.00028	0.00024	-	-	-
Ba-D	mg/L	<0.0010	0.0011	0.0012	0.0017	0.0013	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000050	<0.0000050	0.0000050	<0.0000050	<0.0000050	0.000005	**0.000127**	**0.000288**
Ca-D	mg/L	3.45	3.49	3.70	3.91	3.92	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00042	0.00094	0.00046	0.00021	0.00044	-	-	-
Hard-D	mg/L	11.8	11.9	12.5	13.2	13.1	-	-	-
Fe-D	mg/L	0.0274	0.0252	0.0382	0.0347	0.0578	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.772	0.782	0.782	0.826	0.811	-	-	-
Mn-D	mg/L	0.0026	0.0029	0.0034	0.0042	0.0051	-	-	-
Hg-D	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.064	0.058	0.075	<0.050	0.105	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	0.973	1.12	0.996	1.03	1.11	-	-	-
Sr-D	mg/L	0.0113	0.0117	0.0113	0.0122	0.0127	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 138
2016-2017 Annual Report

EMS ID	E217017								
Site Description		No Name Lake Outlet							
Site Name	NNO	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		4-Aug-16	11-Aug-16	16-Aug-16	22-Aug-16	29-Aug-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	0.82	0.98	0.95	1.12	0.94	1	**128**	-
Alk-T	mg/L	16.7	15.9	15.1	17.0	17.5	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	0.86	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4	**5**	**25**
Al-T	mg/L	0.0423	0.0439	0.0264	0.0287	0.0257	-	-	-
As-T	mg/L	0.00061	0.00049	0.00052	0.00060	0.00048	-	-	**0.005**
Ba-T	mg/L	0.0014	0.0015	0.0014	0.0015	0.0014	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	0.000046	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	5.00	4.88	5.20	5.21	4.70	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00188	0.00109	<0.00050	0.00054	0.00064	0.00093	**0.002**	**0.007**
Hard-T	mg/L	17.2	16.7	17.8	18.0	16.3	-	-	-
Fe-T	mg/L	0.126	0.152	0.094	0.095	0.097	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.14	1.10	1.16	1.21	1.10	-	-	-
Mn-T	mg/L	0.0055	0.0166	0.0046	0.0049	0.0064	0.008	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.107	<0.050	0.063	0.118	0.058	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	2.57	1.23	1.32	1.50	1.22	-	-	-
Sr-T	mg/L	0.0164	0.0157	0.0185	0.0164	0.0166	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0261	0.0233	0.0217	0.0192	0.0224	0.0225	**0.05**	**0.1**
As-D	mg/L	0.00043	0.00045	0.00051	0.00049	0.00055	-	-	-
Ba-D	mg/L	0.0012	0.0012	0.0012	0.0014	0.0012	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	5.34	4.85	4.95	5.00	5.22	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00049	0.00055	0.00054	0.00048	0.00053	-	-	-
Hard-D	mg/L	18.4	16.3	17.0	17.2	18.1	-	-	-
Fe-D	mg/L	0.0674	0.0584	0.0703	0.0643	0.0840	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.22	1.03	1.12	1.16	1.22	-	-	-
Mn-D	mg/L	0.0020	<0.0010	0.0024	<0.0010	0.0044	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.069	0.065	0.068	0.085	0.053	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	1.39	1.17	1.30	1.39	1.33	-	-	-
Sr-D	mg/L	0.0155	0.0154	0.0160	0.0167	0.0167	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 139
2016-2017 Annual Report

EMS ID	E217017								
Site Description		No Name Lake Outlet							
Site Name	NNO	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		12-Oct-16	18-Oct-16	26-Oct-16	31-Oct-16	10-Nov-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	0.72	0.58	1.08	0.59	1.05	1	**128**	-
Alk-T	mg/L	12.6	10.5	11.6	12.0	9.74	-	-	-
Acidity 8.3	mg/L	<0.50	0.54	0.86	0.62	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4	**5**	**25**
Al-T	mg/L	0.0684	0.0766	0.0679	0.0631	0.0754	-	-	-
As-T	mg/L	0.00042	0.00034	0.00031	0.00029	0.00022	-	-	**0.005**
Ba-T	mg/L	0.0015	0.0015	0.0014	0.0013	0.0012	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	4.09	3.35	3.69	3.54	3.01	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00070	0.00066	0.00064	0.00056	0.00066	0.00064	**0.002**	**0.007**
Hard-T	mg/L	13.8	11.8	12.6	12.1	10.3	-	-	-
Fe-T	mg/L	0.145	0.111	0.126	0.105	0.081	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	0.869	0.829	0.823	0.785	0.686	-	-	-
Mn-T	mg/L	0.0081	0.0067	0.0075	0.0048	0.0031	0.006	**0.7**	**0.8**
Hg-T	mg/L	0.0000037	0.0000053	0.0000067	0.0000074	0.0000026	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.138	0.151	0.140	0.134	0.119	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	1.02	1.18	1.07	1.04	0.920	-	-	-
Sr-T	mg/L	0.0139	0.0123	0.0125	0.0111	0.0093	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0430	0.0588	0.0526	0.0478	0.0584	**0.0521**	**0.05**	**0.1**
As-D	mg/L	0.00041	0.00030	0.00031	0.00026	0.00020	-	-	-
Ba-D	mg/L	0.0014	0.0013	0.0013	0.0012	0.0011	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	4.03	3.86	3.86	3.46	3.01	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00056	0.00054	0.00053	0.00085	0.00062	-	-	-
Hard-D	mg/L	13.7	12.9	13.0	11.9	10.2	-	-	-
Fe-D	mg/L	0.0753	0.0799	0.0784	0.0624	0.0486	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.891	0.782	0.818	0.792	0.655	-	-	-
Mn-D	mg/L	<0.0010	0.0032	0.0032	0.0022	0.0013	-	-	-
Hg-D	mg/L	<0.0000020	0.0000032	0.0000033	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.148	0.152	0.138	0.127	0.122	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	1.12	1.02	1.10	1.05	0.864	-	-	-
Sr-D	mg/L	0.0136	0.0118	0.0114	0.0116	0.0100	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 140
2016-2017 Annual Report

EMS ID	E286930								
Site Description		Quinsam River Upstream of 7 South Mining Operation							
Site Name	QRDS1	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		12-Apr-16	19-Apr-16	27-Apr-16	3-May-16	10-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	25.8	31.0	31.7	35.4	42.1	33	**128**	-
Alk-T	mg/L	35.7	37.8	34.4	36.0	37.4	-	-	-
Acidity 8.3	mg/L	0.70	<0.50	<0.50	<0.50	1.39	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4	**5**	**25**
Al-T	mg/L	0.0251	0.0228	0.0175	0.0175	0.0163	-	-	-
As-T	mg/L	0.00035	0.00035	0.00033	0.00029	0.00044	-	-	**0.005**
Ba-T	mg/L	0.0029	0.0027	0.0030	0.0028	0.0033	-	-	-
B-T	mg/L	0.052	0.074	<0.050	<0.050	0.055	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	12.3	12.6	11.6	12.4	15.2	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00185	0.00063	0.00053	0.00059	0.00075	0.00087	**0.002**	**0.007**
Hard-T	mg/L	36.7	37.4	35.1	37.0	45.3	-	-	-
Fe-T	mg/L	0.029	0.025	0.033	0.033	0.026	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.44	1.46	1.46	1.46	1.74	-	-	-
Mn-T	mg/L	0.0035	0.0039	0.0031	0.0046	0.0041	0.004	**0.7**	**0.8**
Hg-T	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.252	0.266	0.255	0.263	0.384	-	-	-
S-T	mg/L	10.0	11.2	12.4	12.3	15.6	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	13.7	16.1	14.6	14.0	18.2	-	-	-
Sr-T	mg/L	0.0632	0.0689	0.0681	0.0726	0.0860	-	-	-
Zn-T	mg/L	0.0927	<0.0050	<0.0050	<0.0050	<0.0050	0.0225	**0.0075**	**0.033**
Al-D	mg/L	0.0212	0.0192	0.0170	0.0172	0.0166	0.0182	**0.05**	**0.1**
As-D	mg/L	0.00038	0.00038	0.00032	0.00030	0.00043	-	-	-
Ba-D	mg/L	0.0026	0.0027	0.0029	0.0034	0.0033	-	-	-
B-D	mg/L	<0.050	0.052	0.050	<0.050	0.060	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000127**	**0.000288**
Ca-D	mg/L	11.9	11.9	12.9	13.2	14.2	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00150	0.00080	0.00051	0.00074	0.00066	-	-	-
Hard-D	mg/L	35.3	36.2	38.1	39.3	42.3	-	-	-
Fe-D	mg/L	0.0184	0.0226	0.0204	0.0174	0.0245	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.35	1.55	1.41	1.54	1.70	-	-	-
Mn-D	mg/L	0.0016	0.0017	<0.0010	0.0014	0.0027	-	-	-
Hg-D	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.220	0.272	0.253	0.286	0.342	-	-	-
S-D	mg/L	12.8	9.7	12.5	12.9	15.1	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	14.2	16.1	14.7	15.6	17.7	-	-	-
Sr-D	mg/L	0.0617	0.0730	0.0663	0.0702	0.0835	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 141
2016-2017 Annual Report

EMS ID	E286930								
Site Description		Quinsam River Upstream of 7 South Mining Operation							
Site Name	QRDS1	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		4-Aug-16	11-Aug-16	16-Aug-16	22-Aug-16	29-Aug-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	32.0	29.4	26.2	25.5	25.1	28	**128**	-
Alk-T	mg/L	36.7	32.6	31.4	32.7	32.5	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	0.82	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4	**5**	**25**
Al-T	mg/L	0.0141	0.0157	0.0148	0.0169	0.0122	-	-	-
As-T	mg/L	0.00041	0.00040	0.00041	0.00043	0.00039	-	-	**0.005**
Ba-T	mg/L	0.0027	0.0027	0.0025	0.0026	0.0023	-	-	-
B-T	mg/L	0.052	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	13.3	11.5	11.6	11.6	11.2	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	<0.00050	0.00070	0.00068	0.00056	0.00114	0.00072	**0.002**	**0.007**
Hard-T	mg/L	40.3	35.2	34.8	35.0	33.4	-	-	-
Fe-T	mg/L	0.031	0.045	0.038	0.036	0.027	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.70	1.56	1.43	1.45	1.33	-	-	-
Mn-T	mg/L	0.0034	0.0085	0.0036	0.0050	0.0026	0.005	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.388	0.223	0.203	0.274	0.200	-	-	-
S-T	mg/L	12.1	10.0	9.8	11.9	8.2	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	16.4	14.2	12.8	12.7	12.5	-	-	-
Sr-T	mg/L	0.0675	0.0590	0.0616	0.0599	0.0559	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0147	0.0124	0.0113	0.0121	0.0110	0.0123	**0.05**	**0.1**
As-D	mg/L	0.00041	0.00035	0.00040	0.00041	0.00039	-	-	-
Ba-D	mg/L	0.0027	0.0026	0.0025	0.0024	0.0021	-	-	-
B-D	mg/L	<0.050	0.054	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000051	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	13.2	11.7	11.3	11.3	10.7	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00060	0.00054	0.00045	0.00043	0.00050	-	-	-
Hard-D	mg/L	39.9	35.0	34.1	33.8	32.2	-	-	-
Fe-D	mg/L	0.0140	0.0199	0.0252	0.0267	0.0218	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.72	1.39	1.42	1.39	1.35	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	0.0012	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.432	0.225	0.207	0.221	0.197	-	-	-
S-D	mg/L	13.2	10.7	8.8	8.9	8.4	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	16.1	13.4	12.1	12.9	12.4	-	-	-
Sr-D	mg/L	0.0658	0.0621	0.0588	0.0594	0.0550	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 142
2016-2017 Annual Report

EMS ID	E286930								
Site Description		Quinsam River Upstream of 7 South Mining Operation							
Site Name	QRDS1	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		12-Oct-16	18-Oct-16	26-Oct-16	31-Oct-16	10-Nov-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	37.0	24.3	31.7	27.9	12.3	27	**128**	-
Alk-T	mg/L	32.7	25.0	30.1	31.5	24.6	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4	**5**	**25**
Al-T	mg/L	0.0351	0.0483	0.0677	0.0409	0.0602	-	-	-
As-T	mg/L	0.00037	0.00045	0.00046	0.00039	0.00020	-	-	**0.005**
Ba-T	mg/L	0.0035	0.0032	0.0038	0.0031	0.0019	-	-	-
B-T	mg/L	<0.050	<0.050	0.051	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	0.000012	<0.000010	-	-	-
Ca-T	mg/L	13.4	10.0	12.2	10.5	8.10	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00056	0.00066	0.00070	0.00070	0.00082	0.00069	**0.002**	**0.007**
Hard-T	mg/L	41.1	31.2	37.7	32.4	24.8	-	-	-
Fe-T	mg/L	0.061	0.086	0.113	0.066	0.057	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.82	1.50	1.78	1.52	1.10	-	-	-
Mn-T	mg/L	0.0057	0.0061	0.0108	0.0059	0.0050	0.007	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	0.0000046	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.268	0.267	0.327	0.327	0.144	-	-	-
S-T	mg/L	10.6	9.0	11.6	9.6	4.1	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	14.4	10.9	13.1	11.8	4.33	-	-	-
Sr-T	mg/L	0.0772	0.0579	0.0757	0.0599	0.0297	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0172	0.0347	0.0308	0.0263	0.0394	0.0297	**0.05**	**0.1**
As-D	mg/L	0.00038	0.00039	0.00038	0.00034	0.00018	-	-	-
Ba-D	mg/L	0.0034	0.0030	0.0036	0.0030	0.0019	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000140	<0.0000050	0.000007	**0.000088**	**0.00017**
Ca-D	mg/L	13.0	9.60	11.5	10.2	8.14	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00051	0.00063	0.00058	0.00088	0.00080	-	-	-
Hard-D	mg/L	39.7	29.8	35.8	31.5	24.7	-	-	-
Fe-D	mg/L	0.0268	0.0492	0.0519	0.0342	0.0260	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.75	1.41	1.73	1.49	1.07	-	-	-
Mn-D	mg/L	<0.0010	0.0021	0.0014	0.0012	0.0016	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.293	0.268	0.320	0.302	0.148	-	-	-
S-D	mg/L	13.0	8.3	11.4	9.3	4.2	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	13.2	9.92	13.0	11.8	4.23	-	-	-
Sr-D	mg/L	0.0789	0.0566	0.0732	0.0610	0.0309	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 143
2016-2017 Annual Report

EMS ID	E292112								
Site Description		Lower Wetland Outlet at the Confluence of the Quinsam River							
Site Name	LWO	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		12-Apr-16	19-Apr-16	27-Apr-16	3-May-16	10-May-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	1	128	-
Alk-T	mg/L	29.1	33.1	29.0	31.1	31.2	-	-	-
Acidity 8.3	mg/L	5.46	9.89	1.22	12.0	8.08	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	5.5	<4.0	4	5	25
Al-T	mg/L	0.171	0.139	0.248	0.231	0.230	-	-	-
As-T	mg/L	0.00069	0.00086	0.00092	0.00117	0.00114	-	-	0.005
Ba-T	mg/L	0.0030	0.0022	0.0037	0.0033	0.0036	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	9.15	8.86	8.23	9.19	9.21	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	0.00054	<0.00050	-	-	0.05
Cu-T	mg/L	0.00262	0.00269	0.00273	0.00255	0.00216	0.00255	0.002	0.007
Hard-T	mg/L	28.7	28.3	26.4	29.4	29.0	-	-	-
Fe-T	mg/L	0.851	0.915	1.88	2.91	2.06	-	-	1
Pb-T	mg/L	0.00024	<0.00020	0.00028	<0.00020	<0.00020	0.00022	0.003	0.005
Mg-T	mg/L	1.42	1.49	1.41	1.57	1.45	-	-	-
Mn-T	mg/L	0.0423	0.0348	0.0255	0.0550	0.0129	0.034	0.7	0.8
Hg-T	mg/L	0.0000030	0.0000035	<0.0000020	<0.0000020	<0.0000020	-	-	0.0001
Mo-T	mg/L	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.088	0.054	<0.050	<0.050	0.110	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00013	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	0.000040	<0.000020	0.000081	-	-	0.0001
Na-T	mg/L	2.63	2.65	2.68	2.52	2.40	-	-	-
Sr-T	mg/L	0.0314	0.0293	0.0322	0.0349	0.0394	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.0075	0.033
Al-D	mg/L	0.126	0.103	0.153	0.184	0.157	0.1446	0.05	0.1
As-D	mg/L	0.00067	0.00064	0.00089	0.00093	0.00076	-	-	-
Ba-D	mg/L	0.0022	0.0020	0.0027	0.0046	0.0026	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000060	<0.0000050	0.0000050	<0.0000050	0.0000050	0.000005	0.000127	0.000288
Ca-D	mg/L	8.24	9.11	8.47	9.37	8.72	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00277	0.00287	0.00212	0.00181	0.00186	-	-	-
Hard-D	mg/L	25.9	29.2	26.5	29.2	27.5	-	-	-
Fe-D	mg/L	0.494	0.444	1.15	1.64	1.26	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.28	1.57	1.30	1.41	1.39	-	-	-
Mn-D	mg/L	0.0298	0.0127	0.0078	0.0088	0.0035	-	-	-
Hg-D	mg/L	0.0000025	0.0000026	0.0000026	0.0000034	0.0000039	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.055	<0.050	<0.050	<0.050	0.061	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	0.00012	0.00011	0.00014	-	-	-
Na-D	mg/L	2.50	2.52	2.68	2.41	2.27	-	-	-
Sr-D	mg/L	0.0275	0.0325	0.0295	0.0358	0.0335	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 144
2016-2017 Annual Report

EMS ID	E292112								
Site Description		Lower Wetland Outlet at the Confluence of the Quinsam River							
Site Name	LWO	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		4-Aug-16	11-Aug-16	16-Aug-16	22-Aug-16	29-Aug-16	5x30 Average	Average	Max
Parameter	Unit	No Flow	No Flow	No Flow	No Flow	No Flow			
SO4-D	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	1	**128**	-
Alk-T	mg/L	29.4	33.2	32.5	31.3	32.0	-	-	-
Acidity 8.3	mg/L	1.17	<0.50	1.30	0.60	2.61	-	-	-
TSS	mg/L	<4.0	**11.3**	<4.0	4.0	4.5	6	**5**	**25**
Al-T	mg/L	0.110	0.111	0.123	0.123	0.121	-	-	-
As-T	mg/L	0.00105	0.00107	0.00110	0.00134	0.00112	-	-	**0.005**
Ba-T	mg/L	0.0045	0.0028	0.0036	0.0036	0.0047	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	11.8	10.9	11.3	10.7	10.7	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00201	0.00229	0.00196	0.00203	0.00335	0.00233	**0.002**	**0.007**
Hard-T	mg/L	36.3	34.2	35.5	34.2	34.2	-	-	-
Fe-T	mg/L	0.825	0.926	0.978	1.110	1.100	-	-	**1**
Pb-T	mg/L	<0.00020	0.00021	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.69	1.69	1.75	1.78	1.80	-	-	-
Mn-T	mg/L	0.0392	0.0636	0.0603	0.0307	0.0657	0.052	**0.7**	**0.8**
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.131	0.145	0.325	0.318	0.399	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	0.00015	0.00010	0.00015	<0.00010	0.00012	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	1.59	1.67	1.76	2.06	2.42	-	-	-
Sr-T	mg/L	0.0397	0.0427	0.0434	0.0436	0.0429	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.0767	0.0734	0.0733	0.0861	0.0902	0.0799	**0.05**	**0.1**
As-D	mg/L	0.00068	0.00105	0.00097	0.00091	0.00098	-	-	-
Ba-D	mg/L	0.0026	0.0028	0.0029	0.0026	0.0027	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000060	<0.0000050	0.0000060	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	10.9	10.6	10.4	9.96	10.5	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00152	0.00153	0.00150	0.00144	0.00154	-	-	-
Hard-D	mg/L	34.5	33.6	32.9	31.7	33.3	-	-	-
Fe-D	mg/L	0.462	0.489	0.536	0.657	0.615	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.74	1.75	1.67	1.64	1.69	-	-	-
Mn-D	mg/L	0.0060	0.0079	0.0125	0.0137	0.0101	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.123	0.153	0.354	0.255	0.371	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	<0.00010	0.00013	0.00011	<0.00010	<0.00010	-	-	-
Na-D	mg/L	1.64	1.74	1.73	1.79	1.93	-	-	-
Sr-D	mg/L	0.0417	0.0433	0.0456	0.0455	0.0435	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 145
2016-2017 Annual Report

EMS ID	E292112								
Site Description		Lower Wetland Outlet at the Confluence of the Quinsam River							
Site Name	LWO	5 in 30 Weekly Samples						Water Quality Guidelines	
Date		12-Oct-16	18-Oct-16	26-Oct-16	31-Oct-16	10-Nov-16	5x30 Average	Average	Max
Parameter	Unit								
SO4-D	mg/L	0.86	5.93	0.75	7.30	10.8	5	**128**	-
Alk-T	mg/L	23.6	22.8	23.6	27.0	21.9	-	-	-
Acidity 8.3	mg/L	<0.50	0.57	<0.50	1.58	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	4	**5**	**25**
Al-T	mg/L	0.157	0.0640	0.0750	0.131	0.0653	-	-	-
As-T	mg/L	0.00047	0.00030	0.00030	0.00059	0.00017	-	-	**0.005**
Ba-T	mg/L	0.0022	0.0020	0.0012	0.0031	0.0020	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	6.75	7.50	7.41	7.60	7.53	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	**0.05**
Cu-T	mg/L	0.00157	0.00090	0.00120	0.00179	0.00098	0.00129	**0.002**	**0.007**
Hard-T	mg/L	21.5	23.6	23.3	24.1	23.2	-	-	-
Fe-T	mg/L	0.282	0.072	0.052	0.418	0.061	-	-	**1**
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	**0.003**	**0.005**
Mg-T	mg/L	1.13	1.19	1.16	1.25	1.06	-	-	-
Mn-T	mg/L	0.0043	0.0019	0.0015	0.0135	0.0023	0.005	**0.7**	**0.8**
Hg-T	mg/L	0.0000022	<0.0000020	<0.0000020	0.0000096	<0.0000020	-	-	**0.0001**
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	**0.025**
K-T	mg/L	0.076	0.178	0.080	0.174	0.134	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	3.9	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	**0.0001**
Na-T	mg/L	2.41	3.31	1.53	4.96	4.20	-	-	-
Sr-T	mg/L	0.0298	0.0350	0.0259	0.0396	0.0281	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0075**	**0.033**
Al-D	mg/L	0.128	0.0576	0.0571	0.102	0.0386	0.0767	**0.05**	**0.1**
As-D	mg/L	0.00039	0.00029	0.00032	0.00046	0.00018	-	-	-
Ba-D	mg/L	0.0021	0.0018	0.0012	0.0028	0.0020	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	**0.000088**	**0.00017**
Ca-D	mg/L	6.72	7.35	7.43	7.53	7.65	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00134	0.00082	0.00123	0.00153	0.00080	-	-	-
Hard-D	mg/L	21.6	23.2	23.6	23.9	23.3	-	-	-
Fe-D	mg/L	0.169	0.0545	0.0342	0.272	0.0304	-	-	**0.35**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.18	1.18	1.22	1.24	1.02	-	-	-
Mn-D	mg/L	<0.0010	0.0013	<0.0010	0.0054	0.0010	-	-	-
Hg-D	mg/L	0.0000026	0.0000048	0.0000054	0.0000024	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.091	0.172	0.090	0.160	0.135	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	3.8	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	2.76	3.24	1.62	4.95	3.99	-	-	-
Sr-D	mg/L	0.0279	0.0330	0.0255	0.0389	0.0308	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 146
2016-2017 Annual Report

EMS ID	E292113	Quinsam River Downstream of 7 South Mine Operation								
Site Description		5 in 30 Weekly Samples					Monthly		Water Quality Guidelines	
Site Name	7SQR									
Date		12-Apr-16	19-Apr-16	27-Apr-16	3-May-16	10-May-16	15-Jun-16	5x30 Average	Average	Max
Parameter	Unit									
SO4-D	mg/L	25.9	32.8	31.4	33.8	39.3	30.1	33	128	-
Alk-T	mg/L	36.0	36.3	34.1	32.8	37.8	34.1	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	<0.50	0.69	1.73	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	5	25
Al-T	mg/L	0.0219	0.0196	0.0169	0.0196	0.0137	0.0188	-	-	-
As-T	mg/L	0.00055	0.00034	0.00032	0.00032	0.00041	0.00038	-	-	0.005
Ba-T	mg/L	0.0030	0.0028	0.0029	0.0031	0.0034	0.0028	-	-	-
B-T	mg/L	0.053	0.063	<0.050	<0.050	0.058	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	12.3	13.1	11.8	12.4	14.4	15.4	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	0.05
Cu-T	mg/L	0.00055	0.00063	0.00050	0.00055	0.00055	0.00213	0.0006	0.002	0.007
Hard-T	mg/L	36.7	39.3	35.6	37.2	43.2	44.4		-	-
Fe-T	mg/L	0.045	0.077	0.056	0.076	0.059	0.100	-	-	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	0.003	0.005
Mg-T	mg/L	1.47	1.61	1.49	1.49	1.73	1.44	-	-	-
Mn-T	mg/L	0.0047	0.0050	0.0040	0.0064	0.0056	0.0058	0.0051	0.7	0.8
Hg-T	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.256	0.269	0.262	0.237	0.295	0.221	-	-	-
S-T	mg/L	12.7	13.3	12.4	12.9	16.1	10.9	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	0.0001
Na-T	mg/L	13.9	16.3	14.7	14.3	17.9	12.6	-	-	-
Sr-T	mg/L	0.0638	0.0693	0.0690	0.0708	0.0809	0.0646	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.0075	0.033
Al-D	mg/L	0.0213	0.0164	0.0155	0.0164	0.0130	0.0297	0.0165	0.05	0.1
As-D	mg/L	0.00053	0.00033	0.00032	0.00030	0.00035	0.00244	-	-	-
Ba-D	mg/L	0.0027	0.0030	0.0032	0.0033	0.0034	0.0053	-	-	-
B-D	mg/L	<0.050	0.057	0.052	<0.050	0.057	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000084	0.000005	0.000088	0.00017
Ca-D	mg/L	11.7	12.6	12.7	13.0	13.5	12.2	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00054	0.00057	0.00058	0.00084	0.00056	0.00089	-	-	-
Hard-D	mg/L	35.0	37.9	37.8	38.9	40.5	34.6	-	-	-
Fe-D	mg/L	0.0381	0.0284	0.0382	0.0339	0.0533	0.0211	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.38	1.53	1.48	1.54	1.68	1.01	-	-	-
Mn-D	mg/L	0.0030	0.0028	0.0018	0.0030	0.0048	<0.0010	-	-	-
Hg-D	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.247	0.261	0.245	0.241	0.245	0.243	-	-	-
S-D	mg/L	11.6	11.0	9.7	13.1	13.9	<3.0	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00013	-	-	-
Na-D	mg/L	14.0	15.5	14.6	15.7	17.6	1.46	-	-	-
Sr-D	mg/L	0.0594	0.0715	0.0662	0.0709	0.0804	0.0395	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 147
2016-2017 Annual Report

EMS ID	E292113		Quinsam River Downstream of 7 South Mine Operation								
Site Description			5 in 30 Weekly Samples							Water Quality Guidelines	
Site Name	7SQR	Monthly						Monthly			
Date		14-Jul-16	4-Aug-16	11-Aug-16	16-Aug-16	22-Aug-16	29-Aug-16	26-Sep-16	5x30 Average	Average	Max
Parameter	Unit										
SO4-D	mg/L	31.7	32.2	29.9	26.2	25.7	24.7	34.4	28	128	-
Alk-T	mg/L	33.3	35.7	34.8	32.3	33.5	31.9	34.4	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	<0.50	0.84	<0.50	<0.50	0.53	-	-	-
TSS	mg/L	<4.0	4.5	<4.0	<4.0	<4.0	4.0	<4.0	4.1	5	25
Al-T	mg/L	0.0177	0.0310	0.203	0.0154	0.0136	0.0265	0.0167	-	-	-
As-T	mg/L	0.00038	0.00388	0.00558	0.00062	0.00045	0.00047	0.00037	-	-	0.005
Ba-T	mg/L	0.0031	0.0032	0.0037	0.0029	0.0026	0.0026	0.0034	-	-	-
B-T	mg/L	<0.050	0.055	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	13.1	13.8	12.2	11.7	11.7	11.0	12.9	-	-	-
Cr-T	mg/L	<0.0010	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	0.05
Cu-T	mg/L	0.00068	0.00074	0.00136	0.00056	<0.00050	0.00061	0.00056	0.0008	0.002	0.007
Hard-T	mg/L	39.7	41.7	37.3	35.5	35.2	33.1	39.0		-	-
Fe-T	mg/L	0.065	0.122	0.465	0.082	0.075	0.103	0.101	-	-	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	0.003	0.005
Mg-T	mg/L	1.68	1.76	1.64	1.52	1.47	1.39	1.64	-	-	-
Mn-T	mg/L	0.0040	0.0098	0.0359	0.0058	0.0054	0.0079	0.0061	0.0130	0.7	0.8
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.253	0.353	0.205	0.213	0.253	0.239	0.293	-	-	-
S-T	mg/L	13.3	17.8	9.6	8.8	9.9	8.8	12.4	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	0.0001
Na-T	mg/L	10.4	17.0	14.5	13.3	12.4	12.7	15.8	-	-	-
Sr-T	mg/L	0.0692	0.0680	0.0638	0.0596	0.0572	0.0569	0.0730	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.0075	0.033
Al-D	mg/L	0.0112	0.0120	0.0125	0.0105	0.0090	0.0106	0.0090	0.0109	0.05	0.1
As-D	mg/L	0.00035	0.00185	0.00127	0.00054	0.00042	0.00046	0.00035	-	-	-
Ba-D	mg/L	0.0031	0.0028	0.0027	0.0027	0.0026	0.0026	0.0031	-	-	-
B-D	mg/L	<0.050	0.056	<0.050	<0.050	<0.050	<0.050	0.051	-	-	-
Cd-D	mg/L	<0.0000050	0.0000051	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	0.000088	0.00017
Ca-D	mg/L	13.9	13.5	11.8	11.4	11.8	11.1	13.3	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00047	0.00055	0.00059	0.00050	0.00042	0.00064	0.00046	-	-	-
Hard-D	mg/L	41.5	41.0	35.4	34.5	35.6	33.9	40.3	-	-	-
Fe-D	mg/L	0.0400	0.0350	0.0402	0.0436	0.0545	0.0516	0.0557	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.65	1.76	1.42	1.47	1.49	1.49	1.71	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	0.0019	0.0034	0.0018	0.0031	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.205	0.289	0.220	0.219	0.218	0.282	0.309	-	-	-
S-D	mg/L	10.8	11.6	10.3	8.9	8.5	9.9	13.3	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	10.1	17.1	13.6	12.6	13.3	14.1	16.8	-	-	-
Sr-D	mg/L	0.0739	0.0665	0.0629	0.0613	0.0600	0.0546	0.0695	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 148
2016-2017 Annual Report

EMS ID	E292113	Quinsam River Downstream of 7 South Mine Operation								
Site Description		5 in 30 Weekly Samples					Monthly		Water Quality Guidelines	
Site Name	7SQR									
Date		12-Oct-16	18-Oct-16	26-Oct-16	31-Oct-16	10-Nov-16	7-Dec-16	5x30 Average	Average	Max
Parameter	Unit									
SO4-D	mg/L	33.9	21.6	28.6	24.3	12.5	33.4	24	128	-
Alk-T	mg/L	32.3	24.9	27.8	29.6	22.9	34.9	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	5	25
Al-T	mg/L	0.0539	0.0912	0.0982	0.0543	0.0539	0.0416	-	-	-
As-T	mg/L	0.00046	0.00048	0.00043	0.00043	0.00021	0.00039	-	-	0.005
Ba-T	mg/L	0.0038	0.0046	0.0038	0.0031	0.0020	0.0026	-	-	-
B-T	mg/L	<0.050	0.052	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	12.4	9.39	10.6	9.01	8.14	12.4	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	0.05
Cu-T	mg/L	0.00081	0.00077	0.00172	0.00065	0.00092	0.00094	0.0010	0.002	0.007
Hard-T	mg/L	38.0	29.5	33.2	28.5	24.9	37.6		-	-
Fe-T	mg/L	0.128	0.122	0.212	0.103	0.059	0.089	-	-	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	0.003	0.005
Mg-T	mg/L	1.69	1.46	1.60	1.46	1.10	1.61	-	-	-
Mn-T	mg/L	0.0085	0.0075	0.0085	0.0076	0.0028	0.0087	0.0070	0.7	0.8
Hg-T	mg/L	0.0000039	0.0000046	0.0000036	0.0000042	<0.0000020	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.286	0.295	0.275	0.252	0.138	0.249	-	-	-
S-T	mg/L	11.3	8.2	9.5	8.2	4.1	10.5	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	0.0001
Na-T	mg/L	11.8	10.2	10.7	10.7	4.55	13.3	-	-	-
Sr-T	mg/L	0.0795	0.0535	0.0642	0.0560	0.0307	0.0681	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.0075	0.033
Al-D	mg/L	0.0246	0.0421	0.0448	0.0327	0.0350	0.0264	0.0358	0.05	0.1
As-D	mg/L	0.00036	0.00045	0.00039	0.00034	0.00020	0.00031	-	-	-
Ba-D	mg/L	0.0034	0.0030	0.0036	0.0029	0.0019	0.0026	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	0.000088	0.00017
Ca-D	mg/L	12.3	9.15	10.5	9.65	8.26	12.1	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00056	0.00067	0.00061	0.00063	0.00085	0.00086	-	-	-
Hard-D	mg/L	37.7	28.4	33.2	30.1	25.1	36.6	-	-	-
Fe-D	mg/L	0.0489	0.0680	0.0804	0.0653	0.0307	0.0530	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.70	1.34	1.68	1.46	1.09	1.58	-	-	-
Mn-D	mg/L	<0.0010	0.0036	0.0027	0.0036	0.0013	0.0056	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	0.0000030	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.296	0.292	0.311	0.237	0.145	0.227	-	-	-
S-D	mg/L	12.0	7.4	9.6	8.2	4.5	10.5	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	12.4	9.13	11.2	10.9	4.46	13.1	-	-	-
Sr-D	mg/L	0.0734	0.0537	0.0639	0.0563	0.0335	0.0651	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 149
2016-2017 Annual Report

EMS ID	E292113	Quinsam River Downstream of 7 South Mine Operation			Water Quality Guidelines
Site Description		Monthly Samples			
Site Name	7SQR				
Date		26-Jan-17	1-Feb-17	22-Mar-17	Max
Parameter	Unit				
SO4-D	mg/L	29.9	Snow and ice posed extreme danger for samplers. Access was not possible.	22.3	-
Alk-T	mg/L	29.3		28.4	-
Acidity 8.3	mg/L	<0.50		<0.50	-
TSS	mg/L	<4.0		<4.0	25
Al-T	mg/L	0.0459		0.0325	-
As-T	mg/L	0.00033		0.00038	0.005
Ba-T	mg/L	0.0026		0.0025	-
B-T	mg/L	<0.050		<0.050	-
Cd-T	mg/L	<0.000010		0.000012	-
Ca-T	mg/L	10.9		9.73	-
Cr-T	mg/L	<0.0010		<0.0010	-
Co-T	mg/L	<0.00050		<0.00020	0.05
Cu-T	mg/L	0.00054		0.00059	0.007
Hard-T	mg/L	33.4		29.7	-
Fe-T	mg/L	0.066		0.059	1
Pb-T	mg/L	<0.00020		<0.00020	0.005
Mg-T	mg/L	1.48		1.31	-
Mn-T	mg/L	0.0041		0.0043	0.8
Hg-T	mg/L	<0.0000020		<0.0000020	0.0001
Mo-T	mg/L	<0.0010		<0.0010	-
Ni-T	mg/L	<0.0010		<0.0010	0.025
K-T	mg/L	0.251		0.226	-
S-T	mg/L	10.9		7.8	-
Se-T	mg/L	<0.00010		<0.00010	-
Ag-T	mg/L	<0.000020		<0.000020	0.0001
Na-T	mg/L	13.4		10.9	-
Sr-T	mg/L	0.0596		0.0521	-
Zn-T	mg/L	<0.0050		<0.0050	0.033
Al-D	mg/L	0.0324		0.0275	0.1
As-D	mg/L	0.00031		0.00036	-
Ba-D	mg/L	0.0025		0.0025	-
B-D	mg/L	<0.050		<0.050	-
Cd-D	mg/L	<0.0000050		0.0000120	0.00017
Ca-D	mg/L	10.4		10.1	-
Cr-D	mg/L	<0.0010		<0.0010	-
Co-D	mg/L	<0.00050		<0.00020	-
Cu-D	mg/L	0.00044		0.00073	-
Hard-D	mg/L	32.4		30.8	-
Fe-D	mg/L	0.0393		0.072	0.35
Pb-D	mg/L	<0.00020		<0.00020	-
Mg-D	mg/L	1.58		1.39	-
Mn-D	mg/L	0.0028		0.0031	-
Hg-D	mg/L	<0.0000020		<0.0000020	-
Mo-D	mg/L	<0.0010		<0.0010	-
Ni-D	mg/L	<0.0010		<0.0010	-
K-D	mg/L	0.218		0.225	-
S-D	mg/L	10.5		8.4	-
Se-D	mg/L	<0.00010		<0.00010	-
Na-D	mg/L	13.2		11.3	-
Sr-D	mg/L	0.0622		0.053	-
Zn-D	mg/L	<0.0050		<0.0050	-

Table 150
2016-2017 Annual Report

EMS ID	E297230	Iron River Upstream of Mining Operations								
Site Description		5 in 30 Weekly Samples					Monthly		Water Quality Guidelines	
Site Name	IR1									
Date		12-Apr-16	19-Apr-16	27-Apr-16	3-May-16	10-May-16	15-Jun-16	5x30 Average	Average	Max
Parameter	Unit									
SO4-D	mg/L	<0.50	<0.50	1.70	0.73	0.55	4.54	1	128	-
Alk-T	mg/L	22.0	22.9	27.4	21.6	24.2	41.8	-	-	-
Acidity 8.3	mg/L	0.85	<0.50	<0.50	<0.50	1.47	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	5	25
Al-T	mg/L	0.0807	0.0962	0.0525	0.0763	0.0598	0.0325	-	-	-
As-T	mg/L	0.00050	0.00027	0.00038	0.00025	0.00031	0.00057	-	-	0.005
Ba-T	mg/L	0.0029	0.0015	0.0022	0.0016	0.0015	0.0029	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	0.000017	0.000029	0.000020	0.000025	0.000023	<0.000010	-	-	-
Ca-T	mg/L	8.35	8.73	9.98	7.30	8.64	15.5	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	0.004	0.11
Cu-T	mg/L	0.00109	0.00084	0.00081	0.00090	0.00079	0.00106	0.0009	0.00092	0.0042
Hard-T	mg/L	23.3	24.1	27.4	20.1	23.8	42.4	**24**	-	-
Fe-T	mg/L	0.028	0.024	0.014	0.027	0.017	0.011	-	-	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	-	0.005
Mg-T	mg/L	0.586	0.554	0.613	0.451	0.541	0.878	-	-	-
Mn-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.7	0.8
Hg-T	mg/L	0.0000024	0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.190	0.197	0.189	0.169	0.190	0.250	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	0.00011	0.00011	0.00015	<0.00010	0.00011	0.00031	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	0.00005	0.0001
Na-T	mg/L	0.653	0.934	0.711	0.516	0.599	0.971	-	-	-
Sr-T	mg/L	0.0262	0.0247	0.0302	0.0199	0.0253	0.0461	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.008	0.03
Al-D	mg/L	0.0777	0.0758	0.0472	0.0749	0.0590	0.0297	**0.067**	0.05	0.1
As-D	mg/L	0.00049	0.00032	0.00036	0.00021	0.00034	0.00048	-	-	-
Ba-D	mg/L	0.0025	0.0013	0.0020	0.0016	0.0016	0.0034	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000180	0.0000249	0.0000210	0.0000248	0.0000210	0.0000159	0.000022	0.000073	0.000132
Ca-D	mg/L	8.04	8.07	10.5	7.42	8.03	15.1	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00079	0.00087	0.00076	0.00096	0.00081	0.00066	-	-	-
Hard-D	mg/L	22.3	22.3	28.8	20.5	22.3	41.2	-	-	-
Fe-D	mg/L	0.0326	0.0204	0.0134	0.0182	0.0152	0.0091	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.553	0.526	0.612	0.477	0.555	0.859	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	0.0000024	<0.000002	<0.0000020	0.0000024	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.201	0.188	0.190	0.162	0.178	0.238	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	0.00014	0.00015	0.00021	<0.00010	0.00011	0.00040	-	-	-
Na-D	mg/L	0.706	0.627	0.675	0.555	0.583	1.01	-	-	-
Sr-D	mg/L	0.0241	0.0258	0.0288	0.0197	0.0252	0.0462	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 151
2016-2017 Annual Report

EMS ID	E297230		Iron River Upstream of Mining Operations							Water Quality Guidelines	
Site Description			5 in 30 Weekly Samples					Monthly			
Site Name	IR1	Monthly									
Date		14-Jul-16	4-Aug-16	11-Aug-16	16-Aug-16	22-Aug-16	29-Aug-16	26-Sep-16	5x30 Average	Average	Max
Parameter	Unit										
SO4-D	mg/L	4.35	5.65	5.75	6.35	7.68	8.85	6.99	7	128	-
Alk-T	mg/L	43.9	62.7	56.2	61.1	71.3	71.8	55.1	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	<0.50	1.77	<0.50	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	-	-
Al-T	mg/L	0.0347	0.0273	0.0239	0.0226	0.0243	0.0227	0.0166	-	-	-
As-T	mg/L	0.00066	0.00067	0.00070	0.00077	0.00078	0.00069	0.00061	-	-	0.005
Ba-T	mg/L	0.0032	0.0047	0.0041	0.0050	0.0047	0.0054	0.0039	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	0.000018	0.000020	0.000014	0.000019	0.000012	0.000014	0.000014	-	-	-
Ca-T	mg/L	16.2	27.3	23.1	25.3	27.3	31.9	21.8	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	0.004	0.11
Cu-T	mg/L	0.00072	0.00230	0.00076	0.00068	0.00057	0.00065	0.00058	0.0010	0.003	0.009
Hard-T	mg/L	44.1	74.0	62.3	68.3	73.7	84.9	58.8	**73**	-	-
Fe-T	mg/L	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	-	-	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	0.003	0.005
Mg-T	mg/L	0.889	1.42	1.14	1.24	1.37	1.29	1.05	-	-	-
Mn-T	mg/L	<0.0010	<0.0010	<0.0010	0.0017	<0.0010	<0.0010	0.0011	0.0011	0.7	0.8
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.234	0.364	0.211	0.282	0.310	0.218	0.224	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	3.3	<3.0	<3.0	-	-	-
Se-T	mg/L	0.00037	0.00038	0.00041	0.00048	0.00046	0.00054	0.00043	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	0.00005	0.0001
Na-T	mg/L	1.12	1.77	1.39	1.57	1.80	1.59	1.39	-	-	-
Sr-T	mg/L	0.0509	0.0808	0.0639	0.0830	0.0885	0.0864	0.0718	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.0075	0.03
Al-D	mg/L	0.0303	0.0278	0.0252	0.0226	0.0215	0.0235	0.0171	0.0241	0.05	0.1
As-D	mg/L	0.00057	0.00066	0.00075	0.00073	0.00075	0.00072	0.00061	-	-	-
Ba-D	mg/L	0.0031	0.0043	0.0041	0.0048	0.0050	0.0048	0.0040	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000140	0.0000184	0.0000130	0.0000180	0.0000130	0.0000152	0.0000150	0.000016	0.00017	0.00043
Ca-D	mg/L	16.9	26.0	22.2	24.6	26.5	30.0	22.4	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00056	0.00167	0.00075	0.00067	0.00046	0.00073	0.00059	-	-	-
Hard-D	mg/L	45.6	70.4	59.7	66.3	71.7	80.4	60.7	-	-	-
Fe-D	mg/L	0.0094	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0117	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.860	1.32	1.04	1.20	1.32	1.30	1.15	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.184	0.357	0.218	0.270	0.251	0.218	0.240	-	-	-
S-D	mg/L	<3.0	3.5	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	0.00027	0.00047	0.00043	0.00049	0.00051	0.00062	0.00037	-	-	-
Na-D	mg/L	1.06	1.59	1.18	1.52	1.56	1.53	1.44	-	-	-
Sr-D	mg/L	0.0489	0.0727	0.0671	0.0736	0.0900	0.0905	0.0679	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 152
2016-2017 Annual Report

EMS ID	E297230	Iron River Upstream of Mining Operations								
Site Description		5 in 30 Weekly Samples					Monthly		Water Quality Guidelines	
Site Name	IR1									
Date		12-Oct-16	18-Oct-16	26-Oct-16	31-Oct-16	10-Nov-16	7-Dec-16	5x30 Average	Average	Max
Parameter	Unit									
SO4-D	mg/L	3.97	2.07	1.45	2.31	1.53	4.16	2	128	-
Alk-T	mg/L	36.0	27.5	24.6	31.3	27.8	30.7	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	5	25
Al-T	mg/L	0.0633	0.0797	0.147	0.0784	0.0920	0.0518	-	-	-
As-T	mg/L	0.00053	0.00034	0.00029	0.00033	0.00028	0.00040	-	-	0.005
Ba-T	mg/L	0.0026	0.0024	0.0026	0.0025	0.0023	0.0024	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	0.000022	0.000026	0.000019	0.000021	0.000014	-	-	-
Ca-T	mg/L	13.4	10.8	9.24	11.3	9.46	11.7	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	0.004	0.11
Cu-T	mg/L	0.00064	0.00066	0.00089	0.00062	0.00080	0.00066	0.0007	0.0011	0.0046
Hard-T	mg/L	36.7	29.8	25.6	30.8	26.1	32.0	**30**	-	-
Fe-T	mg/L	0.031	0.039	0.114	0.026	0.035	0.018	-	-	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	0.003	0.005
Mg-T	mg/L	0.760	0.665	0.609	0.652	0.592	0.701	-	-	-
Mn-T	mg/L	<0.0010	0.0012	0.0031	<0.0010	0.0013	<0.0010	0.0015	0.7	0.8
Hg-T	mg/L	0.0000042	<0.0000020	0.0000024	<0.0000020	0.0000026	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.129	0.191	0.186	0.182	0.185	0.153	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	0.00029	0.00023	0.00014	0.00021	0.00016	0.00022	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	0.00005	0.0001
Na-T	mg/L	0.816	0.908	0.809	0.865	0.798	0.951	-	-	-
Sr-T	mg/L	0.0442	0.0409	0.0340	0.0382	0.0323	0.0442	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.0075	0.033
Al-D	mg/L	0.0512	0.0754	0.105	0.0640	0.0869	0.0478	**0.0765**	0.05	0.1
As-D	mg/L	0.00046	0.00037	0.00027	0.00037	0.00029	0.00040	-	-	-
Ba-D	mg/L	0.0025	0.0025	0.0025	0.0024	0.0023	0.0023	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000140	0.0000160	0.0000229	0.0000180	0.0000180	0.0000120	0.000018	0.00008	0.00016
Ca-D	mg/L	13.0	11.1	9.08	11.2	9.79	11.4	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00059	0.00071	0.00080	0.00085	0.00081	0.00067	-	-	-
Hard-D	mg/L	35.6	30.4	25.1	30.7	26.8	31.1	-	-	-
Fe-D	mg/L	0.0162	0.0221	0.0331	0.0159	0.0217	0.0131	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.741	0.650	0.588	0.671	0.570	0.659	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	0.0000029	0.0000067	0.0000027	0.0000024	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.169	0.181	0.188	0.173	0.191	0.140	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	0.00027	0.00022	0.00013	0.00022	0.00015	0.00021	-	-	-
Na-D	mg/L	0.902	0.830	0.831	0.884	0.750	0.903	-	-	-
Sr-D	mg/L	0.0429	0.0391	0.0323	0.0402	0.0357	0.0404	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 153
2016-2017 Annual Report

EMS ID	E297230	Iron River Upstream of Mining Operations			Water Quality Guidelines
Site Description		Monthly Samples			
Site Name	IR1				
Date		26-Jan-17	1-Feb-17	22-Mar-17	Max
Parameter	Unit				
SO4-D	mg/L	4.18	Snow and ice posed extreme danger for samplers. Access was not possible.	3.73	-
Alk-T	mg/L	29.3		26.5	-
Acidity 8.3	mg/L	<0.50		<0.50	-
TSS	mg/L	<4.0		<4.0	25
Al-T	mg/L	0.0497		0.0679	-
As-T	mg/L	0.00039		0.00036	0.005
Ba-T	mg/L	0.0022		0.0024	5
B-T	mg/L	<0.050		<0.050	-
Cd-T	mg/L	0.000013		0.000011	-
Ca-T	mg/L	11.4		9.8	-
Cr-T	mg/L	<0.0010		<0.0010	-
Co-T	mg/L	<0.00050		<0.00020	0.11
Cu-T	mg/L	<0.00050		0.0007	0.007
Hard-T	mg/L	31.2		27	-
Fe-T	mg/L	0.015		0.019	1
Pb-T	mg/L	<0.00020		<0.00020	0.004
Mg-T	mg/L	0.674		0.606	-
Mn-T	mg/L	<0.0010		<0.0010	0.8
Hg-T	mg/L	<0.0000020		<0.0000020	0.00001
Mo-T	mg/L	<0.0010		<0.0010	2
Ni-T	mg/L	<0.0010		<0.0010	0.025
K-T	mg/L	0.154		0.161	-
S-T	mg/L	<3.0		<3.0	-
Se-T	mg/L	0.00024		0.00026	-
Ag-T	mg/L	<0.000020		<0.000020	0.0001
Na-T	mg/L	0.947		0.917	-
Sr-T	mg/L	0.0362		0.0328	-
Zn-T	mg/L	<0.0050		<0.0050	0.033
Al-D	mg/L	0.0425		0.0505	0.1
As-D	mg/L	0.00035		0.00037	-
Ba-D	mg/L	0.0022		0.002	-
B-D	mg/L	<0.050		<0.050	-
Cd-D	mg/L	0.0000129		0.000012	0.000017
Ca-D	mg/L	10.9		9.76	-
Cr-D	mg/L	<0.0010		<0.0010	-
Co-D	mg/L	<0.00050		<0.00020	-
Cu-D	mg/L	0.00041		0.00058	-
Hard-D	mg/L	29.9		27.3	-
Fe-D	mg/L	0.0094		0.013	0.35
Pb-D	mg/L	<0.00020		<0.00020	-
Mg-D	mg/L	0.671		0.705	-
Mn-D	mg/L	<0.0010		<0.0010	-
Hg-D	mg/L	<0.0000020		<0.0000020	-
Mo-D	mg/L	<0.0010		<0.0010	-
Ni-D	mg/L	<0.0010		<0.0010	-
K-D	mg/L	0.143		0.177	-
S-D	mg/L	<3.0		<3.0	-
Se-D	mg/L	0.00024		0.00019	-
Na-D	mg/L	0.953		1.07	-
Sr-D	mg/L	0.0376		0.0344	-
Zn-D	mg/L	<0.0050		<0.0050	-

Table 154
2016-2017 Annual Report

EMS ID	E297231	Iron River Upstream of Proposed 7SA5 & Upstream of Reclaimed 242 Mine								
Site Description		5 in 30 Weekly Samples					Monthly		Water Quality Guidelines	
Site Name	IR6									
Date		12-Apr-16	19-Apr-16	27-Apr-16	3-May-16	10-May-16	15-Jun-16	5x30 Average	Average	Max
Parameter	Unit									
SO4-D	mg/L	<0.50	<0.50	1.38	<0.50	<0.50	3.94	1	128	-
Alk-T	mg/L	22.3	20.4	24.1	16.0	23.1	34.6	-	-	-
Acidity 8.3	mg/L	0.75	<0.50	<0.50	<0.50	1.34	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	5	25
Al-T	mg/L	0.0804	0.0944	0.0579	0.119	0.0562	0.0366	-	-	-
As-T	mg/L	0.00045	0.00036	0.00071	0.00043	0.00068	0.00133	-	-	0.005
Ba-T	mg/L	0.0071	0.0025	0.0032	0.0024	0.0027	0.0052	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	0.000019	0.000020	0.000013	0.000018	0.000014	<0.000010	-	0.000073	0.000132
Ca-T	mg/L	8.30	7.48	8.55	6.41	8.03	12.8	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	0.004	0.11
Cu-T	mg/L	0.00108	0.00095	0.00068	0.00090	0.00081	0.00114	0.0009	0.0009	0.0042
Hard-T	mg/L	23.0	20.9	24.1	18.1	22.5	35.9		-	-
Fe-T	mg/L	0.033	0.040	0.026	0.034	0.020	0.024	-	-	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	-	0.005
Mg-T	mg/L	0.555	0.547	0.665	0.502	0.588	0.981	-	-	-
Mn-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.7	0.8
Hg-T	mg/L	0.0000021	0.0000025	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.168	0.181	0.191	0.185	0.198	0.269	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	0.00013	<0.00010	0.00012	<0.00010	<0.00010	0.00016	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	0.00005	0.0001
Na-T	mg/L	0.615	0.904	0.810	0.632	0.688	1.26	-	-	-
Sr-T	mg/L	0.0263	0.0210	0.0275	0.0195	0.0247	0.0410	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.0075	0.03
Al-D	mg/L	0.0816	0.0914	0.0553	0.0759	0.0562	0.0326	0.0721	0.05	0.1
As-D	mg/L	0.00054	0.00042	0.00068	0.00050	0.00066	0.00126	-	-	-
Ba-D	mg/L	0.0025	0.0023	0.0029	0.0023	0.0026	0.0052	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000180	0.0000167	0.0000140	0.0000139	0.0000110	0.0000075	0.000015	0.000073	0.000132
Ca-D	mg/L	7.55	7.29	9.65	6.78	7.45	12.8	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00075	0.00087	0.00068	0.00088	0.00091	0.00079	-	-	-
Hard-D	mg/L	21.2	20.2	26.7	19.1	20.9	35.9	-	-	-
Fe-D	mg/L	0.0307	0.0295	0.0258	0.0232	0.0172	0.0168	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.573	0.492	0.624	0.531	0.552	0.952	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	0.0000024	0.0000025	<0.0000020	0.0000023	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.175	0.144	0.205	0.162	0.195	0.238	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	0.00012	<0.00010	0.00012	<0.00010	0.00019	0.00015	-	-	-
Na-D	mg/L	0.700	0.652	0.780	0.612	0.712	1.27	-	-	-
Sr-D	mg/L	0.0240	0.0234	0.0261	0.0196	0.0235	0.0383	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 155
2016-2017 Annual Report

EMS ID	E297231		Iron River Upstream of Proposed 7SA5 & Upstream of Reclaimed 242 Mine								
Site Description											
Site Name	IR6	Monthly	5 in 30 Weekly Samples					Monthly		Water Quality Guidelines	
Date		14-Jul-16	4-Aug-16	11-Aug-16	16-Aug-16	22-Aug-16	29-Aug-16	26-Sep-16	5x30 Average	Average	Max
Parameter	Unit										
SO4-D	mg/L	4.45	6.03	6.45	6.17	7.84	8.77	7.27	7	128	-
Alk-T	mg/L	40.7	59.0	55.9	58.9	67.0	67.3	48.0	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	-	-
Al-T	mg/L	0.0348	0.0220	0.0223	0.0205	0.0204	0.0218	0.0167	-	-	-
As-T	mg/L	0.00125	0.00275	0.00184	0.00300	0.00409	0.00435	0.00174	-	-	0.005
Ba-T	mg/L	0.0055	0.0077	0.0075	0.0088	0.0095	0.0109	0.0074	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	0.000012	0.000014	0.000011	<0.000010	0.000010	0.000011	<0.000010	-	-	-
Ca-T	mg/L	14.6	24.6	21.0	22.9	25.4	26.9	19.1	-	-	-
Cr-T	mg/L	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	0.004	0.11
Cu-T	mg/L	0.00099	0.00070	0.00077	0.00073	<0.00050	0.00094	0.00062	0.0007	0.003	0.009
Hard-T	mg/L	40.7	68.2	58.2	63.3	70.8	74.3	53.1		-	-
Fe-T	mg/L	0.016	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	0.003	0.005
Mg-T	mg/L	1.03	1.61	1.39	1.51	1.78	1.74	1.30	-	-	-
Mn-T	mg/L	<0.0010	0.0023	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0013	0.7	0.8
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.259	0.395	0.265	0.286	0.354	0.320	0.261	-	-	-
S-T	mg/L	<3.0	3.6	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	0.00021	0.00043	0.00033	0.00032	0.00038	0.00030	0.00033	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	0.00005	0.0001
Na-T	mg/L	1.37	1.97	1.81	2.05	2.39	2.56	2.00	-	-	-
Sr-T	mg/L	0.0474	0.0653	0.0612	0.0771	0.0834	0.0835	0.0655	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.0075	0.03
Al-D	mg/L	0.0320	0.0241	0.0236	0.0200	0.0172	0.0193	0.0171	0.0208	0.05	0.1
As-D	mg/L	0.00111	0.00247	0.00183	0.00295	0.00391	0.00426	0.00177	-	-	-
Ba-D	mg/L	0.0053	0.0081	0.0073	0.0087	0.0098	0.0107	0.0070	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000100	0.0000101	0.0000200	0.0000110	0.0000080	0.0000070	0.0000065	0.000011	0.000170	0.00043
Ca-D	mg/L	14.8	23.6	20.5	22.1	24.4	26.7	20.6	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00073	0.00053	0.00056	0.00054	0.00053	0.00075	0.00095	-	-	-
Hard-D	mg/L	41.0	65.8	56.4	61.1	68.0	74.2	56.9	-	-	-
Fe-D	mg/L	0.0144	<0.0050	0.0054	0.0050	<0.0050	<0.0050	0.0118	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.986	1.65	1.27	1.44	1.69	1.85	1.36	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	0.0000030	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.207	0.347	0.270	0.312	0.349	0.382	0.279	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	0.00026	0.00032	0.00035	0.00032	0.00035	0.00031	0.00032	-	-	-
Na-D	mg/L	1.31	1.96	1.60	1.80	2.33	2.68	2.04	-	-	-
Sr-D	mg/L	0.0445	0.0690	0.0669	0.0760	0.0870	0.0827	0.0635	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 156
2016-2017 Annual Report

EMS ID	E297231	Iron River Upstream of Proposed 7SA5 & Upstream of Reclaimed 242 Mine								
Site Description		5 in 30 Weekly Samples					Monthly		Water Quality Guidelines	
Site Name	IR6									
Date		12-Oct-16	18-Oct-16	26-Oct-16	31-Oct-16	10-Nov-16	7-Dec-16	5x30 Average	Average	Max
Parameter	Unit									
SO4-D	mg/L	2.15	0.57	0.71	1.28	0.86	3.35	1	128	-
Alk-T	mg/L	28.2	21.7	17.1	22.9	21.1	24.4	-	-	-
Acidity 8.3	mg/L	<0.50	1.11	<0.50	<0.50	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	5	25
Al-T	mg/L	0.0968	0.135	0.248	0.103	0.169	0.0791	-	-	-
As-T	mg/L	0.00085	0.00054	0.00046	0.00052	0.00046	0.00073	-	-	0.005
Ba-T	mg/L	0.0046	0.0043	0.0050	0.0042	0.0038	0.0038	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	0.000012	0.000023	0.000011	0.000011	<0.000010	-	-	-
Ca-T	mg/L	9.97	8.07	7.20	8.47	7.36	8.71	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	0.004	0.11
Cu-T	mg/L	0.00076	0.00110	0.00133	0.00075	0.00086	0.00100	0.0010	0.0011	0.0046
Hard-T	mg/L	28.4	23.2	20.8	24.1	21.1	25.0		-	-
Fe-T	mg/L	0.052	0.103	0.228	0.051	0.070	0.052	-	-	1.00
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	0.003	0.005
Mg-T	mg/L	0.852	0.741	0.686	0.719	0.649	0.780	-	-	-
Mn-T	mg/L	0.0014	0.0023	0.0057	0.0010	0.0021	<0.0010	0.0025	0.7	0.8
Hg-T	mg/L	<0.0000020	<0.0000020	0.0000026	0.0000083	0.0000029	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.160	0.231	0.266	0.215	0.205	0.179	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	0.00024	0.00017	0.00018	0.00015	0.00012	0.00014	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	0.00005	0.0001
Na-T	mg/L	0.969	0.961	0.908	0.972	0.882	1.10	-	-	-
Sr-T	mg/L	0.0362	0.0278	0.0270	0.0319	0.0258	0.0324	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.0075	0.033
Al-D	mg/L	0.0784	0.114	0.147	0.0924	0.113	0.0688	0.1090	0.05	0.1
As-D	mg/L	0.00070	0.00049	0.00040	0.00057	0.00045	0.00069	-	-	-
Ba-D	mg/L	0.0045	0.0042	0.0042	0.0041	0.0037	0.0036	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000100	0.0000100	0.0000161	0.0000080	0.0000140	0.0000070	0.000012	0.00008	0.00016
Ca-D	mg/L	9.52	8.38	7.34	8.21	7.23	8.02	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00076	0.00152	0.00112	0.00079	0.00086	0.00063	-	-	-
Hard-D	mg/L	27.1	23.9	21.1	23.5	20.6	22.9	-	-	-
Fe-D	mg/L	0.0388	0.0486	0.0650	0.0369	0.0412	0.0323	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.808	0.710	0.662	0.716	0.621	0.698	-	-	-
Mn-D	mg/L	<0.0010	0.0012	0.0014	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	0.0000034	0.0000055	0.0000051	0.0000026	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.193	0.222	0.241	0.199	0.213	0.176	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	0.00019	0.00017	0.00011	0.00014	0.00012	0.00015	-	-	-
Na-D	mg/L	1.04	0.917	0.945	0.955	0.832	0.995	-	-	-
Sr-D	mg/L	0.0345	0.0309	0.0261	0.0323	0.0283	0.0309	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 157
2016-2017 Annual Report

EMS ID	E297231	Iron River Upstream of Proposed 7SA5 & Upstream of Reclaimed 242 Mine			Water Quality Guidelines
Site Description		Monthly Samples			
Site Name	IR6				
Date		26-Jan-17	1-Feb-17	22-Mar-17	Max
Parameter	Unit				
SO4-D	mg/L	2.77	Snow and ice posed extreme danger for samplers. Access was not possible.	2.19	-
Alk-T	mg/L	20.9		20.1	-
Acidity 8.3	mg/L	<0.50		<0.50	-
TSS	mg/L	<4.0		<4.0	25
Al-T	mg/L	0.0821		0.0558	-
As-T	mg/L	0.0007		0.00053	0.005
Ba-T	mg/L	0.0038		0.0031	5
B-T	mg/L	<0.050		<0.050	-
Cd-T	mg/L	<0.000010		<0.000010	-
Ca-T	mg/L	7.72		6.31	-
Cr-T	mg/L	<0.0010		<0.0010	-
Co-T	mg/L	<0.00050		<0.00020	0.11
Cu-T	mg/L	0.0006		<0.00050	0.007
Hard-T	mg/L	22.2		18	-
Fe-T	mg/L	0.044		0.032	1
Pb-T	mg/L	<0.00020		<0.00020	0.004
Mg-T	mg/L	0.712		0.543	-
Mn-T	mg/L	<0.0010		<0.0010	0.8
Hg-T	mg/L	<0.0000020		<0.0000020	0.00001
Mo-T	mg/L	<0.0010		<0.0010	2
Ni-T	mg/L	<0.0010		<0.0010	0.025
K-T	mg/L	0.184		0.154	-
S-T	mg/L	<3.0		<3.0	-
Se-T	mg/L	0.00015		0.00013	-
Ag-T	mg/L	<0.000020		<0.000020	0.0001
Na-T	mg/L	1.04		0.825	-
Sr-T	mg/L	0.028		0.0222	-
Zn-T	mg/L	<0.0050		<0.0050	0.033
Al-D	mg/L	0.0683		0.0693	0.1
As-D	mg/L	0.00070		0.00060	-
Ba-D	mg/L	0.0034		0.0035	-
B-D	mg/L	<0.050		<0.050	-
Cd-D	mg/L	0.0000065		0.000007	0.000017
Ca-D	mg/L	7.65		7.39	-
Cr-D	mg/L	<0.0010		<0.0010	-
Co-D	mg/L	<0.00050		<0.00020	-
Cu-D	mg/L	0.00059		0.00067	-
Hard-D	mg/L	22.2		21.2	-
Fe-D	mg/L	0.0266		0.0386	0.35
Pb-D	mg/L	<0.00020		<0.00020	-
Mg-D	mg/L	0.766		0.674	-
Mn-D	mg/L	<0.0010		<0.0010	-
Hg-D	mg/L	<0.0000020		<0.0000020	-
Mo-D	mg/L	<0.0010		<0.0010	-
Ni-D	mg/L	<0.0010		<0.0010	-
K-D	mg/L	0.197		0.186	-
S-D	mg/L	<3.0		<3.0	-
Se-D	mg/L	0.00012		0.00015	-
Na-D	mg/L	1.09		1.01	-
Sr-D	mg/L	0.0285		0.0267	-
Zn-D	mg/L	<0.0050		<0.0050	-

Table 158
2016-2017 Annual Report

EMS ID	E297232	Iron River Downstream of Proposed 7SA5 & Reclaimed 242 Mine								
Site Description		5 in 30 Weekly Samples					Monthly		Water Quality Guidelines	
Site Name	IR8									
Date		12-Apr-16	19-Apr-16	27-Apr-16	3-May-16	10-May-16	15-Jun-16	5x30 Average	Average	Max
Parameter	Unit									
SO4-D	mg/L	<0.50	<0.50	1.57	<0.50	<0.50	4.05	2	128	-
Alk-T	mg/L	23.3	17.2	25.2	16.7	23.1	36.0	-	-	-
Acidity 8.3	mg/L	0.80	<0.50	<0.50	0.57	1.61	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	5	25
Al-T	mg/L	0.0780	0.0939	0.0554	0.0845	0.0571	0.0340	-	-	-
As-T	mg/L	0.00074	0.00058	0.00113	0.00071	0.00124	0.00252	-	-	0.005
Ba-T	mg/L	0.0032	0.0026	0.0037	0.0026	0.0029	0.0056	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	0.000015	0.000021	0.000012	0.000018	0.000014	<0.000010	-	-	-
Ca-T	mg/L	8.21	7.07	8.52	6.57	8.20	13.4	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	0.004	0.11
Cu-T	mg/L	0.00094	0.00140	0.00068	0.00100	0.00085	0.00117	0.0010	0.0009	0.0042
Hard-T	mg/L	22.9	20.0	24.2	18.6	23.1	37.7		-	-
Fe-T	mg/L	0.030	0.052	0.024	0.037	0.018	0.023	-	-	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	-	0.005
Mg-T	mg/L	0.592	0.571	0.694	0.524	0.624	1.01	-	-	-
Mn-T	mg/L	<0.0010	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.7	0.8
Hg-T	mg/L	0.0000023	0.0000031	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.255	0.190	0.194	0.179	0.196	0.298	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	0.00016	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	0.00005	0.0001
Na-T	mg/L	0.717	0.728	0.933	0.662	0.798	1.51	-	-	-
Sr-T	mg/L	0.0273	0.0213	0.0287	0.0198	0.0250	0.0432	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.0075	0.03
Al-D	mg/L	0.0865	0.0909	0.0527	0.0769	0.0556	0.0129	**0.0725**	0.05	0.1
As-D	mg/L	0.00074	0.00067	0.00117	0.00078	0.00114	0.00051	-	-	-
Ba-D	mg/L	0.0030	0.0026	0.0035	0.0025	0.0030	0.0032	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000200	0.0000175	0.0000150	0.0000130	0.0000100	<0.0000050	0.000015	0.000073	0.000132
Ca-D	mg/L	8.03	6.96	9.44	6.64	7.75	12.1	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00113	0.00094	0.00081	0.00091	0.00090	0.00046	-	-	-
Hard-D	mg/L	22.6	19.7	26.4	18.8	21.9	34.7	-	-	-
Fe-D	mg/L	0.0299	0.0310	0.0237	0.0228	0.0207	0.0460	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.617	0.563	0.693	0.540	0.626	1.54	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	0.0000021	0.0000024	<0.0000020	0.0000025	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.227	0.189	0.188	0.181	0.187	0.224	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	13.1	-	-	-
Se-D	mg/L	<0.00010	<0.00010	0.00011	<0.00010	0.00010	<0.00010	-	-	-
Na-D	mg/L	0.776	0.775	0.938	0.653	0.809	13.3	-	-	-
Sr-D	mg/L	0.0247	0.0230	0.0272	0.0199	0.0244	0.0607	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	0.0096	<0.0050	<0.0050	<0.0050	-	-	-

Table 159
2016-2017 Annual Report

EMS ID	E297232		Iron River Downstream of Proposed 7SA5 & Reclaimed 242 Mine							Water Quality Guidelines	
Site Description			5 in 30 Weekly Samples								
Site Name	IR8	Monthly									
Date		14-Jul-16	4-Aug-16	11-Aug-16	16-Aug-16	22-Aug-16	29-Aug-16	26-Sep-16	5x30 Average	Average	Max
Parameter	Unit										
SO4-D	mg/L	4.25	5.98	6.68	6.23	7.95	9.02	8.02	7	128	-
Alk-T	mg/L	41.6	60.3	55.3	59.6	67.8	68.8	50.2	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	<0.50	0.60	<0.50	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	-	-
Al-T	mg/L	0.0322	0.0224	0.0200	0.0206	0.0194	0.0162	0.0143	-	-	-
As-T	mg/L	0.00212	0.00556	0.00356	0.00599	0.00803	0.00886	0.00342	-	-	0.005
Ba-T	mg/L	0.0057	0.0089	0.0086	0.0099	0.0103	0.0113	0.0082	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.053	<0.050	-	-	-
Cd-T	mg/L	0.000012	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	14.1	25.1	21.9	22.8	25.2	28.2	18.8	-	-	-
Cr-T	mg/L	<0.0010	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	0.004	0.11
Cu-T	mg/L	0.00095	0.00062	0.00086	0.00080	0.00073	0.00079	0.00057	0.0008	0.003	0.009
Hard-T	mg/L	39.3	69.4	60.6	63.5	70.1	78.1	52.7		-	-
Fe-T	mg/L	0.015	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	-	-	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	0.003	0.005
Mg-T	mg/L	1.02	1.63	1.47	1.56	1.74	1.84	1.37	-	-	-
Mn-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.7	0.8
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.259	0.348	0.267	0.311	0.362	0.331	0.272	-	-	-
S-T	mg/L	<3.0	3.1	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	0.00027	0.00041	0.00031	0.00030	0.00027	0.00029	0.00030	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	0.00005	0.0001
Na-T	mg/L	1.38	2.35	2.12	2.66	3.22	3.43	2.16	-	-	-
Sr-T	mg/L	0.0452	0.0677	0.0618	0.0813	0.0872	0.0870	0.0663	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.0075	0.03
Al-D	mg/L	0.0293	0.0232	0.0221	0.0178	0.0195	0.0180	0.0140	0.0201	0.05	0.1
As-D	mg/L	0.00195	0.00485	0.00363	0.00586	0.00759	0.00906	0.00345	-	-	-
Ba-D	mg/L	0.0059	0.0088	0.0083	0.0095	0.0105	0.0110	0.0079	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.052	<0.050	-	-	-
Cd-D	mg/L	0.0000060	0.0000123	<0.0000050	0.0000080	0.0000070	0.0000068	0.0000064	0.000008	0.000170	0.00043
Ca-D	mg/L	14.5	24.0	21.0	23.2	24.7	26.4	20.7	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00077	0.00059	0.00090	0.00065	0.00066	0.00064	0.00056	-	-	-
Hard-D	mg/L	40.4	67.1	57.9	64.2	68.9	74.1	57.8	-	-	-
Fe-D	mg/L	0.0154	<0.0050	<0.0050	<0.0050	<0.0050	0.0054	0.0090	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.00	1.72	1.32	1.55	1.75	1.98	1.47	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.218	0.319	0.271	0.302	0.336	0.393	0.273	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	3.1	<3.0	<3.0	-	-	-
Se-D	mg/L	0.00027	0.00029	0.00033	0.00031	0.00032	0.00042	0.00027	-	-	-
Na-D	mg/L	1.40	2.39	1.82	2.47	3.13	3.65	2.23	-	-	-
Sr-D	mg/L	0.0458	0.0704	0.0682	0.0766	0.0839	0.0868	0.0635	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 160
2016-2017 Annual Report

EMS ID	E297232									
Site Description		Iron River Downstream of Proposed 7SA5 & Reclaimed 242 Mine								
Site Name	IR8	5 in 30 Weekly Samples					Monthly		Water Quality Guidelines	
Date		12-Oct-16	18-Oct-16	26-Oct-16	31-Oct-16	10-Nov-16	7-Dec-16	5x30 Average	Average	Max
Parameter	Unit									
SO4-D	mg/L	2.09	0.99	1.40	1.00	1.06	2.88	1	128	-
Alk-T	mg/L	29.0	21.8	16.2	23.4	21.4	22.7	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	7.0	<4.0	<4.0	<4.0	4.6	5	25
Al-T	mg/L	0.113	0.119	0.226	0.0968	0.125	0.0763	-	-	-
As-T	mg/L	0.00121	0.00064	0.00048	0.00077	0.00054	0.00116	-	-	0.005
Ba-T	mg/L	0.0052	0.0041	0.0041	0.0042	0.0037	0.0041	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	0.000017	0.000013	0.000019	0.000010	0.000013	<0.000010	-	-	-
Ca-T	mg/L	9.84	7.69	6.53	8.41	7.11	8.53	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	0.004	0.11
Cu-T	mg/L	0.00113	0.00118	0.00145	0.00096	0.00080	0.00077	0.0011	0.0011	0.0046
Hard-T	mg/L	28.0	22.4	19.1	24.2	20.6	24.7		-	-
Fe-T	mg/L	0.089	0.077	0.206	0.051	0.069	0.044	-	-	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	0.003	0.005
Mg-T	mg/L	0.822	0.786	0.679	0.777	0.692	0.814	-	-	-
Mn-T	mg/L	0.0033	0.0020	0.0060	0.0013	0.0019	<0.0010	0.0029	0.7	0.8
Hg-T	mg/L	<0.0000020	0.0000049	0.0000027	0.0000022	0.0000030	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.208	0.232	0.226	0.193	0.189	0.172	-	-	-
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-T	mg/L	0.00019	0.00012	0.00015	0.00014	0.00011	0.00014	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	0.00005	0.0001
Na-T	mg/L	0.995	1.07	0.879	1.08	0.987	1.21	-	-	-
Sr-T	mg/L	0.0368	0.0275	0.0227	0.0304	0.0253	0.0311	-	-	-
Zn-T	mg/L	0.0056	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.0075	0.033
Al-D	mg/L	0.0774	0.0988	0.133	0.0810	0.101	0.0624	0.0982	0.05	0.1
As-D	mg/L	0.00103	0.00062	0.00041	0.00071	0.00053	0.00116	-	-	-
Ba-D	mg/L	0.0050	0.0041	0.0039	0.0041	0.0036	0.0037	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	0.0000150	0.0000080	0.0000138	0.0000100	0.0000120	0.0000080	0.000012	0.00010	0.00020
Ca-D	mg/L	9.76	7.96	7.08	8.06	7.21	8.24	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00088	0.00079	0.00093	0.00078	0.00089	0.00065	-	-	-
Hard-D	mg/L	27.8	23.0	20.8	23.3	20.8	23.7	-	-	-
Fe-D	mg/L	0.0397	0.0413	0.0545	0.0318	0.0386	0.0353	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	0.843	0.752	0.756	0.765	0.673	0.766	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	0.0013	<0.0010	0.0010	<0.0010	-	-	-
Hg-D	mg/L	<0.0000020	0.0000024	0.0000038	0.0000025	0.0000029	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.220	0.197	0.203	0.186	0.194	0.157	-	-	-
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-
Se-D	mg/L	0.00019	0.00015	<0.00010	0.00013	0.00012	0.00014	-	-	-
Na-D	mg/L	1.11	1.01	1.07	1.07	0.922	1.12	-	-	-
Sr-D	mg/L	0.0338	0.0294	0.0258	0.0304	0.0266	0.0299	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 161
2016-2017 Annual Report

EMS ID	E297232	Iron River Downstream of Proposed 7SA5 & Reclaimed 242 Mine Monthly Samples			Water Quality Guidelines
Site Description					
Site Name	IR8				
Date		26-Jan-17	1-Feb-17	22-Mar-17	Max
Parameter	Unit				
SO4-D	mg/L	2.53	Snow and ice posed extreme danger for samplers. Access was not possible.	2.22	-
Alk-T	mg/L	21.8		18.1	-
Acidity 8.3	mg/L	<0.50		<0.50	-
TSS	mg/L	<4.0		<4.0	25
Al-T	mg/L	0.0771		0.0625	-
As-T	mg/L	0.0010		0.00083	0.005
Ba-T	mg/L	0.0038		0.0036	5
B-T	mg/L	<0.050		<0.050	-
Cd-T	mg/L	<0.000010		0.00001	-
Ca-T	mg/L	7.31		7.16	-
Cr-T	mg/L	<0.0010		<0.0010	-
Co-T	mg/L	<0.00050		<0.00020	0.11
Cu-T	mg/L	0.00056		0.00053	0.007
Hard-T	mg/L	21.3		20.7	-
Fe-T	mg/L	0.041		0.032	1
Pb-T	mg/L	<0.00020		<0.00020	0.004
Mg-T	mg/L	0.74		0.681	-
Mn-T	mg/L	0.0011		<0.0010	0.8
Hg-T	mg/L	<0.0000020		<0.0000020	0.00001
Mo-T	mg/L	<0.0010		<0.0010	2
Ni-T	mg/L	<0.0010		<0.0010	0.025
K-T	mg/L	0.176		0.169	-
S-T	mg/L	<3.0		<3.0	-
Se-T	mg/L	0.00013		0.0002	-
Ag-T	mg/L	<0.000020		<0.000020	0.0001
Na-T	mg/L	1.12		1.04	-
Sr-T	mg/L	0.0268		0.0253	-
Zn-T	mg/L	<0.0050		<0.0050	0.033
Al-D	mg/L	0.063		0.0655	0.1
As-D	mg/L	0.00094		0.00089	-
Ba-D	mg/L	0.0035		0.004	-
B-D	mg/L	<0.050		<0.050	-
Cd-D	mg/L	0.0000065		0.000007	0.000017
Ca-D	mg/L	7.99		7.99	-
Cr-D	mg/L	<0.0010		<0.0010	-
Co-D	mg/L	<0.00050		<0.00020	-
Cu-D	mg/L	0.00046		0.00067	-
Hard-D	mg/L	23.3		23	-
Fe-D	mg/L	0.0281		0.0336	0.35
Pb-D	mg/L	<0.00020		<0.00020	-
Mg-D	mg/L	0.803		0.727	-
Mn-D	mg/L	<0.0010		<0.0010	-
Hg-D	mg/L	<0.0000020		<0.0000020	-
Mo-D	mg/L	<0.0010		<0.0010	-
Ni-D	mg/L	<0.0010		<0.0010	-
K-D	mg/L	0.160		0.175	-
S-D	mg/L	<3.0		<3.0	-
Se-D	mg/L	0.00014		0.00013	-
Na-D	mg/L	1.16		1.06	-
Sr-D	mg/L	0.0273		0.0271	-
Zn-D	mg/L	<0.0050		0.0129	-

Table 162
2016-2017 Annual Report

EMS ID	E299256									
Site Description		Quinsam River Downstream of the Confluence with Iron River								
Site Name	IRQR	5 in 30 Weekly Samples					Monthly		Water Quality Guidelines	
Date		12-Apr-16	19-Apr-16	27-Apr-16	3-May-16	10-May-16	15-Jun-16	5x30 Average	Average	Max
Parameter										
SO4-D	mg/L	14.3	15.0	23.1	18.1	23.7	22.1	19	128	-
Alk-T	mg/L	30.5	28.8	30.9	28.5	33.1	35.3	-	-	-
Acidity 8.3	mg/L	0.67	<0.50	<0.50	0.73	1.58	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	5	25
Al-T	mg/L	0.0448	0.0557	0.0247	0.0525	0.0267	0.0264	-	-	-
As-T	mg/L	0.00054	0.00049	0.00053	0.00048	0.00063	0.00082	-	-	0.005
Ba-T	mg/L	0.0034	0.0028	0.0033	0.0030	0.0034	0.0040	-	-	-
B-T	mg/L	<0.050	0.051	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	10.7	10.0	11.0	9.67	11.9	13.0	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	-	0.05
Cu-T	mg/L	0.00119	0.00074	0.00063	0.00073	0.00071	0.00111	0.0008	0.0009	0.0042
Hard-T	mg/L	30.8	29.8	32.7	28.6	35.0	39.2		-	-
Fe-T	mg/L	0.048	0.056	0.055	0.071	0.053	0.111	-	-	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	0.003	0.005
Mg-T	mg/L	1.01	1.17	1.27	1.09	1.25	1.64	-	-	-
Mn-T	mg/L	0.0031	0.0031	0.0036	0.0040	0.0040	0.0079	0.0036	0.7	0.8
Hg-T	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.198	0.223	0.234	0.214	0.244	0.298	-	-	-
S-T	mg/L	6.8	6.6	8.2	7.3	8.3	10.0	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	0.0001
Na-T	mg/L	7.07	8.30	10.2	8.16	10.2	11.2	-	-	-
Sr-T	mg/L	0.0489	0.0437	0.0568	0.0482	0.0573	0.0693	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.0075	0.03
Al-D	mg/L	0.0392	0.0514	0.0230	0.0393	0.0267	0.0127	0.0359	0.05	0.1
As-D	mg/L	0.00054	0.00047	0.00054	0.00043	0.00057	0.00059	-	-	-
Ba-D	mg/L	0.0028	0.0029	0.0031	0.0035	0.0035	0.0043	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	-	-	-
Cd-D	mg/L	0.0000050	0.0000055	<0.0000050	0.0000072	<0.0000050	<0.0000050	0.000006	0.000073	0.000132
Ca-D	mg/L	10.1	9.52	11.1	10.6	11.3	12.5	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00071	0.00071	0.00059	0.00066	0.00068	0.00071	-	-	-
Hard-D	mg/L	29.4	28.1	32.7	31.5	33.5	37.3	-	-	-
Fe-D	mg/L	0.0421	0.0435	0.0405	0.0403	0.0480	0.0500	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.03	1.04	1.24	1.20	1.31	1.46	-	-	-
Mn-D	mg/L	0.0025	0.0023	0.0020	0.0033	0.0035	0.0018	-	-	-
Hg-D	mg/L	<0.000002	<0.000002	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.221	0.218	0.244	0.204	0.228	0.211	-	-	-
S-D	mg/L	4.4	3.4	8.9	6.0	7.2	8.6	-	-	-
Se-D	mg/L	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	7.89	8.11	10.1	9.03	10.9	9.52	-	-	-
Sr-D	mg/L	0.0431	0.0461	0.0520	0.0490	0.0569	0.0575	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 163
2016-2017 Annual Report

EMS ID	E299256		Quinsam River Downstream of the Confluence with Iron River								
Site Description			5 in 30 Weekly Samples							Water Quality Guidelines	
Site Name	IRQR	Monthly						Monthly			
Date		14-Jul-16	4-Aug-16	11-Aug-16	16-Aug-16	22-Aug-16	29-Aug-16	26-Sep-16	5x30 Average	Average	Max
Parameter	Unit										
SO4-D	mg/L	24.9	28.0	24.2	23.8	23.4	23.6	30.0	25	128	-
Alk-T	mg/L	34.8	38.4	35.5	35.1	33.9	32.7	36.6	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	-	-
Al-T	mg/L	0.0183	0.0148	0.0134	0.0147	0.0138	0.0115	0.0120	-	-	-
As-T	mg/L	0.00067	0.00054	0.00056	0.00052	0.00063	0.00045	0.00058	-	-	0.005
Ba-T	mg/L	0.0040	0.0040	0.0041	0.0035	0.0039	0.0030	0.0038	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	0.052	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	13.0	13.7	13.0	12.1	11.6	11.4	14.1	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	-	0.05
Cu-T	mg/L	0.00061	<0.00050	0.00112	0.00064	<0.00050	0.00066	0.00057	0.0007	0.003	0.009
Hard-T	mg/L	38.8	41.3	39.1	36.3	35.2	34.1	42.3		-	-
Fe-T	mg/L	0.079	0.087	0.091	0.091	0.082	0.081	0.100	-	-	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	0.003	0.005
Mg-T	mg/L	1.55	1.73	1.58	1.50	1.50	1.39	1.74	-	-	-
Mn-T	mg/L	0.0065	0.0063	0.0063	0.0068	0.0062	0.0055	0.0068	0.0062	0.7	0.8
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.228	0.216	0.220	0.214	0.304	0.237	0.329	-	-	-
S-T	mg/L	8.8	9.8	8.4	9.8	10.5	8.1	11.4	-	-	-
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	0.0001
Na-T	mg/L	8.10	14.4	12.1	11.3	12.1	11.9	14.3	-	-	-
Sr-T	mg/L	0.0669	0.0659	0.0576	0.0609	0.0588	0.0556	0.0682	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.0075	0.03
Al-D	mg/L	0.0144	0.0120	0.0112	0.0090	0.0145	0.0102	0.0094	0.0114	0.05	0.1
As-D	mg/L	0.00059	0.00046	0.00068	0.00053	0.00048	0.00050	0.00057	-	-	-
Ba-D	mg/L	0.0040	0.0038	0.0040	0.0037	0.0030	0.0030	0.0046	-	-	-
B-D	mg/L	<0.050	0.051	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	0.000170	0.00043
Ca-D	mg/L	14.2	13.9	12.7	12.3	11.4	11.5	14.3	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00059	0.00037	0.00060	0.00042	0.00048	0.00064	0.00047	-	-	-
Hard-D	mg/L	41.9	42.0	38.4	36.7	34.3	34.9	43.2	-	-	-
Fe-D	mg/L	0.0431	0.0452	0.0482	0.0508	0.0514	0.0570	0.0858	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.57	1.79	1.62	1.45	1.42	1.52	1.79	-	-	-
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	0.0052	0.0035	0.0027	0.0044	-	-	-
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.221	0.264	0.268	0.224	0.223	0.287	0.315	-	-	-
S-D	mg/L	9.2	10.8	6.5	8.7	7.9	9.2	10.4	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	8.75	15.0	11.3	11.6	12.0	13.4	14.6	-	-	-
Sr-D	mg/L	0.0634	0.0667	0.0638	0.0610	0.0594	0.0556	0.0683	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 164
2016-2017 Annual Report

EMS ID	E299256	Quinsam River Downstream of the Confluence with Iron River								
Site Description		5 in 30 Weekly Samples					Monthly		Water Quality Guidelines	
Site Name	IRQR									
Date		12-Oct-16	18-Oct-16	26-Oct-16	31-Oct-16	10-Nov-16	7-Dec-16	5x30 Average	Average	Max
Parameter	Unit									
SO4-D	mg/L	22.1	12.8	13.5	14.3	10.4	22.0	15	128	-
Alk-T	mg/L	30.4	24.3		27.3	21.8	30.5	-	-	-
Acidity 8.3	mg/L	<0.50	<0.50		<0.50	<0.50	<0.50	-	-	-
TSS	mg/L	<4.0	4.3	<4.0	<4.0	<4.0	<4.0	4.1	5	25
Al-T	mg/L	0.0625	0.0875	0.161	0.0688	0.0716	0.0468	-	-	-
As-T	mg/L	0.00079	0.00053	0.00045	0.00057	0.00029	0.00049	-	-	0.005
Ba-T	mg/L	0.0041	0.0037	0.0040	0.0036	0.0025	0.0030	-	-	-
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-T	mg/L	<0.000010	0.000010	0.000012	<0.000010	<0.000010	<0.000010	-	-	-
Ca-T	mg/L	11.2	8.67	8.52	9.05	7.77	11.3	-	-	-
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	-	0.05
Cu-T	mg/L	0.00076	0.00096	0.00118	0.00076	0.00088	0.00089	0.0009	0.0011	0.0046
Hard-T	mg/L	33.8	26.3	25.7	27.3	23.7	34.4		-	-
Fe-T	mg/L	0.095	0.100	0.159	0.091	0.068	0.087	-	-	1
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	0.003	0.005
Mg-T	mg/L	1.41	1.12	1.08	1.15	1.03	1.48	-	-	-
Mn-T	mg/L	0.0060	0.0049	0.0052	0.0050	0.0030	0.0067	0.0048	0.7	0.8
Hg-T	mg/L	0.0000034	0.0000043	0.0000023	0.0000076	<0.0000020	<0.0000020	-	-	0.0001
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	0.025
K-T	mg/L	0.202	0.236	0.246	0.217	0.150	0.219	-	-	-
S-T	mg/L	5.5	3.7	4.2	4.6	3.4	8.2	-	-	-
Se-T	mg/L	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	-	0.0001
Na-T	mg/L	7.77	5.71	5.30	6.32	3.84	9.76	-	-	-
Sr-T	mg/L	0.0554	0.0452	0.0390	0.0447	0.0296	0.0531	-	-	-
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.0075	0.033
Al-D	mg/L	0.0390	0.0632	0.0923	0.0523	0.0468	0.0337	**0.0587**	0.05	0.1
As-D	mg/L	0.00057	0.00049	0.00035	0.00057	0.00027	0.00052	-	-	-
Ba-D	mg/L	0.0039	0.0036	0.0037	0.0035	0.0024	0.0029	-	-	-
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-
Cd-D	mg/L	<0.0000050	<0.0000050	0.0000076	<0.0000050	<0.0000050	<0.0000050	0.000006	0.000088	0.000170
Ca-D	mg/L	11.0	8.71	8.91	9.22	8.05	11.0	-	-	-
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Cu-D	mg/L	0.00065	0.00072	0.00091	0.00073	0.00085	0.00064	-	-	-
Hard-D	mg/L	33.3	26.4	27.0	27.8	24.1	32.8	-	-	-
Fe-D	mg/L	0.0568	0.0659	0.0659	0.0754	0.0358	0.0547	-	-	0.35
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-
Mg-D	mg/L	1.38	1.12	1.16	1.16	0.977	1.30	-	-	-
Mn-D	mg/L	0.0013	0.0027	0.0015	0.0032	0.0012	0.0050	-	-	-
Hg-D	mg/L	<0.0000020	0.0000054	0.0000038	0.0000052	<0.0000020	<0.0000020	-	-	-
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
K-D	mg/L	0.241	0.231	0.246	0.220	0.152	0.200	-	-	-
S-D	mg/L	7.4	4.4	5.8	4.9	3.6	7.4	-	-	-
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Na-D	mg/L	7.73	5.65	5.62	6.34	3.62	9.18	-	-	-
Sr-D	mg/L	0.0572	0.0428	0.0394	0.0451	0.0320	0.0509	-	-	-
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-

Table 165
2016-2017 Annual Report

EMS ID	E299256	Quinsam River Downstream of the Confluence with Iron River			Water Quality Guidelines
Site Description		Monthly Samples			
Site Name	IRQR				
Date		26-Jan-17	1-Feb-17	22-Mar-17	Max
Parameter	Unit				
SO4-D	mg/L	19.2	Snow and ice posed extreme danger for samplers. Access was not possible.	13.8	-
Alk-T	mg/L	28		25.7	-
Acidity 8.3	mg/L	<0.50		<0.50	-
TSS	mg/L	<4.0		<4.0	25
Al-T	mg/L	0.0578		0.0448	-
As-T	mg/L	0.00057		0.00053	0.005
Ba-T	mg/L	0.0031		0.0031	-
B-T	mg/L	<0.050		<0.050	-
Cd-T	mg/L	<0.000010		0.000013	-
Ca-T	mg/L	10.2		8.72	-
Cr-T	mg/L	<0.0010		<0.0010	-
Co-T	mg/L	<0.00050		<0.00020	0.05
Cu-T	mg/L	0.00064		0.00056	0.0046
Hard-T	mg/L	30.3		25.9	-
Fe-T	mg/L	0.071		0.053	1
Pb-T	mg/L	<0.00020		<0.00020	0.005
Mg-T	mg/L	1.2		0.993	-
Mn-T	mg/L	0.0039		0.0029	0.8
Hg-T	mg/L	<0.0000020		<0.0000020	0.0001
Mo-T	mg/L	<0.0010		<0.0010	-
Ni-T	mg/L	<0.0010		<0.0010	0.025
K-T	mg/L	0.232		0.173	-
S-T	mg/L	6.9		3.9	-
Se-T	mg/L	<0.00010		<0.00010	-
Ag-T	mg/L	<0.000020		<0.000020	0.0001
Na-T	mg/L	8.41		6.17	-
Sr-T	mg/L	0.0463		0.0390	-
Zn-T	mg/L	<0.0050		<0.0050	0.033
Al-D	mg/L	0.0397		0.0387	0.1
As-D	mg/L	0.00047		0.00054	-
Ba-D	mg/L	0.0029		0.0029	-
B-D	mg/L	<0.050		<0.050	-
Cd-D	mg/L	<0.0000050		<0.0000050	0.000170
Ca-D	mg/L	9.2		8.96	-
Cr-D	mg/L	<0.0010		<0.0010	-
Co-D	mg/L	<0.00050		<0.00020	-
Cu-D	mg/L	0.00058		0.00061	-
Hard-D	mg/L	28.1		27.0	-
Fe-D	mg/L	0.0382		0.049	0.35
Pb-D	mg/L	<0.00020		<0.00020	-
Mg-D	mg/L	1.23		1.11	-
Mn-D	mg/L	0.0023		0.0025	-
Hg-D	mg/L	<0.0000020		<0.0000020	-
Mo-D	mg/L	<0.0010		<0.0010	-
Ni-D	mg/L	<0.0010		<0.0010	-
K-D	mg/L	0.202		0.196	-
S-D	mg/L	5		5.7	-
Se-D	mg/L	<0.00010		<0.00010	-
Na-D	mg/L	8.84		6.82	-
Sr-D	mg/L	0.0491		0.0429	-
Zn-D	mg/L	<0.0050		<0.0050	-

Table 166
2016-2017 Annual Report

Nutrient Sampling for Select Rivers Sites

EMS ID: E0900504								
Site Name				**Middle Quinsam Lake Outlet**				
Stn.Code				**WB**				**VIO**
Date		**15-Jun-16**	**14-Jul-16**	**11-Aug-16**	**26-Sep-16**			**(M)**
P-T	**mg/L**	0.0026	0.0050	0.0021	0.0032			**0.01**
EMS ID: E219412								
Site Name				**Long Lake Outlet**				
Stn.Code				**LLO**				
Date		**12-Apr-16**	**19-Apr-16**	**15-Jun-16**	**14-Jul-16**	**11-Aug-16**	**20-Sep-16**	
P-T	**mg/L**	0.0024	0.0070	<0.002	0.0053	0.0032	0.0039	**0.01**
P-D	**mg/L**	0.0027	0.0079					
EMS ID: E292113								
Site Name				**7 South Quinsam River**				
Stn.Code				**7SQR**				
Date		**15-Jun-16**	**14-Jul-16**	**11-Aug-16**	**26-Sep-16**			
P-T	**mg/L**	0.0038	0.0049	0.0117	0.004			**0.01**
EMS ID: E217017								
Site Name				**No Name Lake Outlet**				
Stn.Code				**NNO**				
Date		**22-Aug-16**	**29-Aug-16**					
P-T	**mg/L**	0.0099	0.0066					**0.01**
P-D	**mg/L**	0.0084	0.0110					
N-NO2,3	**mg/L**	<0.020	<0.020					
Notes:								

Frequency of nutirent sampling is permitted for every three years (August through September). Parameters include Ammonia (NH_3), Nitate/ Nitrite ($N\text{-}NO_{2,3}$) combined & Phosphourous-total (P-T). Nutrient sampling was performed in 2015. Sampling in 2016 was established to monitor P-T at certain locations in the watershed from May through September.

Table 167
2016-17 Annual Report

Sediment Study Water Quality - Gooseneck Lake (GNL)

Site Description.		Deep Site				
Site ID.		GNL1	GNL5	GNL9	GNLB	Water Quality Guidelines
EMS ID:		1132502	1132502	1132502	1132502	
Date		7-Sep-2016	7-Sep-2016	7-Sep-2016	7-Sep-2016	Max
Depth (m)		1	5	9	14	
Parameter	Units					
Hard-D	mg/L	19.0	19.4	15.5	16.6	
Hard-T	mg/L	17.7	18.3	16.1	15.9	
Turb	NTU	0.19	0.23	0.42	0.26	
SO4-D	mg/L	0.61	0.67	<0.50	0.91	
Ag-D	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	**0.0001**
Al-D	mg/L	0.0176	0.0179	0.0271	0.0304	**0.1**
Al-T	mg/L	0.0161	0.0177	0.0304	0.0287	
As-D	mg/L	0.00043	0.00036	0.00029	0.00023	
As-T	mg/L	0.00021	0.00021	<0.00010	0.00013	**0.005**
Ba-D	mg/L	0.0033	0.0026	0.0026	0.0028	
Ba-T	mg/L	0.0029	0.0025	0.0029	0.0028	
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	
Be-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	
Bi-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	
Bi-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	
Ca-D	mg/L	6.32	6.50	5.09	5.55	
Ca-T	mg/L	5.93	6.07	5.35	5.26	
Cd-D	mg/L	0.0000051	<0.0000050	<0.0000050	<0.0000050	**0.00017**
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	**0.05**
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	
Cu-D	mg/L	0.00090	0.00090	0.00090	0.00065	
Cu-T	mg/L	0.00052	0.00067	0.00057	0.00062	**0.007**
Fe-D	mg/L	0.0223	0.0176	0.0117	0.0171	**0.35**
Fe-T	mg/L	0.026	0.029	0.028	0.030	**1**
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	**0.0001**
K-D	mg/L	0.082	0.103	0.075	0.085	
K-T	mg/L	0.080	0.076	0.085	0.090	
Li-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Li-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Mg-D	mg/L	0.784	0.775	0.684	0.677	
Mg-T	mg/L	0.709	0.768	0.657	0.669	
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	
Mn-T	mg/L	0.0022	0.0024	0.0030	0.0037	**0.8**
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	
Na-D	mg/L	1.02	0.955	0.948	0.964	
Na-T	mg/L	0.929	0.963	0.972	0.947	
Ni-D	mg/L	<0.0010	0.0018	<0.0010	<0.0010	
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	**0.025**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	**0.005**
Sb-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	
Sb-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	
Si-D	mg/L	1.98	2.00	2.04	2.81	
Si-T	mg/L	1.77	1.85	2.11	2.50	
Sn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Sn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Sr-D	mg/L	0.0128	0.0118	0.0105	0.0111	
Sr-T	mg/L	0.0129	0.0129	0.0109	0.0112	
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	
Ti-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Ti-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Tl-D	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	
Tl-T	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	
U-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	
U-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	
V-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
V-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	**0.03**
Zr-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	
Zr-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	

Table 168
2016-17 Annual Report

Sediment Study Water Quality - Gooseneck Lake PAH

Site Description.		Deep Site					
Site ID.		GNL1	GNL5	GNL9	GNLB		
EMS ID:.		1132502	1132502	1132502	1132502	Water Quality Guidelines	
Date		7-Sep-2016	7-Sep-2016	7-Sep-2016	7-Sep-2016	Average	Max
Depth (m)		1	5	9	14		
Parameter	Units						
2-Methlynaphlalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010		
Acenaphthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	**0.006**	
Acenaphthylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	**0.006**	
Acridine	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	**0.003**	
Anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	**0.004**	
Benzo(a)anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	**0.0001**	
Benzo(a)pyrene	mg/L	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	***0.00001***	
Benzo(b&j)fluoranthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050		
Benzo(g,h,i)prylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050		
Benzo(k)fluoranthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050		
Chrysene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050		
D10-ANTHRACENCE (sur.)	%	102	98	101	101		
TERPHENYL-D14(sur.)	%	97	92	97	97		
D8-ACENAPHTHYLENE(sur.)	%	102	101	103	104		
D8-NAPHTHALENE(sur.)	%	95	97	100	101		
D9-Acridine	%	90	87	88	89		
Fluoranthene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	**0.004**	
Fluorene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	**0.012**	
Indeno(1,2,3-c,d)pyrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050		
Naphthalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	**0.001**	
Dibenz(a,h)anthracene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050		
High Molecular Weight PAH`s	mg/L	<0.000050	<0.000050	<0.000050	<0.000050		
Low Molecular Weight PAH`s	mg/L	<0.00024	<0.00024	<0.00024	<0.00024		
PAH-Total	mg/L	<0.00024	<0.00024	<0.00024	<0.00024		
Phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	**0.0003**	
Pyrene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020		
Quinoline	mg/L	<0.00024	<0.00024	<0.00024	<0.00024		**0.0034**

Notes:

Lab Mean Detection Limits (LMDL) set higher than standard

R-denotes replicate sample

M-denotes regular monitoring

B-denotes 1 metre from bottom

Blue Bold - indicates concentration exceeds B.C. WQG for freshwater aquatic life

Average - indicates (Chronic) 30-day average BC WQG for freshwater aquatic life

Max - indicates (Acute) Maximum BC WQG for freshwater aquatic life

Table 169
2016-17 Annual Report

Sediment Study Water Quality - Gooseneck Lake Depth Profiling

Site Description	**Deep Site**
Site Name	**GNL**
EMS ID	**1132502**
Date	**7-Sep-16**

Depth (m)	Temp C	pH	C µS/cm	% Sat. %	D.O. mg/L	ORP mV
1	18.81	7.29	46	95.3	8.88	156.0
2	18.81	7.28	46	95.2	8.86	155.0
3	18.81	7.25	46	95.4	8.88	155.5
4	18.81	7.22	46	95.3	8.87	156.1
5	18.81	7.22	46	94.9	8.84	155.3
6	17.69	7.24	44	102.5	9.78	157.7
7	13.79	7.44	41	105.7	11	159.6
8	10.69	7.47	40	97.5	10.76	166.9
9	8.69	7.22	40	86	10.06	182.7
10	7.16	6.92	40	72.7	8.79	194.5
11	6.80	6.54	40	69.5	8.49	197.2
12	6.39	6.38	40	66	8.14	200.1
13	6.06	6.23	40	63.1	7.84	203.4
14	5.95	6.13	40	62.1	7.74	205.4
15	5.88	6.08	41	59.5	7.42	206.8

Table 170
2016-17 Annual Report

Sediment Study Water Quality - No Name Lake (NNL)

Site Description.		Inlet		Deep Site				Near Seep	Outlet	
Site ID.		NNLI	NNLI-Replicate	NNL1	NNL5	NNL9	NNLB	NNLNEARSEEP	NNLO	Water Quality Guidelines
EMS ID:		E224246	E224246	E217018	E217018	E217018	E217018	E292114	E217017	
Date		24-Aug-2016	24-Aug-2016	24-Aug-2016	24-Aug-2016	24-Aug-2016	24-Aug-2016	24-Aug-2016	24-Aug-2016	
Depth (m)		1	1	1	5	9	11	1	1	
Parameter	Units									Max
Hard-D	mg/L	18.3	17.5	17.7	12.4	12.4	12.8	17.4	18.2	
Hard-T	mg/L	17.4	17.8	17.2	12.7	12.6	12.7	17.6	18.0	
Turb	NTU	0.36	0.27	0.28	0.32	0.37	0.55	0.23	0.32	
SO4-D	mg/L	0.72	0.87	0.84	1.59	2.48	2.67	0.71	2.35	
Ag-D	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.0001
Al-D	mg/L	0.0195	0.0218	0.0211	0.0268	0.0316	0.0344	0.0186	0.0220	0.1
Al-T	mg/L	0.0272	0.0219	0.0221	0.0299	0.0366	0.0395	0.0210	0.0209	
As-D	mg/L	0.00054	0.00048	0.00052	0.00022	0.00017	0.00022	0.00048	0.00051	
As-T	mg/L	0.00050	0.00051	0.00049	0.00024	0.00018	0.00023	0.00046	0.00048	0.005
Ba-D	mg/L	0.0020	0.0016	0.0014	0.0012	0.0013	0.0014	0.0015	0.0014	
Ba-T	mg/L	0.0019	0.0017	0.0013	0.0013	0.0012	0.0014	0.0013	0.0013	
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Be-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Bi-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Bi-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
Ca-D	mg/L	5.44	5.17	5.06	3.68	3.73	3.86	5.17	5.33	
Ca-T	mg/L	5.04	5.17	4.98	3.80	3.79	3.83	5.14	5.24	
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000130	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.00017
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.05
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Cu-D	mg/L	0.00076	0.00096	0.00055	0.00037	0.00048	0.00053	0.00046	0.00063	
Cu-T	mg/L	0.00083	0.00087	0.00088	0.00173	0.00065	0.00111	0.00077	0.00113	0.007
Fe-D	mg/L	0.0622	0.0619	0.0635	0.0249	0.0488	0.0914	0.0494	0.0599	0.35
Fe-T	mg/L	0.097	0.097	0.093	0.062	0.097	0.173	0.088	0.092	1.0
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	0.0001
K-D	mg/L	0.114	0.051	0.058	0.054	0.057	0.059	0.057	<0.050	
K-T	mg/L	0.134	0.077	0.066	0.074	0.077	0.072	0.061	0.063	
Li-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Li-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Mg-D	mg/L	1.14	1.12	1.22	0.791	0.755	0.774	1.09	1.18	
Mg-T	mg/L	1.17	1.18	1.15	0.778	0.772	0.767	1.14	1.20	
Mn-D	mg/L	<0.0010	<0.0010	0.0013	0.0072	0.0057	0.0086	<0.0010	<0.0010	
Mn-T	mg/L	0.0054	0.0051	0.0053	0.0098	0.0094	0.0143	0.0046	0.0046	0.8
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Na-D	mg/L	1.30	1.26	1.36	0.994	0.942	0.956	1.22	1.34	
Na-T	mg/L	1.39	1.41	1.35	1.03	0.990	0.971	1.33	1.37	
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.025
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.005
Sb-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Sb-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
S-D	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Si-D	mg/L	3.27	3.37	3.54	2.59	3.27	3.47	3.33	3.37	
Si-T	mg/L	3.09	3.08	3.14	2.51	3.25	3.22	3.16	3.18	
Sn-D	mg/L	<0.0050	0.0051	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Sn-T	mg/L	<0.0050	<0.0050	<0.0050	0.0076	<0.0050	<0.0050	<0.0050	<0.0050	
Sr-D	mg/L	0.0170	0.0161	0.0180	0.0129	0.0131	0.0142	0.0158	0.0178	
Sr-T	mg/L	0.0172	0.0167	0.0162	0.0125	0.0132	0.0138	0.0159	0.0163	
S-T	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	
Ti-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Ti-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Tl-D	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Tl-T	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
U-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
U-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
V-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
V-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.03
Zr-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Zr-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	

Table 171
2016-17 Annual Report

Sediment Study Water Quality - No Name Lake PAH											
Site Description.		**Inlet**		**Deep Site**				**Near Seep**	**Outlet**		
Site ID.		**NNLI**	**NNLI- Rep**	**NNL1**	**NNL5**	**NNL9**	**NNLB**	**NNLNS**	**NNLO**		
EMS ID:.		**E224246**	**E224246**	**E217018**	**E217018**	**E217018**	**E217018**	**E292114**	**E217017**	**Water Quality Guidelines**	
Date		**24-Aug-2016**	**24-Aug-2016**	**24-Aug-2016**	**24-Aug-2016**	**24-Aug-2016**	**24-Aug-2016**	**24-Aug-2016**	**24-Aug-2016**	**Average**	**Max**
Depth (m)		**1**	**1**	**1**	**5**	**9**	**11**	**1**	**1**		
Parameter	**Units**										
2-Methlynaphlalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Acenaphthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.006**	
Acenaphthylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Acridine	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.003**	
Anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	**0.004**	
Benzo(a)anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	**0.0001**	
	mg/L	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	**0.00001**	
Benzo(b&j)fluoranthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Benzo(g,h,i)prylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Benzo(k)fluoranthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Chrysene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
D10-ANTHRACENCE (sur.)	%	100	100	104	105	103	103	99	99		
TERPHENYL-D14(sur.)	%	92	94	98	99	95	97	91	92		
D8-ACENAPHTHYLENE(sur.)	%	99	106	104	104	103	105	100	100		
D8-NAPHTHALENE(sur.)	%	92	101	98	94	101	96	92	97		
D9-Acridine	%	78	79	84	83	83	83	76	70		
Fluoranthene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	**0.004**	
Fluorene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.012**	
Indeno(1,2,3-c,d)pyrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Naphthalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	**0.001**	
Dibenz(a,h)anthracene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
High Molecular Weight PAH`s	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Low Molecular Weight PAH`s	mg/L	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024		
PAH-Total	mg/L	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024		
Phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.0003**	
Pyrene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020		
Quinoline	mg/L	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024		**0.0034**

Notes:

Lab Mean Detection Limits (LMDL) set higher than standard

R-denotes replicate sample

M-denotes regular monitoring

B-denotes 1 metre from bottom

Blue Bold - indicates concentration exceeds B.C. WQG for freshwater aquatic life

Average - indicates (Chronic) 30-day average BC WQG for freshwater aquatic life

Max - indicates (Acute) Maximum BC WQG for freshwater aquatic life

Table 172
2016-17 Annual Report

Depth Profiling

Site Description		Inlet	Near Seep	Outlet		
Site Name		NNLINLET	NNLNEARSEEP	NNLO		
EMS ID		E224246	E292114	E217017		
Date		24-Aug-16	24-Aug-16	24-Aug-16		
Depth	m	1	1	1		
Temp	C	23.54	21.6	21.46		
pH	pH Units	7.34	7.43	6.82		
Cond.	uS/cm	46	41	46		
DO	mg/L	8.7	8.77	8.65		
ORP	mV	96	108.9	149.1		

Site Description	Deep Site
Site Name	NNL
EMS ID	E292115
Date	30-Aug-16

Depth (m)	Temp C	pH	Cond. µS/cm	% Sat. %	D.O. mg/L	ORP mV
1	21.4	7.37	42.2	97.8	8.65	102.4
2	21.265	7.3	45.2	98	8.68	102
3	21.194	7.22	41.9	96.9	8.6	102.6
4	16.333	7.31	31.5	93.6	9.19	105.5
5	13.843	7.11	26.2	94..8	9.77	109
6	10..252	6.9	23.4	75.4	8.52	117.7
7	7.96	6.55	22.8	61.2	7.23	126
8	7.468	6.42	22.4	59.1	7.09	129.7
9	7.082	6.34	22.4	56.1	6.79	132.7
10	6.83	6.24	22.5	53	6.46	136.7
11	6.784	6.17	22.5	52	6.34	140.3

Table 173
2016-17 Annual Report

Sediment Study Water Quality - Long Lake (LL)

Site Description.		Inlet	Deep Site				Near Seep				Outlet	Water Quality Guidelines
Site ID.		LLI1	LLM1	LLM5	LLM9	LLMB	LLNS1	LLNS5	LLNS9	LLNSB	LLO1	
EMS ID:		E292121	E206619	E206619	E206619	E206619	E292123	E292123	E292123	E292123	E219412	
Date		31-Aug-2016	30-Aug-2016	30-Aug-2016	30-Aug-2016	30-Aug-2016	30-Aug-2016	30-Aug-2016	30-Aug-2016	30-Aug-2016	25-Aug-2016	
Depth (m)		1	1	5	9	17.8	1	5	9	15	1	
Parameter	Units											Max
Hard-D	mg/L	80.0	82.6	106	142	142	86.3	99.5	142	139	85.6	
Hard-T	mg/L	85.2	82.9	106	135	134	83.5	94.5	140	136	85.0	
Turb	NTU	0.25	0.21	0.23	0.29	0.68	0.21	0.24	0.31	0.64	0.31	
SO4-D	mg/L	66.4	67.5	89.6	127	128	68.0	82.7	127	128	66.5	
Ag-D	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	**0.0001**
Al-D	mg/L	0.0118	0.0066	0.0061	0.0105	0.0082	0.0062	0.0049	0.0098	0.0079	0.0070	**0.1**
Al-T	mg/L	0.0076	0.0073	0.0096	0.0245	0.0144	0.0120	0.0098	0.0128	0.0133	0.0091	
As-D	mg/L	0.00067	0.00058	0.00053	0.00019	0.00024	0.00056	0.00057	0.00021	0.00020	0.00061	
As-T	mg/L	0.00061	0.00061	0.00054	0.00025	0.00029	0.00062	0.00052	0.00022	0.00026	0.00069	**0.005**
Ba-D	mg/L	0.0063	0.0062	0.0068	0.0075	0.0111	0.0062	0.0068	0.0075	0.0085	0.0063	
Ba-T	mg/L	0.0061	0.0063	0.0072	0.0072	0.0111	0.0062	0.0066	0.0076	0.0088	0.0064	
B-D	mg/L	0.085	0.068	0.089	0.119	0.126	0.071	0.081	0.128	0.128	0.069	
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Be-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Bi-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Bi-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
B-T	mg/L	0.069	0.070	0.114	0.133	0.129	0.081	0.088	0.123	0.127	0.072	
Ca-D	mg/L	26.1	27.4	35.7	48.2	48.2	28.8	33.5	48.2	47.0	28.7	
Ca-T	mg/L	28.4	27.4	34.5	44.8	44.1	26.8	31.0	47.0	45.3	28.5	
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	**0.00017**
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	**0.05**
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Cu-D	mg/L	0.00028	0.00033	0.00039	0.00035	0.00044	0.00035	0.00027	0.00040	0.00039	0.00047	
Cu-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00057	<0.00050	<0.00050	<0.00050	<0.00050	**0.007**
Fe-D	mg/L	0.0267	0.0193	0.0163	0.0121	0.0083	0.0217	0.0115	0.0120	0.0111	0.0206	**0.35**
Fe-T	mg/L	0.043	0.032	0.031	0.030	0.048	0.042	0.038	0.032	0.055	0.035	**1.0**
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	**0.0001**
K-D	mg/L	0.212	0.353	0.450	0.647	0.673	0.362	0.428	0.660	0.662	0.387	
K-T	mg/L	0.359	0.352	0.468	0.620	0.699	0.384	0.404	0.662	0.670	0.382	
Li-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Li-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Mg-D	mg/L	3.62	3.44	3.99	5.32	5.36	3.48	3.83	5.30	5.35	3.37	
Mg-T	mg/L	3.44	3.51	4.74	5.63	5.68	4.04	4.13	5.49	5.44	3.37	
Mn-D	mg/L	0.0018	<0.0010	<0.0010	0.0271	0.431	0.0011	<0.0010	0.0394	0.101	<0.0010	
Mn-T	mg/L	0.0105	0.0043	0.0055	0.0334	0.472	0.0063	0.0061	0.0529	0.133	0.0068	**0.8**
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Na-D	mg/L	12.0	11.8	15.8	23.3	23.8	11.8	14.4	23.4	23.7	11.4	
Na-T	mg/L	11.8	11.6	18.0	25.3	26.2	13.1	15.2	24.1	24.5	11.4	
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	**0.025**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	**0.005**
Sb-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Sb-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
S-D	mg/L	25.0	24.5	31.8	45.8	46.9	25.2	30.2	46.7	46.3	23.7	
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Se-T	mg/L	<0.00010	<0.00010	0.00021	0.00018	0.00013	0.00021	0.00021	<0.00010	<0.00010	<0.00010	
Si-D	mg/L	2.94	2.72	2.70	3.47	3.90	2.80	2.98	3.47	3.74	2.66	
Si-T	mg/L	2.73	3.00	2.67	3.25	3.76	2.54	2.53	3.52	3.74	2.74	
Sn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Sn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Sr-D	mg/L	0.160	0.182	0.243	0.350	0.352	0.183	0.237	0.347	0.351	0.177	
Sr-T	mg/L	0.176	0.184	0.244	0.339	0.342	0.182	0.216	0.340	0.349	0.179	
S-T	mg/L	24.7	23.8	34.2	43.7	41.2	23.2	28.0	46.8	47.5	23.6	
Ti-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Ti-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Tl-D	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Tl-T	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
U-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
U-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
V-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
V-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	**0.03**
Zr-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Zr-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	

Table 174
2016-17 Annual Report

Sediment Study Water Quality - Long Lake PAH

Site Description.		Inlet	Deep Site				Near Seep				Outlet		
Site ID.		LLI1	LLM1	LLM5	LLM9	LLMB	LLNS1	LLNS5	LLNS9	LLNSB	LLO1		
EMS ID:.		E292121	E206619	E206619	E206619	E206619	E292123	E292123	E292123	E292123	E219412	Water Quality Guidelines	
Date		31-Aug-2016	30-Aug-2016	30-Aug-2016	30-Aug-2016	30-Aug-2016	30-Aug-2016	30-Aug-2016	30-Aug-2016	30-Aug-2016	25-Aug-2016	Average	Max
Depth (m)	Depth (m)	1	1	5	9	17.8	1	5	9	15	1		
Parameter	Units												
2-Methlynaphlalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Acenaphthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.006**	
Acenaphthylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Acridine	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.003**	
Anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	**0.004**	
Benzo(a)anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	**0.0001**	
Benzo(a)pyrene	mg/L	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	**0.00001**	
Benzo(b&j)fluoranthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Benzo(g,h,i)prylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Benzo(k)fluoranthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Chrysene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
D10-ANTHRACENCE (sur.)	%	91	103	104	100	102	103	99	100	99	100		
TERPHENYL-D14(sur.)	%	89	96	95	94	95	94	93	96	95	94		
D8-ACENAPHTHYLENE(sur.)	%	91	106	107	104	108	106	104	104	104	103		
D8-NAPHTHALENE(sur.)	%	60	96	99	98	103	99	98	98	98	97		
D9-Acridine	%	71	94	95	91	95	93	91	91	91	90		
Fluoranthene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	**0.004**	
Fluorene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.012**	
Indeno(1,2,3-c,d)pyrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Naphthalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	**0.001**	
Dibenz(a,h)anthracene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
High Molecular Weight PAH`s	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Low Molecular Weight PAH`s	mg/L	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024		
PAH-Total	mg/L	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024		
Phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.0003**	
Pyrene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020		
Quinoline	mg/L	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024		**0.0034**

Notes:

Lab Mean Detection Limits (LMDL) set higher than standard

R-denotes replicate sample

M-denotes regular monitoring

B-denotes 1 metre from bottom

Blue Bold - indicates concentration exceeds B.C. WQG for freshwater aquatic life

Average - indicates (Chronic) 30-day average BC WQG for freshwater aquatic life

Max - indicates (Acute) Maximum BC WQG for freshwater aquatic life

Table 175
2016-17 Annual Report

Sediment Study Water Quality - Long Lake Depth Profiling

Site Description		**Inlet**	**Outlet**											
Site Name		**LLI**	**LLO1**											
EMS ID		**E292121**	**E219412**											
Date		**31-Aug-16**	**29-Aug-16**											
Depth	**m**	1	1											
Temp	**C**	19.73	19.86											
pH	**pH Units**	7.31	7.04											
Cond.	**uS/cm**	229	251											
DO	**mg/L**	8.5	8.43											
ORP	**mV**	91.3	97.3											

Site Description	**Deep Site**						**Site Description**	**Near Seep**					
Site Name	**LLM**						**Site Name**	**LLNS**					
EMS ID	**E292122**						**EMS ID**	**E292123**					
Date	**30-Aug-16**						**Date**	**31-Aug-16**					
Depth	**Temp**	**pH**	**Cond.**	**% Sat.**	**D.O.**	**ORP**	**Depth**	**Temp**	**pH**	**Cond.**	**% Sat.**	**D.O.**	**ORP**
(m)	**C**		**µS/cm**	**%**	**mg/L**	**mV**	**(m)**	**C**		**µS/cm**	**%**	**mg/L**	**mV**
1	19.97	7.35	255	94.1	8.56	68.4	1	20.06	7.27	254	94.3	8.56	77.8
2	19.97	7.28	255	94.1	8.54	71	2	20.06	7.27	254	93.8	8.51	77.8
3	19.97	7.28	254	93.7	8.52	74.2	3	20.04	7.26		93.7	8.51	82.4
4	19.97	7.32	255	93.6	8.51	78.3	4	19.97	7.26	262	93.3	8.48	84.4
5	15.71	7.31	415	106.4	10.56	92.2	5	16.52	7.22	410	103.7	10.35	95.9
6	11.23	7.3	428	90.3	9.91	100.4	6	12.16	7.24	421	92.8	9.93	101
7	8.38	7.22	421	73.1	8.52	107.8	7	8.64	7.23	424	71.4	8.28	105.2
8	7.18	6.97	424	62.3	7.53	118.5	8	7.24	7.16	423	58.7	6.98	108.3
9	6.54	6.89	423	58.9	7.24	121.7	9	6.68	7.06	424	52.9	6.47	110.8
10	6.19	6.8	423	55.5	6.86	124.6	10	6.28	6.98	424	49.3	6.09	112.1
11	5.94	6.75	424	50.3	6.26	126.4	11	5.96	6.93	423	46.9	5.84	113.7
12	5.74	6.72	423	46.5	5.82	127.6	12	5.85	6.88	424	45.4	5.67	114.9
13	5.56	6.69	424	42.8	5.39	128.6	13	5.74	6.85	425	41.3	5.13	116
14	5.47	6.66	424	40.4	5.1	129.4	14	5.59	6.8	428	33.4	4.19	117.3
15	5.38	6.64	424	35.8	4.52	130.3	15	5.59	6.66	430	22.8	2.86	75.9
16	5.29	6.61	424	33.3	4.22	130.8							
17	5.26	6.59	424	31	4	131.2							
18	5.24	6.58	424	29.3	3.72	131.6							

Table 176
2016-17 Annual Report

Sediment Study Water Quality - Middle Quinsam Lake (MQL)									
Site Description.		Inlet	Near Seep	Deep Site				Outlet	Water Quality Guidelines
Site ID.		MQLI	MQLS1	MQL1	MQL5	MQL9	MQLB	MQLO	
EMS ID:.		E206901	E292116	E206618	E206618	E206618	E206618	900504	
Date		1-Sep-2016	1-Sep-2016	1-Sep-2016	1-Sep-2016	1-Sep-2016	1-Sep-2016	1-Sep-2016	
Depth (m)		1	1	1	5	9	13.5	1	
Parameter	Units								Max
Hard-D	mg/L	33.3	37.5	30.1	31.2	32.6	34.9	31.6	
Hard-T	mg/L	32.9	37.0	30.7	30.8	31.9	34.5	32.2	
Turb	NTU	0.33	0.36	0.25	0.27	0.32	0.65	0.34	
SO4-D	mg/L	30.3	35.3	21.9	22.0	23.1	23.7	21.7	
Ag-D	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.0001
Al-D	mg/L	0.0155	0.0116	0.0113	0.0107	0.0055	0.0047	0.0195	0.1
Al-T	mg/L	0.0177	0.0146	0.0142	0.0137	0.0088	0.0076	0.0193	
As-D	mg/L	0.00018	0.00018	0.00018	0.00017	0.00011	0.00011	0.00019	
As-T	mg/L	0.00161	0.00031	0.00080	0.00044	0.00029	0.00034	0.00020	0.005
Ba-D	mg/L	0.0024	0.0026	0.0017	0.0018	0.0021	0.0027	0.0025	
Ba-T	mg/L	0.0026	0.0026	0.0016	0.0017	0.0021	0.0028	0.0025	
B-D	mg/L	<0.050	0.057	<0.050	<0.050	<0.050	<0.050	<0.050	
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Be-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Bi-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Bi-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
B-T	mg/L	<0.050	0.057	<0.050	<0.050	<0.050	<0.050	<0.050	
Ca-D	mg/L	11.1	12.5	10.1	10.5	11.0	11.6	10.7	
Ca-T	mg/L	10.9	12.4	10.3	10.4	10.6	11.4	10.8	
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000050	0.00017
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.05
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Cu-D	mg/L	0.00045	0.00046	0.00048	0.00046	0.00049	0.00052	0.00048	
Cu-T	mg/L	0.00066	0.00060	0.00074	0.00061	0.00081	0.00062	0.00052	0.007
Fe-D	mg/L	0.0408	0.0457	0.0142	0.0139	0.0058	0.0319	0.0147	0.35
Fe-T	mg/L	0.075	0.077	0.033	0.033	0.017	0.075	0.015	1
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	0.0001
K-D	mg/L	0.271	0.325	0.183	0.198	0.166	0.209	0.187	
K-T	mg/L	0.247	0.312	0.162	0.168	0.151	0.203	0.194	
Li-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Li-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Mg-D	mg/L	1.38	1.50	1.19	1.21	1.26	1.46	1.21	
Mg-T	mg/L	1.36	1.48	1.20	1.21	1.29	1.48	1.27	
Mn-D	mg/L	0.0042	0.0052	<0.0010	<0.0010	<0.0010	0.0706	<0.0010	
Mn-T	mg/L	0.0108	0.0110	0.0048	0.0047	0.0036	0.0888	<0.0010	0.8
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Na-D	mg/L	15.2	18.5	10.6	10.8	12.6	13.6	10.6	
Na-T	mg/L	16.2	19.6	11.3	11.6	14.0	14.0	11.0	
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.025
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.005
Sb-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Sb-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
S-D	mg/L	10.7	12.9	7.3	7.4	8.2	8.2	7.8	
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Si-D	mg/L	2.07	2.15	1.84	1.89	1.52	2.85	1.91	
Si-T	mg/L	1.82	2.17	1.72	1.78	1.33	2.67	1.87	
Sn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Sn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Sr-D	mg/L	0.0608	0.0719	0.0481	0.0495	0.0522	0.0540	0.0505	
Sr-T	mg/L	0.0594	0.0698	0.0485	0.0501	0.0504	0.0530	0.0518	
S-T	mg/L	11.6	13.6	8.6	8.8	10.0	7.5	8.1	
Ti-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Ti-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Tl-D	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Tl-T	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
U-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
U-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
V-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
V-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.03
Zr-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Zr-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	

Table 177
2016-17 Annual Report

Sediment Study Water Quality - Middle Quinsam Lake PAH

Site Description.		Inlet	Deep Site				Near Seep	Outlet		
Site ID.		MQLI	MQL1	MQL5	MQL9	MQLB	MQLS1	MQLO		
EMS ID:.		E206901	E206618	E206618	E206618	E206618	E292116	0900504	Water Quality Guidelines	
Date		1-Sep-2016	1-Sep-2016	1-Sep-2016	1-Sep-2016	1-Sep-2016	1-Sep-2016	1-Sep-2016	Average	Max
Depth (m)		1	1	5	9	13.5	1	1		
Parameter	Units									
2-Methlynaphlalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Acenaphthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.006**	
Acenaphthylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Acridine	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.003**	
Anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	**0.004**	
Benzo(a)anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	**0.0001**	
Benzo(a)pyrene	mg/L	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	**0.00001**	
Benzo(b&j)fluoranthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Benzo(g,h,i)prylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Benzo(k)fluoranthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Chrysene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
D10-ANTHRACENCE (sur.)	%	90	107	87	119	85	106	115		
TERPHENYL-D14(sur.)	%	93	104	88	116	83	103	115		
D8-ACENAPHTHYLENE(sur.)	%	96	108	84	121	86	109	118		
D8-NAPHTHALENE(sur.)	%	96	113	82	116	95	117	117		
D9-Acridine	%	85	95	79	105	76	95	103		
Fluoranthene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	**0.004**	
Fluorene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.012**	
Indeno(1,2,3-c,d)pyrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Naphthalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	**0.001**	
Dibenz(a,h)anthracene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
High Molecular Weight PAH`s	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Low Molecular Weight PAH`s	mg/L	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024		
PAH-Total	mg/L	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024		
Phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.0003**	
Pyrene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020		
Quinoline	mg/L	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024		**0.0034**

Notes:

Lab Mean Detection Limits (LMDL) set higher than standard

R-denotes replicate sample

M-denotes regular monitoring

B-denotes 1 metre from bottom

Blue Bold - indicates concentration exceeds B.C. WQG for freshwater aquatic life

Average - indicates (Chronic) 30-day average BC WQG for freshwater aquatic life

Max - indicates (Acute) Maximum BC WQG for freshwater aquatic life

Table 178
2016-17 Annual Report

Sediment Study Water Quality - Middle Quinsam Lake Depth Profiling

Site Description		**Inlet**	**Near Seep**	**Outlet**		
Site Name		**MQLI**	**MQLNS**	**MQLO**		
EMS ID		**E206901**	**E292116**	**900504**		
Date		**1-Sep-16**	**1-Sep-16**	**1-Sep-16**		
Depth	**m**	1	1	1		
Temp	**C**	18.642	17.96	19.497		
pH	**pH Units**	7.26	6.65	7.09		
Cond.	**uS/cm**	162.3	163.1	119		
DO	**mg/L**	9.25	8.46	8.84		
ORP	**mV**	77.1	171.1	182.6		

Site Description	**Deep Site**
Site Name	**MQL**
EMS ID	**E292115**
Date	**1-Sep-16**

Depth	**Temp**	**pH**	**Cond.**	**% Sat.**	**D.O.**	**ORP**
(m)	**C**		**µS/cm**	**%**	**mg/L**	**mV**
1	19.88	6.83	119	97.7	8.91	140.2
2	19.88	7.3	119	98	8.93	138
3	19.88	7.41	119	97.5	8.88	137.5
4	19.88	7.45	119	97.3	8.86	137.7
5	19.83	7.46	119	98.1	8.95	138.4
6	19.73	7.48	119	97.7	8.92	138.3
7	17.32	7.52	122	97.7	11.43	141.8
8	14.12	7.56	115	97.2	11.49	143.5
9	11.26	7.42	107	83.6	9.23	148.4
10	10.23	7.21	105	61.4	6.92	153.4
11	9.35	7.09	106	45.4	5.08	156.2
12	9.19	6.92	107	33	3.73	158.8
13	9.01	6.81	109	23.4	2.73	161.5
13.5	8.87	6.65	118	6.6	0.73	-14.8

Table 179
2016-17 Annual Report

Sediment Study Water Quality - Lower Quinsam Lake (LQL)

Site Description.		Inlet			Deep Site 1			Deep Site 2				Outlet	
Site ID.		LQLI	LQL1	LQL1-Repliacte	LQL5	LQL9	LQLB	LQLM1	LQLM5	LQLM9	LQLMB	LQLO	Water Quality
EMS ID:.		E292117	E292118	E292118	E292118	E292118	E292118	E292119	E292119	E292119	E292119	E292120	Guidelines
Date		12-Sep-2016	12-Sep-2016	12-Sep-2016	12-Sep-2016	12-Sep-2016	12-Sep-2016	12-Sep-2016	12-Sep-2016	12-Sep-2016	12-Sep-2016	8-Sep-2016	Max
Depth (m)		1	1	1	5	9	16.4	1	5	9	13.2	1	
Parameter	Units												
Hard-D	mg/L	36.2	37.8	35.3	36.0	35.5	33.8	35.1	36.7	33.4	30.7	36.2	
Hard-T	mg/L	36.3	36.9	36.9	36.4	35.3	34.0	35.2	36.9	33.9	30.6	37.1	
Turb	NTU	0.33	0.37	0.31	0.32	0.51	11.6	0.28	0.32	0.43	0.58	0.33	
SO4-D	mg/L	22.2	21.9	21.9	22.0	20.4	11.6	21.9	21.8	19.2	14.2	26.2	
Ag-D	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000025	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	**0.0001**
Al-D	mg/L	0.0067	0.0071	0.0067	0.0067	0.0083	0.0128	0.0066	0.0076	0.0104	0.0166	0.0125	**0.1**
Al-T	mg/L	0.0076	0.0069	0.0069	0.0074	0.0095	0.0337	0.0070	0.0075	0.0114	0.0197	0.0074	
As-D	mg/L	0.00054	0.00063	0.00060	0.00059	0.00054	0.00079	0.00059	0.00058	0.00057	0.00058	0.00056	
As-T	mg/L	0.00061	0.00064	0.00058	0.00057	0.00059	0.00226	0.00060	0.00060	0.00051	0.00077	0.00067	**0.005**
Ba-D	mg/L	0.0037	0.0035	0.0036	0.0037	0.0035	0.0078	0.0035	0.0035	0.0034	0.0036	0.0048	
Ba-T	mg/L	0.0036	0.0037	0.0036	0.0037	0.0037	0.0100	0.0036	0.0036	0.0035	0.0037	0.0037	
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Be-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Bi-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Bi-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
Ca-D	mg/L	12.0	12.6	11.8	11.9	12.0	11.3	11.8	12.3	11.2	10.3	12.0	
Ca-T	mg/L	12.1	12.4	12.5	12.3	11.9	11.5	11.8	12.5	11.5	10.4	12.3	
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000090	<0.0000050	<0.0000050	<0.0000050	0.0000090	<0.0000050	**0.000017**
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000022	<0.000010	<0.000010	<0.000010	0.000013	<0.000010	
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00090	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	**0.11**
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Cu-D	mg/L	0.00043	0.00045	0.00038	0.00040	0.00054	0.00045	0.00040	0.00036	0.00059	0.00065	0.00059	
Cu-T	mg/L	0.00051	<0.00050	<0.00050	<0.00050	0.00055	0.00065	<0.00050	<0.00050	0.00083	0.00060	<0.00050	**0.007**
Fe-D	mg/L	0.0343	0.0321	0.0316	0.0339	0.0680	0.381	0.0279	0.0286	0.0584	0.0899	0.0159	**0.35**
Fe-T	mg/L	0.045	0.044	0.044	0.044	0.092	2.36	0.037	0.040	0.076	0.131	0.038	**1**
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	**0.00001**
K-D	mg/L	0.242	0.231	0.235	0.226	0.259	0.280	0.240	0.238	0.232	0.221	0.191	
K-T	mg/L	0.232	0.228	0.230	0.231	0.229	0.251	0.227	0.226	0.226	0.215	0.233	
Li-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Li-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Mg-D	mg/L	1.54	1.55	1.42	1.50	1.34	1.32	1.40	1.41	1.33	1.18	1.51	
Mg-T	mg/L	1.45	1.41	1.41	1.40	1.33	1.28	1.40	1.40	1.28	1.11	1.52	
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.392	<0.0010	<0.0010	<0.0010	0.0895	<0.0010	
Mn-T	mg/L	0.0042	0.0039	0.0041	0.0035	0.0106	0.689	0.0041	0.0039	0.0091	0.106	0.0095	**0.8**
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Na-D	mg/L	11.0	10.4	9.74	10.2	10.1	7.19	9.87	9.98	9.53	6.61	10.6	
Na-T	mg/L	9.99	9.93	9.98	9.93	9.28	7.24	9.87	9.71	8.72	6.49	10.1	
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	**0.025**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	**0.005**
Sb-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Sb-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
S-D	mg/L	7.1	8.3	7.8	8.3	8.7	6.6	7.8	8.4	7.7	3.4	7.3	
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Si-D	mg/L	2.11	2.28	2.10	2.13	2.42	3.08	2.06	2.12	2.21	3.14	2.04	
Si-T	mg/L	2.22	2.26	2.19	2.24	2.32	3.09	2.19	2.27	2.41	3.24	2.04	
Sn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Sn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Sr-D	mg/L	0.0563	0.0554	0.0553	0.0576	0.0561	0.0513	0.0566	0.0555	0.0502	0.0469	0.0551	
Sr-T	mg/L	0.0607	0.0603	0.0588	0.0607	0.0569	0.0509	0.0595	0.0616	0.0558	0.0488	0.0585	
S-T	mg/L	7.5	8.3	7.8	7.5	7.0	4.5	8.0	7.7	6.6	5.3	6.6	
Ti-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Ti-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Tl-D	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Tl-T	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
U-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
U-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
V-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
V-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	**0.03**
Zr-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Zr-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	

Table 180
2016-17 Annual Report

Sediment Study Water Quality - Lower Quinsam Lake PAH

Site Description.		Inlet	Deep Site 1					Deep Site 2				Outlet		
Site ID.		LQLI	LQL1	LQL1-Replicate	LQL5	LQL9	LQLB	LQLM1	LQLM5	LQLM9	LQLMB	LQLO		
EMS ID:.		E292117	E292118	E292118	E292118	E292118	E292118	E292119	E292119	E292119	E292119	E292120	Water Quality Guidelines	
Date		12-Sep-2016	12-Sep-2016	12-Sep-2016	12-Sep-2016	12-Sep-2016	12-Sep-2016	12-Sep-2016	12-Sep-2016	12-Sep-2016	12-Sep-2016	8-Sep-2016	Average	Max
Depth (m)		1	1	1	5	9	16.4	1	5	9	13.2	1		
Parameter	**Units**													
2-Methlynaphlalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Acenaphthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.006**	
Acenaphthylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Acridine	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.003**	
Anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	**0.004**	
Benzo(a)anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	**0.0001**	
Benzo(a)pyrene	mg/L	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	**0.00001**	
Benzo(b&j)fluoranthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Benzo(g,h,i)prylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Benzo(k)fluoranthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Chrysene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
D10-ANTHRACENCE (sur.)	%	96	90	91	90	89	90	89	95	91	85	96		
TERPHENYL-D14(sur.)	%	88	82	86	82	84	84	85	90	87	86	90		
D8-ACENAPHTHYLENE(sur.)	%	96	92	94	93	92	93	93	97	95	94	100		
D8-NAPHTHALENE(sur.)	%	94	97	100	97	97	100	98	103	96	98	94		
D9-Acridine	%	86	81	79	80	77	80	79	83	80	82	86		
Fluoranthene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	**0.004**	
Fluorene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.012**	
Indeno(1,2,3-c,d)pyrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Naphthalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	**0.001**	
Dibenz(a,h)anthracene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
High Molecular Weight PAH`s	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Low Molecular Weight PAH`s	mg/L	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024		
PAH-Total	mg/L	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024		
Phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.0003**	
Pyrene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020		
Quinoline	mg/L	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024		**0.0034**

Notes:

Lab Mean Detection Limits (LMDL) set higher than standard

R-denotes replicate sample

M-denotes regular monitoring

B-denotes 1 metre from bottom

Blue Bold - indicates concentration exceeds B.C. WQG for freshwater aquatic life

Average - indicates (Chronic) 30-day average BC WQG for freshwater aquatic life

Max - indicates (Acute) Maximum BC WQG for freshwater aquatic life

Table 181
2016-17 Annual Report

Sediment Study Water Quality - Lower Quinsam Lake Depth Profiling

Site Description.		**Inlet**	**Outlet**											
Site Name		**LQLI**	**LQLO**											
EMS ID:		**E292117**	**E292120**											
Date		**12-Sep-16**	**8-Sep-16**											
Depth	**m**	1	1											
Temp	**C**	17.44	17.63											
pH	**pH Units**	7.64	7.73											
Cond.	**uS/cm**	142	140											
DO	**mg/L**	9.15	9.09											
ORP	**mV**	176.6	171.1											

Site Description	**Deep Site 1**
Site Name	**LQLM1**
EMS ID	**E29118**
Date	**12-Sep-16**

Depth	**Temp**	**C**	**pH**	**% Sat.**	**D.O.**	**ORP**
(m)	**C**	**µS/cm**		**%**	**mg/L**	**mV**
1	17.11	142	7.65	95.8	9.24	122.1
2	17.1	142	7.57	95.9	9.24	125.3
3	17.09	142	7.53	95.6	9.22	127.8
4	17.09	142	7.5	95.5	9.21	129.8
5	17.08	141	7.46	95.4	9.2	133.9
6	17.08	142	7.45	95.8	9.24	135.5
7	16.72	141	7.44	90.3	8.77	139.8
8	16.46	1939	7.38	87	8.5	143.3
9	15.1	129	7.35	71.8	7.21	149.5
10	12.43	116	7.33	56.3	6.01	157.5
11	11.29	114	7.07	48.3	5.27	161.1
12	10.07	111	6.96	38.1	4.26	164.2
13	9.04	109	6.79	21.9	2.53	166.9
14	8.81	109	6.64	17.2	2	167.3

Site Description	**Deep Site 2**
Site Name	**LQL**
EMS ID	**E292119**
Date	**12-Sep-16**

Depth	**Temp**	**C**	**pH**	**% Sat.**	**D.O.**	**ORP**
(m)	**C**	**µS/cm**		**%**	**mg/L**	**mV**
1	17.05	142	7.6	94.6	9.13	194.1
2	16.99	142	7.6	94.2	9.1	207.5
3	16.97	142	7.56	93.8	9.07	210.00
4	16.94	142	7.53	93.6	9.05	212.3
5	16.91	142	7.51	92.7	8.97	214.6
6	16.8	142	7.46	91.4	8.87	217.4
7	16.61	143	7.44	91.3	8.89	219.9
8	15.79	137	7.42	81.1	8.02	225.7
9	15.07	134	7.37	75.3	7.57	229.9
10	12.55	117	7.33	51.1	5.44	236.3
11	11.33	115	7.19	40.1	4.39	238.1
12	10.31	115	7.08	20	2.24	239
13	9.66	114	6.89	6.3	0.74	234.8
14	9.07	117	6.68	0.9	0.11	152.3
15	8.79	122	6.55	0	0	93.3
16	8.72	126	6.48	0	0	71.2

Table 182
2016-17 Annual Report

Sediment Study Water Quality - Lower Wetland (LW)

Site Description.		Inlet	Middle		Outlet		
Site ID.		LWI	LWM	LWM-Replicate	LWO	LWO	Water Quality Guidelines
EMS ID:.		E292124	E292125	E292125	E292112	E292112	
Date		5-Oct-2016	5-Oct-2016	5-Oct-2016	13-Sep-2016	5-Oct-2016	
Parameter	Units						Max
Depth	m	0.1	0.2	0.2	0.5	0.5	
Temp	C	10.5	10	10	13	9.7	
pH	pH Units	7.36	6.54	6.54	7.84	6.8	
Cond.	uS/cm	39.6	37.5	37.5	145.6	37.5	
DO	mg/L	12.16	7.82	7.82	5.2	9.4	
ORP	mV	181.7	176.7	176.7	-	152.7	
Hard-D	mg/L	23.1	21.4	21.5	44.8	20.8	
Hard-T	mg/L	17.0	24.9	25.7	43.6	24.8	
Turb	NTU	0.37	1.59	1.61	1.05	4.33	**5**
SO4-D	mg/L	<0.50	<0.50	<0.50	39.3	<0.50	
Ag-D	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	0.000020	<0.000020	**0.0001**
Al-D	mg/L	0.0454	0.14	0.141	0.157	0.176	**0.1**
Al-T	mg/L	0.0388	0.197	0.189	0.194	0.329	
As-D	mg/L	0.00035	0.00047	0.00045	0.00051	0.00057	
As-T	mg/L	0.00027	0.00050	0.00050	0.00062	0.00092	**0.005**
Ba-D	mg/L	<0.0010	0.0025	0.0024	0.0073	0.0023	
Ba-T	mg/L	<0.0010	0.0028	0.0027	0.0071	0.0036	
B-D	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Be-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Bi-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Bi-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
Ca-D	mg/L	7.46	6.39	6.47	14.4	6.34	
Ca-T	mg/L	5.55	7.51	7.88	14.0	7.56	
Cd-D	mg/L	<0.0000050	<0.0000050	0.0000050	0.0000130	0.0000050	**0.000017**
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	0.000015	<0.000010	
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Co-T	mg/L	<0.00050	<0.00050	<0.00050	0.00056	<0.00050	**0.11**
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Cu-D	mg/L	0.00140	0.00143	0.00137	0.00215	0.00263	
Cu-T	mg/L	0.00119	0.00350	0.00164	0.00580	0.00359	**0.007**
Fe-D	mg/L	0.0372	0.201	0.197	0.328	0.286	**0.35**
Fe-T	mg/L	0.026	0.340	0.331	0.635	0.675	**1**
Hg-D	mg/L	<0.0000020	0.0000035	0.0000020	0.0000028	<0.0000020	
Hg-T	mg/L	<0.0000020	0.0000021	<0.0000020	<0.0000020	0.0000024	**0.00001**
K-D	mg/L	0.112	0.437	0.429	0.078	0.416	
K-T	mg/L	0.078	0.483	0.509	0.066	0.493	
Li-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Li-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Mg-D	mg/L	1.08	1.33	1.31	2.17	1.21	
Mg-T	mg/L	0.757	1.48	1.46	2.09	1.43	
Mn-D	mg/L	<0.0010	0.0037	0.0034	0.0635	0.0036	
Mn-T	mg/L	<0.0010	0.0073	0.0071	0.0814	0.0267	**0.8**
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Na-D	mg/L	1.72	2.37	2.31	2.24	2.34	
Na-T	mg/L	1.20	2.51	2.51	2.06	2.58	
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	**0.025**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	**0.005**
Sb-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Sb-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
S-D	mg/L	<3.0	<3.0	<3.0	13.6	<3.0	
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Se-T	mg/L	<0.00010	0.00011	<0.00010	<0.00010	0.00015	
Si-D	mg/L	4.61	4.66	4.54	9.08	4.59	
Si-T	mg/L	3.45	5.53	5.76	8.79	5.75	
Sn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Sn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Sr-D	mg/L	0.0204	0.0268	0.0258	0.0580	0.0249	
Sr-T	mg/L	0.0144	0.0277	0.0272	0.0525	0.0270	
S-T	mg/L	<3.0	<3.0	<3.0	13.2	<3.0	
Ti-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Ti-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.0086	
Tl-D	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Tl-T	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
U-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
U-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
V-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
V-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	0.0052	<0.0050	**0.03**
Zr-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Zr-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	

Table 183
2016-17 Annual Report

Sediment Study Water Quality - Lower Wetland PAH

Site Description.		Inlet	Middle		Outlet			
Site ID.		LWI	LWM	LWM- Replicate	LWO	LWO		
EMS ID:.		E292124	E292125	E292125	E292112	E292112	Water Quality Guidelines	
Date		5-Oct-2016	5-Oct-2016	5-Oct-2016	13-Sep-2016	5-Oct-2016	Average	Max
Depth (m)		0.1	0.25	0.25	0.5	0.5		
Parameter	**Units**							
2-Methlynaphlalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Acenaphthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.006**	
Acenaphthylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Acridine	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.003**	
Anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	**0.004**	
Benzo(a)anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	**0.0001**	
Benzo(a)pyrene	mg/L	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	**0.00001**	
Benzo(b&j)fluoranthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Benzo(g,h,i)prylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Benzo(k)fluoranthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Chrysene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
D10-ANTHRACENCE (sur.)	%	105	96	73	101	99		
TERPHENYL-D14(sur.)	%	102	95	72	99	91		
D8-ACENAPHTHYLENE(sur.)	%	102	98	76	102	106		
D8-NAPHTHALENE(sur.)	%	73	70	55	107	77		
D9-Acridine	%	98	90	68	89	92		
Fluoranthene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	**0.004**	
Fluorene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.012**	
Indeno(1,2,3-c,d)pyrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Naphthalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	**0.001**	
Dibenz(a,h)anthracene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
High Molecular Weight PAH`s	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Low Molecular Weight PAH`s	mg/L	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024		
PAH-Total	mg/L	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024		
Phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	**0.0003**	
Pyrene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020		
Quinoline	mg/L	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024		**0.0034**

Notes:

Lab Mean Detection Limits (LMDL) set higher than standard

R-denotes replicate sample

M-denotes regular monitoring

B-denotes 1 metre from bottom

Blue Bold - indicates concentration exceeds B.C. WQG for freshwater aquatic life

Average - indicates (Chronic) 30-day average BC WQG for freshwater aquatic life

Max - indicates (Acute) Maximum BC WQG for freshwater aquatic life

Table 184
2016-17 Annual Report

Sediment Study Water Quality - Quinsam River (QR)

Site Description.		QR at Argonaut Rd		QR Upstream of 7-South Mine	QR Downstream of 7-South Mine	
Site ID.		WA	WA-Replicate	QRDS1	7SQR	
EMS ID		E0126402	E0126402	E286930	E292113	Water Quality Guidelines
Date		14-Sep-2016	14-Sep-2016	15-Sep-2016	19-Sep-2016	Max
Depth (m)		0.5	0.5	0.5	0.5	
Parameter	Units					
Depth	m	0.5	0.5	0.5	0.5	
Temp	C	16.2	16.2	17.4	14.9	
pH	pH Units	7.51	7.51	7.84	7.32	
Cond.	uS/cm	47.9	47.9	145.6	135.5	
DO	mg/L	7.09	7.09	7.82	7.83	
ORP	mV	142.9	142.9	130	134	
Hard-D	mg/L	20.7	20.5	36.1	39.8	
Hard-T	mg/L	22.2	21.3	35.1	37.4	
Turb	NTU	0.19	0.15	0.26	0.46	**5**
SO4-D	mg/L	1.53	1.73	27.2	31.3	
Ag-D	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	
Ag-T	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	**0.0001**
Al-D	mg/L	0.0142	0.0142	0.0111	0.0134	**0.1**
Al-T	mg/L	0.0172	0.0174	0.0101	0.0153	
As-D	mg/L	0.00011	0.00011	0.00022	0.00045	
As-T	mg/L	0.00013	0.00011	0.00022	0.00050	**0.005**
Ba-D	mg/L	<0.0010	<0.0010	0.0023	0.0031	
Ba-T	mg/L	<0.0010	<0.0010	0.0022	0.0032	
B-D	mg/L	<0.050	<0.050	<0.050	0.061	
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	
Be-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	
Bi-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	
Bi-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	
B-T	mg/L	<0.050	<0.050	<0.050	<0.050	
Ca-D	mg/L	7.05	6.91	12.2	13.1	
Ca-T	mg/L	7.55	7.22	11.6	12.4	
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	**0.00017**
Cd-T	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	
Co-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	**0.05**
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	
Cr-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	
Cu-D	mg/L	0.00053	0.00053	0.00038	0.00046	
Cu-T	mg/L	0.00076	0.00060	0.00053	0.00057	**0.007**
Fe-D	mg/L	0.0076	0.0065	0.0272	0.0735	**0.35**
Fe-T	mg/L	0.016	0.014	0.038	0.130	**1**
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	
Hg-T	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	**0.0001**
K-D	mg/L	0.051	0.061	0.247	0.250	
K-T	mg/L	0.075	0.074	0.219	0.258	
Li-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Li-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Mg-D	mg/L	0.749	0.789	1.38	1.74	
Mg-T	mg/L	0.826	0.793	1.45	1.57	
Mn-D	mg/L	<0.0010	<0.0010	<0.0010	0.0030	
Mn-T	mg/L	0.0011	0.0012	0.0028	0.0072	**0.8**
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	
Mo-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	
Na-D	mg/L	0.582	0.634	12.4	14.4	
Na-T	mg/L	0.668	0.653	13.1	13.0	
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	
Ni-T	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	**0.025**
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	
Pb-T	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	**0.005**
Sb-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	
Sb-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	
S-D	mg/L	<3.0	<3.0	8.6	11.6	
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	
Se-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	
Si-D	mg/L	1.79	1.78	1.88	2.41	
Si-T	mg/L	1.97	2.00	1.84	2.22	
Sn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Sn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Sr-D	mg/L	0.0113	0.0112	0.0547	0.0640	
Sr-T	mg/L	0.0125	0.0122	0.0617	0.0669	
S-T	mg/L	<3.0	<3.0	9.0	10.9	
Ti-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Ti-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Tl-D	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	
Tl-T	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	
U-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	
U-T	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	
V-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
V-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	
Zn-T	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	**0.03**
Zr-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	
Zr-T	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	

Table 185
2016-17 Annual Report

Sediment Study Water Quality -Quinsam River PAH

Site Description.		QR at Argonaut Rd		QR Upstream of 7-South Mine	QR Downstream of 7-South Mine	Water Quality Guidelines	
Site ID.		WA	WA-Replicate	QRDS1	7SQR		
EMS ID:.		E0126402	E0126402	E286930	E292113		
Date		14-Sep-2016	14-Sep-2016	15-Sep-2016	19-Sep-2016		
Depth (m)		0.5	0.5	0.5	0.5	Average	Max
Parameter	Units						
2-Methlynaphlalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010		
Acenaphthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	**0.006**	
Acenaphthylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050		
Acridine	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	**0.003**	
Anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	**0.004**	
Benzo(a)anthracene	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	**0.0001**	
Benzo(a)pyrene	mg/L	*<0.0090*	*<0.0090*	*<0.0090*	*<0.0090*	**0.00001**	
Benzo(b&j)fluoranthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050		
Benzo(g,h,i)prylene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050		
Benzo(k)fluoranthene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050		
Chrysene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050		
D10-ANTHRACENCE (sur.)	%	93	94	101	93		
TERPHENYL-D14(sur.)	%	92	93	96	88		
D8-ACENAPHTHYLENE(sur.)	%	93	95	99	96		
D8-NAPHTHALENE(sur.)	%	100	101	103	92		
D9-Acridine	%	81	83	98	87		
Fluoranthene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	**0.004**	
Fluorene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	**0.012**	
Indeno(1,2,3-c,d)pyrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050		
Naphthalene	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	**0.001**	
Dibenz(a,h)anthracene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050		
High Molecular Weight PAH`s	mg/L	<0.000050	<0.000050	<0.000050	<0.000050		
Low Molecular Weight PAH`s	mg/L	<0.00024	<0.00024	<0.00024	<0.00024		
PAH-Total	mg/L	<0.00024	<0.00024	<0.00024	<0.00024		
Phenanthrene	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	**0.0003**	
Pyrene	mg/L	<0.000020	<0.000020	<0.000020	<0.000020		
Quinoline	mg/L	<0.00024	<0.00024	<0.00024	<0.00024		**0.0034**

Notes:

Lab Mean Detection Limits (LMDL) set higher than standard

R-denotes replicate sample

M-denotes regular monitoring

B-denotes 1 metre from bottom

Blue Bold - indicates concentration exceeds B.C. WQG for freshwater aquatic life

Average - indicates (Chronic) 30-day average BC WQG for freshwater aquatic life

Max - indicates (Acute) Maximum BC WQG for freshwater aquatic life

Table 186
2016-17 Annual Report

Physical Parameters of Sediment Chemistry Analysis in Gooseneck Lake

Gooseneck Lake Middle EMS ID: 1132502

	Stn.Code	MGL1	MGL2	MGL3	MGL4	MGL5				
	Date	7-Sep-16	7-Sep-16	7-Sep-16	7-Sep-16	7-Sep-16				
							Minimum	Maximum	Average	Standard Deviation
Moisture	**%**	88	87	87	89	88	87	89	87.8	0.8
Soluble (2:1) pH-L	**pH Units**	5.71	5.68	5.50	5.77	5.71	5.50	5.77	5.67	0.10
Clay Content	**%**	6.4	5.9	7.2	4.3	5.5	4.3	7.2	5.9	1.1
% sand by hydrometer	**%**	57	49	57	56	50	49	57	53.8	4.0
% silt by hydrometer	**%**	36	46	36	39	45	36	46	40.4	4.8

Table 187
2016-17 Annual Report

Physical Parameters of Sediment Chemistry Analysis in No Name Lake

No Name Lake Inlet EMS ID: E224246

	Stn.Code	NNLI1	NNLI2	NNLI3	NNLI4	NNLI5				
		24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16				
							Minimum	Maximum	Average	Standard Deviation
Moisture	%	92	91	92	93	92	91	93	92	0.7
Soluble (2:1) pH-L	pH Units	5.65	5.88	5.41	5.95	5.75	5.41	5.95	5.73	0.21
Clay Content	%	11	11	8.6	19	27	8.6	27	15.3	7.6
% sand by hydrometer	%	59	49	58	54	42	42	59	52.4	7.0
% silt by hydrometer	%	30	40	33	27	31	27	40	32.2	4.9

No Name Lake Deep EMS ID: E217018

	Stn.Code	NNLD1	NNLD2	NNLD3	NNLD4	NNLD5				
		24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16				
							Minimum	Maximum	Average	Standard Deviation
Moisture	%	89	89	89	88	89	88	89	88.8	0.4
Soluble (2:1) pH-L	pH Units	5.58	5.59	5.66	5.52	5.67	5.52	5.67	5.60	0.06
Clay Content	%	7.1	4.4	7.1	11	12	4.4	12	8.3	3.1
% sand by hydrometer	%	74	77	72	61	61	61	77	69.0	7.5
% silt by hydrometer	%	19	19	21	29	27	19	29	23.0	4.7

No Name Lake Near Seep Site EMS ID: E292114

	Stn.Code	NNLNS1	NNLNS2	NNLNS3	NNLNS4	NNLNS5				
		24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16				
							Minimum	Maximum	Average	Standard Deviation
Moisture	%	87	89	89	89	88	87	89	88.4	0.9
Soluble (2:1) pH-L	pH Units	5.39	5.46	5.70	5.40	5.55	5.39	5.70	5.50	0.13
Clay Content	%	8.8	6.1	12	13	15	6.1	15	11.0	3.5
% sand by hydrometer	%	44	51	45	38	35	35	51	42.6	6.3
% silt by hydrometer	%	47	43	43	49	51	43	51	46.6	3.6

No Name Lake Outlet EMS ID:E217017

	Stn.Code	NNO1	NNO2	NNO3	NNO4	NNO5				
		24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16				
							Minimum	Maximum	Average	Standard Deviation
Moisture	%	92	93	93	94	94	92	94	93.2	0.84
Soluble (2:1) pH-L	pH Units	5.72	6.26	5.94	5.97	6.01	5.72	6.26	5.98	0.19
Clay Content	%	11	12	7.0	15	11	7.0	15	11.2	2.9
% sand by hydrometer	%	54	55	59	61	73	54	73	60.4	7.6
% silt by hydrometer	%	35	34	34	24	16	16	35	28.6	8.4

Table 188
2016-17 Annual Report

Physical Parameters of Sediment Chemistry Analysis in Long Lake

Long Lake Lake Inlet EMS ID:E292121

	Stn.Code	LLI1	LLI2	LLI3							
		31-Aug-16	31-Aug-16	31-Aug-16							
					Minimum	Maximum	Average	Standard Deviation			
Moisture	%	86	88	87	86	88	87.0	1.0			
Soluble (2:1) pH-L	pH Units	6.57	6.34	6.59	6.34	6.59	6.50	0.14			
Clay Content	%	5.9	6.2	9.8	5.9	9.8	7.3	2.2			
% sand by hydrometer	%	51	50	59	50	59	53.3	4.9			
% silt by hydrometer	%	44	44	31	31	44	39.7	7.5			

Long Lake Lake Near Seep EMS ID:E292123

	Stn.Code	LLNS1	LLNS2	LLNS3	LLNS4	LLNS5	LLNS6				
		31-Aug-16	31-Aug-16	31-Aug-16	31-Aug-16	31-Aug-16	31-Aug-16				
								Minimum	Maximum	Average	Standard Deviation
Moisture	%	87	83	87	87	86	88.0	83.0	88	86.3	1.8
Soluble (2:1) pH-L	pH Units	6.23	6.45	6.09	6.3	6.26	6.1	6.1	6.45	6.24	0.13
Clay Content	%	9	13	13	12	9.5	10.0	9.0	13	11.1	1.8
% sand by hydrometer	%	50	53	60	59	57	62.0	50.0	62	56.8	4.5
% silt by hydrometer	%	41	34	27	29	34	28.0	27.0	41	32.2	5.3

Long Lake Deep Site EMS ID:E292122

	Stn.Code	LLM1	LLM2	LLM3							
		30-Aug-16	30-Aug-16	30-Aug-16							
					Minimum	Maximum	Average	Standard Deviation			
Moisture	%	87	88	87	87	88	87.3	0.6			
Soluble (2:1) pH-L	pH Units	5.89	5.86	5.81	5.81	5.89	5.9	0.0			
Clay Content	%	15	13	14	13	15	14.0	1.0			
% sand by hydrometer	%	57	55	52	52	57	54.7	2.5			
% silt by hydrometer	%	28	32	33	28	33	31.0	2.6			

Long Lake Outlet EMS ID:E219412

	Stn.Code	LLO1	LLO2	LLO3							
		30-Aug-16	30-Aug-16	30-Aug-16							
					Minimum	Maximum	Average	Standard Deviation			
Moisture	%	87	87	87	87	87	87	0			
Soluble (2:1) pH-L	pH Units	6.26	6.12	6.12	6.12	6.26	6.17	0.08			
Clay Content	%	12	12	12	12	12	12.0	0.0			
% sand by hydrometer	%	40	36	37	36	40	37.7	2.1			
% silt by hydrometer	%	48	52	51	48	52	50.3	2.1			

Table 189
2016-17 Annual Report

Physical Parameters of Sediment Chemistry Analysis in Middle Quinsam Lake

Middle Quinsam Lake Inlet EMS ID: E206901

	Stn.Code	MQLI1	MQLI2	MQLI3						
		1-Sep-16	1-Sep-16	1-Sep-16						
					Minimum	Maximum	Average	Standard Deviation		
Moisture	%	90	90	90	90	90	90.0	0.0		
Soluble (2:1) pH-L	pH Units	6.03	6.00	5.83	5.83	6.03	5.95	0.11		
Clay Content	%	9.7	9.1	13	9.1	13	10.6	2.1		
% sand by hydrometer	%	45	53	48	45	53	48.7	4.0		
% silt by hydrometer	%	45	38	40	38	45	41.0	3.6		

Middle Quinsam Lake Near Seep EMS ID: E292116

	Stn.Code	MQLNS1	MQLNS2	MQLNS3	MQLNS4	MQLNS5				
		1-Sep-16	1-Sep-16	1-Sep-16	1-Sep-16	1-Sep-16				
							Minimum	Maximum	Average	Standard Deviation
Moisture	%	94	95	95	95	95	94	95	94.8	0.45
Soluble (2:1) pH-L	pH Units	6.86	7.13	7.57	7.51	7.53	6.86	7.57	7.32	0.31
Clay Content	%	15	17	10	16	12	10	17	14.0	2.9
% sand by hydrometer	%	61	66	53	53	62	53	66	59.0	5.8
% silt by hydrometer	%	25	17	37	30	26	17	37	27.0	7.3

Middle Quinsam Deep EMS ID: E292115

	Stn.Code	MQL1	MQL2	MQL3						
		1-Sep-16	1-Sep-16	1-Sep-16						
					Minimum	Maximum	Average	Standard Deviation		
Moisture	%	92	92	92	92	92	92	0		
Soluble (2:1) pH-L	pH Units	6.59	6.60	6.58	6.58	6.60	6.59	0.01		
Clay Content	%	13	13	18	13	18	14.7	2.9		
% sand by hydrometer	%	56	56	59	56	59	57.0	1.7		
% silt by hydrometer	%	31	31	24	24	31	28.7	4.0		

Middle Quinsam Outlet EMS ID: 0900504

	Stn.Code	MQLO1	MQLO2	MQLO3						
		1-Sep-16	1-Sep-16	1-Sep-16						
					Minimum	Maximum	Average	Standard Deviation		
Moisture	%	94	94	93	93	94	93.7	0.5		
Soluble (2:1) pH-L	pH Units	6.44	6.55	6.48	6.44	6.55	6.49	0.07		
Clay Content	%	13	20	14	13	20	15.7	3.8		
% sand by hydrometer	%	57	61	54	54	61	57.3	3.5		
% silt by hydrometer	%	31	19	32	19	32	27.3	7.2		

Table 190
2016-17 Annual Report

Physical Parameters of Sediment Chemistry Analysis in Lower Quinsam Lake

Lower Quinsam Lake Inlet EMS ID: E292117

	Stn.Code	LQLI1	LQLI2	LQLI3	LQLI4	LQLI5				
		12-Sep-16	12-Sep-16	12-Sep-16	12-Sep-16	12-Sep-16				
							Minimum	Maximum	Average	Standard Deviation
Moisture	%	43	42	31			31	43	38.7	6.7
Soluble (2:1) pH-L	pH Units	5.30	5.11	6.36	5.35	5.26	5.11	6.36	5.48	0.50
Clay Content	%	7.1	6.3	3.5	4.0	4.1	3.5	7.1	5.0	1.6
% sand by hydrometer	%	73	74	87	59	60	59	87	70.6	11.5
% silt by hydrometer	%	20	20	9.2	37	36	9.2	37	24.4	11.9

Lower Quinsam Lake Deep 1 EMS ID: E29118

	Stn.Code	LQL1	LQL2	LQL3	LQL4	LQL5				
		12-Sep-16	12-Sep-16	12-Sep-16	12-Sep-16	12-Sep-16				
							Minimum	Maximum	Average	Standard Deviation
Moisture	%	66	67	67	66	68	66	68	66.8	0.8
Soluble (2:1) pH-L	pH Units	5.85	5.68	5.86	5.71	5.78	5.68	5.86	5.78	0.08
Clay Content	%	12	16	12	13	14	12	16	13.4	1.7
% sand by hydrometer	%	22	14	18	18	17	14	22	17.8	2.9
% silt by hydrometer	%	65	69	70	69	69	65	70	68.4	1.9

Lower Quinsam Lake Deep 2 - EMS ID: E292119

	Stn.Code	LQLM1	LQLM2	LQLM3	LQLM4	LQLM5				
		12-Sep-16	12-Sep-16	12-Sep-16	12-Sep-16	12-Sep-16				
							Minimum	Maximum	Average	Standard Deviation
Moisture	%	75	75	75			75	75	75.0	0.0
Soluble (2:1) pH-L	pH Units	7.39	6.04	6.05	5.37	5.75	5.37	7.39	6.12	0.76
Clay Content	%	20	18	17	5.6	13	5.6	20	14.7	5.7
% sand by hydrometer	%	23	27	35	18	35	18	35	27.6	7.5
% silt by hydrometer	%	57	55	49	76	52	49	76	57.8	10.6

Lower Quinsam Lake Outlet EMS ID: E292120

	Stn.Code	LQLO1	LQLO2	LQLO3	LQLO4	LQLO5				
		8-Sep-16	8-Sep-16	8-Sep-16	8-Sep-16	8-Sep-16				
							Minimum	Maximum	Average	Standard Deviation
Moisture	%	87	88	87			87	88	87.3	0.6
Soluble (2:1) pH-L	pH Units	5.45	6.04	5.96	5.85	6.46	5.45	6.46	5.95	0.36
Clay Content	%	12	10	13	18	14	10	18	13.4	3.0
% sand by hydrometer	%	50	53	48	40	44	40	53	47.0	5.1
% silt by hydrometer	%	37	37	38	42	42	37	42	39.2	2.6

Table 191
2016-17 Annual Report

Physical Parameters of Sediment Chemistry Analysis in Lower Wetland

Lower Wetland Inlet EMS ID: E292124

	Stn.Code	**LWI1**	**LWI2**	**LWI3**						
		5-Oct-16	**5-Oct-16**	**5-Oct-16**						
					Minimum	**Maximum**	**Average**	**Standard Deviation**		
Moisture	%	91	89	89	89	91	89.7	1.2		
Soluble (2:1) pH-L	pH Units	5.80	5.61	5.90	5.61	5.90	5.77	0.15		
Clay Content	%	4.0	3.6	2.5	2.5	4.0	3.4	0.8		
% sand by hydrometer	%	69	76	77	69	77	74.0	4.4		
% silt by hydrometer	%	27	21	21	21	27	23.0	3.5		

Lower Wetland Middle EMS ID: E292125

	Stn.Code	**LWM1**	**LWM2**	**LWM3**						
		5-Oct-16	**5-Oct-16**	**5-Oct-16**						
					Minimum	**Maximum**	**Average**	**Standard Deviation**		
Moisture	%	86	85	88	85	88	86.3	1.5		
Soluble (2:1) pH-L	pH Units	5.68	5.60	5.90	5.60	5.90	5.73	0.16		
Clay Content	%	8.3	9.7	6.7	6.7	9.7	8.2	1.5		
% sand by hydrometer	%	50	50	68	50	68	56.0	10.4		
% silt by hydrometer	%	42	40	25	25	42	35.7	9.3		

Lower Wetland Outlet EMS ID: E292112

	Stn.Code	**LWO1**	**LWO2**	**LWO3**	**LWO4**	**LWO5**				
		13-Sep-16	**13-Sep-16**	**13-Sep-16**	**13-Sep-16**	**13-Sep-16**				
							Minimum	**Maximum**	**Average**	**Standard Deviation**
Moisture	%	76	77	73	77	78	73	78	76.2	1.9
Soluble (2:1) pH-L	pH Units	5.75	5.78	5.78	5.86	5.83	5.75	5.86	5.80	0.04
Clay Content	%	12	8.8	11	8.4	8.6	8.4	12	9.8	1.6
% sand by hydrometer	%	41	45	43	41	45	41	45	43.0	2.0
% silt by hydrometer	%	48	46	46	50	47	46	50	47.4	1.7

Table 192
2016-17 Annual Report

Physical Parameters of Sediment Chemistry Analysis on Quinsam River

Quinsam River at Argonaut Bridge										
EMS ID:	**O126402**									
	Stn.Code	**WA1**	**WA2**	**WA3**	**WA4**	**WA5**				
		14-Sep-16	**14-Sep-16**	**14-Sep-16**	**14-Sep-16**	**14-Sep-16**				
							Minimum	**Maximum**	**Average**	**Standard Deviation**
Moisture	**%**	17	23	20	23	25	17	25	21.6	3.1
Soluble (2:1) pH-L	**pH Units**	7.17	7.25	6.99	7.04	6.61	6.61	7.25	7.01	0.25
Clay Content	**%**	<2.0	2.0	2.1	<2.0	2.0	<2.0	2.1	2.0	0.04
% sand by hydrometer	**%**	94	96	95	95	96	94	96	95.2	0.8
% silt by hydrometer	**%**	4.9	2.5	2.5	3.8	2.5	2.5	4.9	3.2	1.1
Quinsam River Downstream of North Mining Operation										
EMS ID:	**E286930**									
	Stn.Code	**QRDS11**	**QRDS12**	**QRDS13**	**QRDS14**	**QRDS15**				
		15-Sep-16	**15-Sep-16**	**15-Sep-16**	**15-Sep-16**	**15-Sep-16**				
							Minimum	**Maximum**	**Average**	**Standard Deviation**
Moisture	**%**	12	19	16	13	20	12	20	16.0	3.5
Soluble (2:1) pH-L	**pH Units**	7.14	7.10	7.49	7.48	7.09	7.09	7.49	7.26	0.21
Clay Content	**%**	4.5	2.2	2.1	2.3	2.4	2.1	4.5	2.7	1.0
% sand by hydrometer	**%**	95	96	96	96	93	93	96	95.2	1.3
% silt by hydrometer	**%**	<2.0	<2.0	<2.0	<2.0	4.2	<2.0	4.2	2.4	1.0
Quinsam River Downstream of 7-South Mining Operation										
EMS ID:	**E292113**									
	Stn.Code	**7SQR1**	**7SQR2**	**7SQR3**	**7SQR4**	**7SQR5**				
		19-Sep-16	**19-Sep-16**	**19-Sep-16**	**19-Sep-16**	**19-Sep-16**				
							Minimum	**Maximum**	**Average**	**Standard Deviation**
Moisture	**%**	46	34	22	30	26	22	46	31.6	9.2
Soluble (2:1) pH-L	**pH Units**	6.59	6.05	5.92	6.63	6.10	5.92	6.63	6.26	0.33
Clay Content	**%**	7.7	5.0	2.5	2.7	<2.0	<2.0	7.7	4.0	2.4
% sand by hydrometer	**%**	66	87	92	75	91	66	92	82.2	11.3
% silt by hydrometer	**%**	27	7.7	5.3	22	7.9	5.3	27	14.0	9.8

Table 193
2016-17 Annual Report

List of Standards For Sediment Quality Comparison

Parameter	ISQG	PEL	BCASQG	SQO
PAH'S				
2-Methylnaphthalene	0.0202	0.201		
Acenaphthene	0.00671	0.0889	0.15	
Acenaphthylene	0.00587	0.128		
Anthracene	0.0469	0.245	0.6	
Benzo(a)anthracene	0.0317	0.385	0.2	
Benzo(a)pyrene	0.0319	0.782	0.06	
Benzo(b&j)fluoranthene				
Benzo(g,h,i)perylene	0.17 [1]	0.17 [1]		
Benzo(k)fluoranthene	0.24 [1]	0.24 [1]		
Chrysene	0.0571	0.862		
Dibenz(a,h)anthracene	0.0062	0.135		
Fluoranthene	0.111	2.355	2	
Fluorene	0.0212	0.144	0.2	
Indeno(1,2,3-cd)pyrene	0.2 [1]	0.2 [1]		
Naphthalene	0.0346	0.391	0.01	
Phenanthrene	0.0419	0.515	0.04	
Pyrene	0.053	0.875		
Metals				
Total Silver (Ag)	0.5	0.5		
Total Aluminum (Al)				
Total Arsenic (As)	5.9	17		***
Total Barium (Ba)				
Total Beryllium (Be)				
Total Bismuth (Bi)				
Total Calcium (Ca)				
Total Cadmium (Cd)	0.6	3.5		0.9
Total Cobalt (Co)				
Total Chromium (Cr)	37.3	90		39.7
Total Copper (Cu)	35.7	197		172
Total Iron (Fe)	21200 [1]	43766 [2]		155000
Total Mercury (Hg)	0.17	0.486		5.72
Total Potassium (K)				
Total Lithium (Li)				
Total Magnesium (Mg)				
Total Manganese (Mn)	460 [1]	1100 [2]		2040
Total Molybdenum (Mo)				
Total Sodium (Na)				
Total Nickel (Ni)	16 [1]	75 [2]		16
Total Lead (Pb)	35	91.3		35
Total Phosphorus (P)				
Total Antimony (Sb)				
Total Selenium (Se)	2	2		2
Total Tin (Sn)				
Total Strontium (Sr)				
Total Sulphur (S)				
Total Titanium (Ti)				
Total Thallium (Tl)				
Total Uranium (U)				
Total Vanadium (V)				
Total Zinc (Zn)	123	315		
Total Zirconium (Zr)				

[1] Obtained from Ontario Sediment Quality Guidelines - Lowest Effects Level

[2] Obtained from Ontario Sediment Quality Guidelines - Severe Effects Level

*** Arsenic Objective variable based on location within Long Lake

Table 194
2016-17 Annual Report

Summary of Sediment Metal Exceedances - PEL , ISQG & (SQO for Long Lake)

Stn.Code	EMS ID	Date	Param.Code	Units	Result	PEL	ISQG	SQO for Long Lake
LLI1	E292121	31-Aug-16	As-T	mg/kg	***50***	17	5.9	
LLI1	E292121	31-Aug-16	Cd-T	mg/kg	0.637	3.5	0.6	0.9
LLI1	E292121	31-Aug-16	Cu-T	mg/kg	36.6	197	35.7	172
LLI1	E292121	31-Aug-16	Fe-T	mg/kg	43400	43766	21200	155000
LLI1	E292121	31-Aug-16	Mn-T	mg/kg	783	1100	460	2040
LLI1	E292121	31-Aug-16	Ni-T	mg/kg	***18.6***		16	16
LLI2	E292121	31-Aug-16	As-T	mg/kg	***57.7***	17	5.9	
LLI2	E292121	31-Aug-16	Cd-T	mg/kg	0.655	3.5	0.6	0.9
LLI2	E292121	31-Aug-16	Fe-T	mg/kg	***51900***	43766	21200	155000
LLI2	E292121	31-Aug-16	Mn-T	mg/kg	684	1100	460	2040
LLI2	E292121	31-Aug-16	Ni-T	mg/kg	***17***		16	16
LLI3	E292121	31-Aug-16	As-T	mg/kg	***48.7***	17	5.9	
LLI3	E292121	31-Aug-16	Cd-T	mg/kg	0.635	3.5	0.6	0.9
LLI3	E292121	31-Aug-16	Fe-T	mg/kg	40200	43766	21200	155000
LLI3	E292121	31-Aug-16	Mn-T	mg/kg	717	1100	460	2040
LLI3	E292121	31-Aug-16	Ni-T	mg/kg	***16.8***		16	16
LLM1	E292122	30-Aug-16	As-T	mg/kg	***170***	17	5.9	
LLM1	E292122	30-Aug-16	Cr-T	mg/kg	***38.8***		37.3	39.7
LLM1	E292122	30-Aug-16	Cu-T	mg/kg	70	197	35.7	172
LLM1	E292122	30-Aug-16	Fe-T	mg/kg	***113000***	43766	21200	155000
LLM1	E292122	30-Aug-16	Hg-T	mg/kg	0.244	0.486	0.17	5.72
LLM1	E292122	30-Aug-16	Mn-T	mg/kg	***3420***	1100	460	2040
LLM1	E292122	30-Aug-16	Ni-T	mg/kg	***30.9***		16	16
LLM2	E292122	30-Aug-16	As-T	mg/kg	***152***	17	5.9	
LLM2	E292122	30-Aug-16	Cr-T	mg/kg	***38.5***		37.3	39.7
LLM2	E292122	30-Aug-16	Cu-T	mg/kg	69.1	197	35.7	172
LLM2	E292122	30-Aug-16	Fe-T	mg/kg	***119000***	43766	21200	155000
LLM2	E292122	30-Aug-16	Hg-T	mg/kg	0.251	0.486	0.17	5.72
LLM2	E292122	30-Aug-16	Mn-T	mg/kg	***3510***	1100	460	2040
LLM2	E292122	30-Aug-16	Ni-T	mg/kg	***30.2***		16	16
LLM3	E292122	30-Aug-16	As-T	mg/kg	***159***	17	5.9	
LLM3	E292122	30-Aug-16	Cr-T	mg/kg	***42.2***		37.3	39.7
LLM3	E292122	30-Aug-16	Cu-T	mg/kg	74.4	197	35.7	172
LLM3	E292122	30-Aug-16	Fe-T	mg/kg	***104000***	43766	21200	155000
LLM3	E292122	30-Aug-16	Hg-T	mg/kg	0.257	0.486	0.17	5.72
LLM3	E292122	30-Aug-16	Mn-T	mg/kg	***2790***	1100	460	2040
LLM3	E292122	30-Aug-16	Ni-T	mg/kg	***33.1***		16	16
LLNS1	E292123	31-Aug-16	As-T	mg/kg	***47.8***	17	5.9	
LLNS1	E292123	31-Aug-16	Cu-T	mg/kg	64.6	197	35.7	172
LLNS1	E292123	31-Aug-16	Fe-T	mg/kg	***51000***	43766	21200	155000
LLNS1	E292123	31-Aug-16	Hg-T	mg/kg	0.217	0.486	0.17	5.72
LLNS1	E292123	31-Aug-16	Mn-T	mg/kg	811	1100	460	2040
LLNS1	E292123	31-Aug-16	Ni-T	mg/kg	***29.5***		16	16
LLNS2	E292123	31-Aug-16	As-T	mg/kg	***41.4***	17	5.9	
LLNS2	E292123	31-Aug-16	Cr-T	mg/kg	***40.7***		37.3	39.7
LLNS2	E292123	31-Aug-16	Cu-T	mg/kg	76.8	197	35.7	172
LLNS2	E292123	31-Aug-16	Fe-T	mg/kg	***55400***	43766	21200	155000
LLNS2	E292123	31-Aug-16	Mn-T	mg/kg	***1380***	1100	460	2040
LLNS2	E292123	31-Aug-16	Ni-T	mg/kg	***34.6***		16	16
LLNS3	E292123	31-Aug-16	As-T	mg/kg	***68.5***	17	5.9	
LLNS3	E292123	31-Aug-16	Cd-T	mg/kg	0.622	3.5	0.6	0.9
LLNS3	E292123	31-Aug-16	Cr-T	mg/kg	***40.2***		37.3	39.7
LLNS3	E292123	31-Aug-16	Cu-T	mg/kg	67.9	197	35.7	172
LLNS3	E292123	31-Aug-16	Fe-T	mg/kg	***62000***	43766	21200	155000
LLNS3	E292123	31-Aug-16	Hg-T	mg/kg	0.233	0.486	0.17	5.72
LLNS3	E292123	31-Aug-16	Mn-T	mg/kg	987	1100	460	2040
LLNS3	E292123	31-Aug-16	Ni-T	mg/kg	***32.1***		16	16
LLNS4	E292123	31-Aug-16	As-T	mg/kg	***55.2***	17	5.9	
LLNS4	E292123	31-Aug-16	Cu-T	mg/kg	58	197	35.7	172
LLNS4	E292123	31-Aug-16	Fe-T	mg/kg	***54600***	43766	21200	155000
LLNS4	E292123	31-Aug-16	Hg-T	mg/kg	0.199	0.486	0.17	5.72
LLNS4	E292123	31-Aug-16	Mn-T	mg/kg	922	1100	460	2040
LLNS4	E292123	31-Aug-16	Ni-T	mg/kg	***26.1***		16	16
LLNS5	E292123	31-Aug-16	As-T	mg/kg	***44.8***	17	5.9	
LLNS5	E292123	31-Aug-16	Cu-T	mg/kg	66.4	197	35.7	172
LLNS5	E292123	31-Aug-16	Fe-T	mg/kg	***51300***	43766	21200	155000
LLNS5	E292123	31-Aug-16	Hg-T	mg/kg	0.192	0.486	0.17	5.72
LLNS5	E292123	31-Aug-16	Mn-T	mg/kg	804	1100	460	2040
LLNS5	E292123	31-Aug-16	Ni-T	mg/kg	***29.8***		16	16
LLNS6	E292123	31-Aug-16	As-T	mg/kg	***74.8***	17	5.9	
LLNS6	E292123	31-Aug-16	Cd-T	mg/kg	0.609	3.5	0.6	0.9
LLNS6	E292123	31-Aug-16	Cu-T	mg/kg	55.5	197	35.7	172
LLNS6	E292123	31-Aug-16	Fe-T	mg/kg	***59000***	43766	21200	155000
LLNS6	E292123	31-Aug-16	Hg-T	mg/kg	0.212	0.486	0.17	5.72
LLNS6	E292123	31-Aug-16	Mn-T	mg/kg	737	1100	460	2040
LLNS6	E292123	31-Aug-16	Ni-T	mg/kg	***25.8***		16	16
LLO1	E219412	30-Aug-16	As-T	mg/kg	***46.9***	17	5.9	
LLO1	E219412	30-Aug-16	Cu-T	mg/kg	57.2	197	35.7	172
LLO1	E219412	30-Aug-16	Fe-T	mg/kg	***55900***	43766	21200	155000
LLO1	E219412	30-Aug-16	Mn-T	mg/kg	813	1100	460	2040
LLO1	E219412	30-Aug-16	Ni-T	mg/kg	***28.3***		16	16
LLO2	E219412	30-Aug-16	As-T	mg/kg	***49.4***	17	5.9	
LLO2	E219412	30-Aug-16	Cu-T	mg/kg	48.9	197	35.7	172
LLO2	E219412	30-Aug-16	Fe-T	mg/kg	***52200***	43766	21200	155000
LLO2	E219412	30-Aug-16	Mn-T	mg/kg	***1170***	1100	460	2040
LLO2	E219412	30-Aug-16	Ni-T	mg/kg	***24.7***		16	16
LLO3	E219412	30-Aug-16	As-T	mg/kg	***47.3***	17	5.9	
LLO3	E219412	30-Aug-16	Cu-T	mg/kg	46.3	197	35.7	172
LLO3	E219412	30-Aug-16	Fe-T	mg/kg	***51300***	43766	21200	155000
LLO3	E219412	30-Aug-16	Mn-T	mg/kg	***1120***	1100	460	2040
LLO3	E219412	30-Aug-16	Ni-T	mg/kg	***23.9***		16	16

Bold Red indicates PEL exceedence

Bold Red italics with fill indicates ISQG exceedence

Indicates SQO was exceeded in Long Lake

Table 195
2016-17 Annual Report

Summary of Sediment Metal Exceedances - PEL , ISQG & (SQO for comparison only)

Stn.Code	EMS ID	Date	Param.Code	Units	Result	PEL	ISQG	SQO for Long Lake
7SQR1	E292113	19-Sep-16	As-T	mg/kg	***21.0***	17	5.9	
7SQR1	E292113	19-Sep-16	Cd-T	mg/kg	0.682	3.5	0.6	0.9
7SQR1	E292113	19-Sep-16	Cu-T	mg/kg	44.6	197	35.7	172
7SQR1	E292113	19-Sep-16	Fe-T	mg/kg	35700	43766	21200	155000
7SQR1	E292113	19-Sep-16	Mn-T	mg/kg	608	1100	460	2040
7SQR1	E292113	19-Sep-16	Ni-T	mg/kg	***21.3***		16	16
7SQR2	E292113	19-Sep-16	As-T	mg/kg	15.6	17	5.9	
7SQR2	E292113	19-Sep-16	Cu-T	mg/kg	39.3	197	35.7	172
7SQR2	E292113	19-Sep-16	Fe-T	mg/kg	27300	43766	21200	155000
7SQR2	E292113	19-Sep-16	Ni-T	mg/kg	***18.5***		16	16
7SQR3	E292113	19-Sep-16	As-T	mg/kg	15.5	17	5.9	
7SQR3	E292113	19-Sep-16	Cu-T	mg/kg	39.8	197	35.7	172
7SQR3	E292113	19-Sep-16	Fe-T	mg/kg	29100	43766	21200	155000
7SQR3	E292113	19-Sep-16	Ni-T	mg/kg	***18.6***		16	16
7SQR4	E292113	19-Sep-16	As-T	mg/kg	***24.9***	17	5.9	
7SQR4	E292113	19-Sep-16	Cd-T	mg/kg	0.613	3.5	0.6	0.9
7SQR4	E292113	19-Sep-16	Cu-T	mg/kg	47.1	197	35.7	172
7SQR4	E292113	19-Sep-16	Fe-T	mg/kg	39200	43766	21200	155000
7SQR4	E292113	19-Sep-16	Mn-T	mg/kg	554	1100	460	2040
7SQR4	E292113	19-Sep-16	Ni-T	mg/kg	***21.2***		16	16
7SQR5	E292113	19-Sep-16	As-T	mg/kg	8.82	17	5.9	
LQL1	E29118	12-Sep-16	As-T	mg/kg	***41.6***	17	5.9	
LQL1	E29118	12-Sep-16	Cd-T	mg/kg	1.37	3.5	0.6	0.9
LQL1	E29118	12-Sep-16	Cr-T	mg/kg	***40.9***		37.3	39.7
LQL1	E29118	12-Sep-16	Cu-T	mg/kg	71.9	197	35.7	172
LQL1	E29118	12-Sep-16	Fe-T	mg/kg	***52400***	43766	21200	155000
LQL1	E29118	12-Sep-16	Mn-T	mg/kg	638	1100	460	2040
LQL1	E29118	12-Sep-16	Ni-T	mg/kg	***33.7***		16	16
LQL2	E29118	12-Sep-16	As-T	mg/kg	***42.7***	17	5.9	
LQL2	E29118	12-Sep-16	Cd-T	mg/kg	1.47	3.5	0.6	0.9
LQL2	E29118	12-Sep-16	Cr-T	mg/kg	***42.4***		37.3	39.7
LQL2	E29118	12-Sep-16	Cu-T	mg/kg	73.6	197	35.7	172
LQL2	E29118	12-Sep-16	Fe-T	mg/kg	***53400***	43766	21200	155000
LQL2	E29118	12-Sep-16	Mn-T	mg/kg	665	1100	460	2040
LQL2	E29118	12-Sep-16	Ni-T	mg/kg	***34.6***		16	16
LQL3	E29118	12-Sep-16	As-T	mg/kg	***40.6***	17	5.9	
LQL3	E29118	12-Sep-16	Cd-T	mg/kg	1.24	3.5	0.6	0.9
LQL3	E29118	12-Sep-16	Cr-T	mg/kg	***38.3***		37.3	39.7
LQL3	E29118	12-Sep-16	Cu-T	mg/kg	68.5	197	35.7	172
LQL3	E29118	12-Sep-16	Fe-T	mg/kg	***49700***	43766	21200	155000
LQL3	E29118	12-Sep-16	Mn-T	mg/kg	595	1100	460	2040
LQL3	E29118	12-Sep-16	Ni-T	mg/kg	***31.8***		16	16
LQL4	E29118	12-Sep-16	As-T	mg/kg	***43.9***	17	5.9	
LQL4	E29118	12-Sep-16	Cd-T	mg/kg	1.33	3.5	0.6	0.9
LQL4	E29118	12-Sep-16	Cr-T	mg/kg	***41.5***		37.3	39.7
LQL4	E29118	12-Sep-16	Cu-T	mg/kg	72.7	197	35.7	172
LQL4	E29118	12-Sep-16	Fe-T	mg/kg	***54800***	43766	21200	155000
LQL4	E29118	12-Sep-16	Mn-T	mg/kg	666	1100	460	2040
LQL4	E29118	12-Sep-16	Ni-T	mg/kg	***34.4***		16	16
LQL5	E29118	12-Sep-16	As-T	mg/kg	***42.3***	17	5.9	
LQL5	E29118	12-Sep-16	Cd-T	mg/kg	1.28	3.5	0.6	0.9
LQL5	E29118	12-Sep-16	Cr-T	mg/kg	***40.2***		37.3	39.7
LQL5	E29118	12-Sep-16	Cu-T	mg/kg	71.9	197	35.7	172
LQL5	E29118	12-Sep-16	Fe-T	mg/kg	***53200***	43766	21200	155000
LQL5	E29118	12-Sep-16	Mn-T	mg/kg	631	1100	460	2040
LQL5	E29118	12-Sep-16	Ni-T	mg/kg	***33.5***		16	16
LQLI1	E292117	12-Sep-16	As-T	mg/kg	***33.5***	17	5.9	
LQLI1	E292117	12-Sep-16	Cd-T	mg/kg	1.37	3.5	0.6	0.9
LQLI1	E292117	12-Sep-16	Cr-T	mg/kg	***40.4***		37.3	39.7
LQLI1	E292117	12-Sep-16	Cu-T	mg/kg	72.7	197	35.7	172
LQLI1	E292117	12-Sep-16	Fe-T	mg/kg	***50300***	43766	21200	155000
LQLI1	E292117	12-Sep-16	Mn-T	mg/kg	482	1100	460	2040
LQLI1	E292117	12-Sep-16	Ni-T	mg/kg	***33.3***		16	16
LQLI2	E292117	12-Sep-16	As-T	mg/kg	***35.3***	17	5.9	
LQLI2	E292117	12-Sep-16	Cd-T	mg/kg	1.43	3.5	0.6	0.9
LQLI2	E292117	12-Sep-16	Cr-T	mg/kg	***41.9***		37.3	39.7
LQLI2	E292117	12-Sep-16	Cu-T	mg/kg	71.8	197	35.7	172
LQLI2	E292117	12-Sep-16	Fe-T	mg/kg	***50200***	43766	21200	155000
LQLI2	E292117	12-Sep-16	Mn-T	mg/kg	472	1100	460	2040
LQLI2	E292117	12-Sep-16	Ni-T	mg/kg	***33.3***		16	16
LQLI3	E292117	12-Sep-16	As-T	mg/kg	***31.5***	17	5.9	
LQLI3	E292117	12-Sep-16	Cd-T	mg/kg	1.50	3.5	0.6	0.9
LQLI3	E292117	12-Sep-16	Cr-T	mg/kg	***42.7***		37.3	39.7
LQLI3	E292117	12-Sep-16	Cu-T	mg/kg	75.8	197	35.7	172
LQLI3	E292117	12-Sep-16	Fe-T	mg/kg	***47700***	43766	21200	155000
LQLI3	E292117	12-Sep-16	Mn-T	mg/kg	661	1100	460	2040
LQLI3	E292117	12-Sep-16	Ni-T	mg/kg	***34.2***		16	16
LQLI4	E292117	12-Sep-16	As-T	mg/kg	***36.1***	17	5.9	
LQLI4	E292117	12-Sep-16	Cd-T	mg/kg	1.37	3.5	0.6	0.9
LQLI4	E292117	12-Sep-16	Cr-T	mg/kg	***41.9***		37.3	39.7
LQLI4	E292117	12-Sep-16	Cu-T	mg/kg	72.2	197	35.7	172
LQLI4	E292117	12-Sep-16	Fe-T	mg/kg	***53300***	43766	21200	155000
LQLI4	E292117	12-Sep-16	Mn-T	mg/kg	494	1100	460	2040
LQLI4	E292117	12-Sep-16	Ni-T	mg/kg	***33.4***		16	16
LQLI5	E292117	12-Sep-16	As-T	mg/kg	***42.1***	17	5.9	
LQLI5	E292117	12-Sep-16	Cd-T	mg/kg	1.61	3.5	0.6	0.9
LQLI5	E292117	12-Sep-16	Cr-T	mg/kg	***47.2***		37.3	39.7
LQLI5	E292117	12-Sep-16	Cu-T	mg/kg	80.1	197	35.7	172
LQLI5	E292117	12-Sep-16	Fe-T	mg/kg	***59300***	43766	21200	155000
LQLI5	E292117	12-Sep-16	Mn-T	mg/kg	534	1100	460	2040
LQLI5	E292117	12-Sep-16	Ni-T	mg/kg	***36.9***		16	16

Bold Red indicates PEL exceedence
Bold Red italics with fill indicates ISQG exceedence

Table 196
2016-17 Annual Report

Summary of Sediment Metal Exceedances - PEL , ISQG & (SQO for comparison only)

Stn.Code	EMS ID	Date	Param.Code	Units	Result	PEL	ISQG	SQO for Long Lake
LQLM1	E292119	12-Sep-16	As-T	mg/kg	***75.3***	17	5.9	
LQLM1	E292119	12-Sep-16	Cd-T	mg/kg	1.41	3.5	0.6	0.9
LQLM1	E292119	12-Sep-16	Cr-T	mg/kg	***44.2***		37.3	39.7
LQLM1	E292119	12-Sep-16	Cu-T	mg/kg	74.7	197	35.7	172
LQLM1	E292119	12-Sep-16	Fe-T	mg/kg	***69300***	43766	21200	155000
LQLM1	E292119	12-Sep-16	Mn-T	mg/kg	995	1100	460	2040
LQLM1	E292119	12-Sep-16	Ni-T	mg/kg	***34.1***		16	16
LQLM2	E292119	12-Sep-16	As-T	mg/kg	***107***	17	5.9	
LQLM2	E292119	12-Sep-16	Cd-T	mg/kg	1.35	3.5	0.6	0.9
LQLM2	E292119	12-Sep-16	Cr-T	mg/kg	***42.8***		37.3	39.7
LQLM2	E292119	12-Sep-16	Cu-T	mg/kg	73.8	197	35.7	172
LQLM2	E292119	12-Sep-16	Fe-T	mg/kg	***70100***	43766	21200	155000
LQLM2	E292119	12-Sep-16	Mn-T	mg/kg	***1750***	1100	460	2040
LQLM2	E292119	12-Sep-16	Ni-T	mg/kg	***33.5***		16	16
LQLM3	E292119	12-Sep-16	As-T	mg/kg	***80.0***	17	5.9	
LQLM3	E292119	12-Sep-16	Cd-T	mg/kg	1.26	3.5	0.6	0.9
LQLM3	E292119	12-Sep-16	Cr-T	mg/kg	***37.6***		37.3	39.7
LQLM3	E292119	12-Sep-16	Cu-T	mg/kg	69.4	197	35.7	172
LQLM3	E292119	12-Sep-16	Fe-T	mg/kg	***55800***	43766	21200	155000
LQLM3	E292119	12-Sep-16	Mn-T	mg/kg	***1270***	1100	460	2040
LQLM3	E292119	12-Sep-16	Ni-T	mg/kg	***31.6***		16	16
LQLM4	E292119	12-Sep-16	As-T	mg/kg	***98.5***	17	5.9	
LQLM4	E292119	12-Sep-16	Cd-T	mg/kg	1.45	3.5	0.6	0.9
LQLM4	E292119	12-Sep-16	Cr-T	mg/kg	***48.6***		37.3	39.7
LQLM4	E292119	12-Sep-16	Cu-T	mg/kg	82.1	197	35.7	172
LQLM4	E292119	12-Sep-16	Fe-T	mg/kg	***74100***	43766	21200	155000
LQLM4	E292119	12-Sep-16	Mn-T	mg/kg	***1520***	1100	460	2040
LQLM4	E292119	12-Sep-16	Ni-T	mg/kg	***38.1***		16	16
LQLM5	E292119	12-Sep-16	As-T	mg/kg	***99.3***	17	5.9	
LQLM5	E292119	12-Sep-16	Cd-T	mg/kg	1.39	3.5	0.6	0.9
LQLM5	E292119	12-Sep-16	Cr-T	mg/kg	***45.3***		37.3	39.7
LQLM5	E292119	12-Sep-16	Cu-T	mg/kg	79.4	197	35.7	172
LQLM5	E292119	12-Sep-16	Fe-T	mg/kg	***70800***	43766	21200	155000
LQLM5	E292119	12-Sep-16	Mn-T	mg/kg	***1380***	1100	460	2040
LQLM5	E292119	12-Sep-16	Ni-T	mg/kg	***35.1***		16	16
LQLO1	E292120	8-Sep-16	As-T	mg/kg	***72.6***	17	5.9	
LQLO1	E292120	8-Sep-16	Cd-T	mg/kg	1.70	3.5	0.6	0.9
LQLO1	E292120	8-Sep-16	Cu-T	mg/kg	61.1	197	35.7	172
LQLO1	E292120	8-Sep-16	Fe-T	mg/kg	***71500***	43766	21200	155000
LQLO1	E292120	8-Sep-16	Mn-T	mg/kg	***1730***	1100	460	2040
LQLO1	E292120	8-Sep-16	Ni-T	mg/kg	***29.0***		16	16
LQLO2	E292120	8-Sep-16	As-T	mg/kg	***90.0***	17	5.9	
LQLO2	E292120	8-Sep-16	Cd-T	mg/kg	1.25	3.5	0.6	0.9
LQLO2	E292120	8-Sep-16	Cu-T	mg/kg	53.8	197	35.7	172
LQLO2	E292120	8-Sep-16	Fe-T	mg/kg	***71200***	43766	21200	155000
LQLO2	E292120	8-Sep-16	Mn-T	mg/kg	***2390***	1100	460	2040
LQLO2	E292120	8-Sep-16	Ni-T	mg/kg	***27.6***		16	16
LQLO3	E292120	8-Sep-16	As-T	mg/kg	***81.7***	17	5.9	
LQLO3	E292120	8-Sep-16	Cd-T	mg/kg	1.21	3.5	0.6	0.9
LQLO3	E292120	8-Sep-16	Cu-T	mg/kg	51.7	197	35.7	172
LQLO3	E292120	8-Sep-16	Fe-T	mg/kg	***67400***	43766	21200	155000
LQLO3	E292120	8-Sep-16	Mn-T	mg/kg	***2330***	1100	460	2040
LQLO3	E292120	8-Sep-16	Ni-T	mg/kg	***27.1***		16	16
LQLO4	E292120	8-Sep-16	As-T	mg/kg	***56.3***	17	5.9	
LQLO4	E292120	8-Sep-16	Cd-T	mg/kg	1.41	3.5	0.6	0.9
LQLO4	E292120	8-Sep-16	Cr-T	mg/kg	***41.2***		37.3	39.7
LQLO4	E292120	8-Sep-16	Cu-T	mg/kg	63.5	197	35.7	172
LQLO4	E292120	8-Sep-16	Fe-T	mg/kg	***62800***	43766	21200	155000
LQLO4	E292120	8-Sep-16	Mn-T	mg/kg	***2160***	1100	460	2040
LQLO4	E292120	8-Sep-16	Ni-T	mg/kg	***31.6***		16	16
LQLO5	E292120	8-Sep-16	As-T	mg/kg	***39.4***	17	5.9	
LQLO5	E292120	8-Sep-16	Cd-T	mg/kg	1.49	3.5	0.6	0.9
LQLO5	E292120	8-Sep-16	Cr-T	mg/kg	***42.5***		37.3	39.7
LQLO5	E292120	8-Sep-16	Cu-T	mg/kg	63.2	197	35.7	172
LQLO5	E292120	8-Sep-16	Fe-T	mg/kg	***48900***	43766	21200	155000
LQLO5	E292120	8-Sep-16	Mn-T	mg/kg	***1800***	1100	460	2040
LQLO5	E292120	8-Sep-16	Ni-T	mg/kg	***31.6***		16	16
LWI3	E292124	5-Oct-16	Se-T	mg/kg	***2.75***		2	2
LWM1	E292125	5-Oct-16	As-T	mg/kg	8.16	17	5.9	
LWM2	E292125	5-Oct-16	As-T	mg/kg	10.5	17	5.9	
LWM2	E292125	5-Oct-16	Fe-T	mg/kg	21300	43766	21200	155000
LWM3	E292125	5-Oct-16	As-T	mg/kg	11.3	17	5.9	
LWM3	E292125	5-Oct-16	Fe-T	mg/kg	22500	43766	21200	155000
LWM3	E292125	5-Oct-16	Mn-T	mg/kg	598	1100	460	2040
MGL1	1132502	7-Sep-16	As-T	mg/kg	***25.0***	17	5.9	
MGL1	1132502	7-Sep-16	Cd-T	mg/kg	0.627	3.5	0.6	0.9
MGL1	1132502	7-Sep-16	Cu-T	mg/kg	68.0	197	35.7	172
MGL1	1132502	7-Sep-16	Fe-T	mg/kg	41400	43766	21200	155000
MGL1	1132502	7-Sep-16	Hg-T	mg/kg	0.355	0.486	0.17	5.72
MGL1	1132502	7-Sep-16	Mn-T	mg/kg	***1200***	1100	460	2040
MGL1	1132502	7-Sep-16	Ni-T	mg/kg	***19.0***		16	16
MGL2	1132502	7-Sep-16	As-T	mg/kg	***20.8***	17	5.9	
MGL2	1132502	7-Sep-16	Cu-T	mg/kg	71.1	197	35.7	172
MGL2	1132502	7-Sep-16	Fe-T	mg/kg	37100	43766	21200	155000
MGL2	1132502	7-Sep-16	Hg-T	mg/kg	0.330	0.486	0.17	5.72
MGL2	1132502	7-Sep-16	Mn-T	mg/kg	1000	1100	460	2040
MGL2	1132502	7-Sep-16	Ni-T	mg/kg	***19.7***		16	16
MGL3	1132502	7-Sep-16	As-T	mg/kg	***23.4***	17	5.9	
MGL3	1132502	7-Sep-16	Cu-T	mg/kg	66.7	197	35.7	172
MGL3	1132502	7-Sep-16	Fe-T	mg/kg	38200	43766	21200	155000

Bold Red indicates PEL exceedence

Bold Red italics with fill indicates ISQG exceedence

Table 197
2016-17 Annual Report

Summary of Sediment Metal Exceedances - PEL , ISQG & (SQO for comparison only)

Stn.Code	EMS ID	Date	Param.Code	Units	Result	PEL	ISQG	SQO for Long Lake
MGL3	1132502	7-Sep-16	Hg-T	mg/kg	0.355	0.486	0.17	5.72
MGL3	1132502	7-Sep-16	Mn-T	mg/kg	1010	1100	460	2040
MGL3	1132502	7-Sep-16	Ni-T	mg/kg	***19.3***		16	16
MGL4	1132502	7-Sep-16	As-T	mg/kg	***17.6***	17	5.9	
MGL4	1132502	7-Sep-16	Cu-T	mg/kg	58.0	197	35.7	172
MGL4	1132502	7-Sep-16	Fe-T	mg/kg	29500	43766	21200	155000
MGL4	1132502	7-Sep-16	Hg-T	mg/kg	0.322	0.486	0.17	5.72
MGL4	1132502	7-Sep-16	Mn-T	mg/kg	781	1100	460	2040
MGL4	1132502	7-Sep-16	Ni-T	mg/kg	***16.3***		16	16
MGL5	1132502	7-Sep-16	As-T	mg/kg	***20.4***	17	5.9	
MGL5	1132502	7-Sep-16	Cu-T	mg/kg	69.2	197	35.7	172
MGL5	1132502	7-Sep-16	Fe-T	mg/kg	36500	43766	21200	155000
MGL5	1132502	7-Sep-16	Hg-T	mg/kg	0.365	0.486	0.17	5.72
MGL5	1132502	7-Sep-16	Mn-T	mg/kg	946	1100	460	2040
MGL5	1132502	7-Sep-16	Ni-T	mg/kg	***20.0***		16	16
MQL1	E292115	1-Sep-16	As-T	mg/kg	11.8	17	5.9	
MQL1	E292115	1-Sep-16	Cu-T	mg/kg	69.8	197	35.7	172
MQL1	E292115	1-Sep-16	Fe-T	mg/kg	32800	43766	21200	155000
MQL1	E292115	1-Sep-16	Hg-T	mg/kg	0.207	0.486	0.17	5.72
MQL1	E292115	1-Sep-16	Ni-T	mg/kg	***16.3***		16	16
MQL1	E292115	1-Sep-16	Se-T	mg/kg	***2.46***		2	2
MQL2	E292115	1-Sep-16	As-T	mg/kg	13.7	17	5.9	
MQL2	E292115	1-Sep-16	Cd-T	mg/kg	0.642	3.5	0.6	0.9
MQL2	E292115	1-Sep-16	Cu-T	mg/kg	80.7	197	35.7	172
MQL2	E292115	1-Sep-16	Fe-T	mg/kg	40700	43766	21200	155000
MQL2	E292115	1-Sep-16	Hg-T	mg/kg	0.235	0.486	0.17	5.72
MQL2	E292115	1-Sep-16	Ni-T	mg/kg	***18.7***		16	16
MQL2	E292115	1-Sep-16	Se-T	mg/kg	***2.72***		2	2
MQL3	E292115	1-Sep-16	As-T	mg/kg	12.9	17	5.9	
MQL3	E292115	1-Sep-16	Cu-T	mg/kg	69.9	197	35.7	172
MQL3	E292115	1-Sep-16	Fe-T	mg/kg	35700	43766	21200	155000
MQL3	E292115	1-Sep-16	Hg-T	mg/kg	0.200	0.486	0.17	5.72
MQL3	E292115	1-Sep-16	Ni-T	mg/kg	***16.3***		16	16
MQL3	E292115	1-Sep-16	Se-T	mg/kg	***2.46***		2	2
MQLI1	E206901	1-Sep-16	As-T	mg/kg	7.83	17	5.9	
MQLI1	E206901	1-Sep-16	Cu-T	mg/kg	60.5	197	35.7	172
MQLI1	E206901	1-Sep-16	Fe-T	mg/kg	30100	43766	21200	155000
MQLI1	E206901	1-Sep-16	Mn-T	mg/kg	728	1100	460	2040
MQLI1	E206901	1-Sep-16	Ni-T	mg/kg	***17.8***		16	16
MQLI2	E206901	1-Sep-16	As-T	mg/kg	8.29	17	5.9	
MQLI2	E206901	1-Sep-16	Cu-T	mg/kg	61.8	197	35.7	172
MQLI2	E206901	1-Sep-16	Fe-T	mg/kg	31700	43766	21200	155000
MQLI2	E206901	1-Sep-16	Mn-T	mg/kg	631	1100	460	2040
MQLI2	E206901	1-Sep-16	Ni-T	mg/kg	***18.0***		16	16
MQLI3	E206901	1-Sep-16	As-T	mg/kg	8.08	17	5.9	
MQLI3	E206901	1-Sep-16	Cu-T	mg/kg	58.7	197	35.7	172
MQLI3	E206901	1-Sep-16	Fe-T	mg/kg	30500	43766	21200	155000
MQLI3	E206901	1-Sep-16	Mn-T	mg/kg	730	1100	460	2040
MQLI3	E206901	1-Sep-16	Ni-T	mg/kg	***17.1***		16	16
MQLNS1	E292116	1-Sep-16	As-T	mg/kg	9.12	17	5.9	
MQLNS1	E292116	1-Sep-16	Cd-T	mg/kg	0.633	3.5	0.6	0.9
MQLNS1	E292116	1-Sep-16	Cu-T	mg/kg	57.7	197	35.7	172
MQLNS1	E292116	1-Sep-16	Fe-T	mg/kg	43400	43766	21200	155000
MQLNS1	E292116	1-Sep-16	Ni-T	mg/kg	***17.7***		16	16
MQLNS2	E292116	1-Sep-16	As-T	mg/kg	10.4	17	5.9	
MQLNS2	E292116	1-Sep-16	Cu-T	mg/kg	49.2	197	35.7	172
MQLNS2	E292116	1-Sep-16	Fe-T	mg/kg	***51700***	43766	21200	155000
MQLNS3	E292116	1-Sep-16	As-T	mg/kg	6.88	17	5.9	
MQLNS3	E292116	1-Sep-16	Cu-T	mg/kg	45.9	197	35.7	172
MQLNS3	E292116	1-Sep-16	Fe-T	mg/kg	32700	43766	21200	155000
MQLNS4	E292116	1-Sep-16	As-T	mg/kg	12.1	17	5.9	
MQLNS4	E292116	1-Sep-16	Cu-T	mg/kg	45.7	197	35.7	172
MQLNS4	E292116	1-Sep-16	Fe-T	mg/kg	***48200***	43766	21200	155000
MQLNS5	E292116	1-Sep-16	As-T	mg/kg	8.39	17	5.9	
MQLNS5	E292116	1-Sep-16	Cu-T	mg/kg	45.1	197	35.7	172
MQLNS5	E292116	1-Sep-16	Fe-T	mg/kg	43200	43766	21200	155000
MQLO1	900504	1-Sep-16	As-T	mg/kg	8.02	17	5.9	
MQLO1	900504	1-Sep-16	Cu-T	mg/kg	41.3	197	35.7	172
MQLO1	900504	1-Sep-16	Mn-T	mg/kg	472	1100	460	2040
MQLO2	900504	1-Sep-16	As-T	mg/kg	10.5	17	5.9	
MQLO2	900504	1-Sep-16	Cd-T	mg/kg	0.687	3.5	0.6	0.9
MQLO2	900504	1-Sep-16	Cu-T	mg/kg	49.5	197	35.7	172
MQLO2	900504	1-Sep-16	Fe-T	mg/kg	29700	43766	21200	155000
MQLO2	900504	1-Sep-16	Mn-T	mg/kg	791	1100	460	2040
MQLO2	900504	1-Sep-16	Ni-T	mg/kg	***17.8***		16	16
MQLO3	900504	1-Sep-16	As-T	mg/kg	10.6	17	5.9	
MQLO3	900504	1-Sep-16	Cd-T	mg/kg	0.689	3.5	0.6	0.9
MQLO3	900504	1-Sep-16	Cu-T	mg/kg	53.1	197	35.7	172
MQLO3	900504	1-Sep-16	Fe-T	mg/kg	28400	43766	21200	155000
MQLO3	900504	1-Sep-16	Mn-T	mg/kg	902	1100	460	2040
MQLO3	900504	1-Sep-16	Ni-T	mg/kg	***19.3***		16	16
MQLO5	900504	1-Sep-16	As-T	mg/kg	***17.7***	17	5.9	
MQLO5	900504	1-Sep-16	Cu-T	mg/kg	60.1	197	35.7	172
MQLO5	900504	1-Sep-16	Fe-T	mg/kg	34300	43766	21200	155000
MQLO5	900504	1-Sep-16	Mn-T	mg/kg	953	1100	460	2040
MQLO5	900504	1-Sep-16	Ni-T	mg/kg	***23.6***		16	16
NNLD1	E217018	24-Aug-16	As-T	mg/kg	***125***	17	5.9	
NNLD1	E217018	24-Aug-16	Cu-T	mg/kg	38.7	197	35.7	172
NNLD1	E217018	24-Aug-16	Fe-T	mg/kg	***165000***	43766	21200	155000
NNLD1	E217018	24-Aug-16	Hg-T	mg/kg	0.209	0.486	0.17	5.72
NNLD1	E217018	24-Aug-16	Mn-T	mg/kg	***5340***	1100	460	2040

Bold Red indicates PEL exceedence

Bold Red italics with fill indicates ISQG exceedence

Table 198
2016-17 Annual Report

Summary of Sediment Metal Exceedances - PEL , ISQG & (SQO for comparison only)

Stn.Code	EMS ID	Date	Param.Code	Units	Result	PEL	ISQG	SQO for Long Lake
NNLD2	E217018	24-Aug-16	Cu-T	mg/kg	42.2	197	35.7	172
NNLD2	E217018	24-Aug-16	Fe-T	mg/kg	***181000***	43766	21200	155000
NNLD2	E217018	24-Aug-16	Hg-T	mg/kg	0.243	0.486	0.17	5.72
NNLD2	E217018	24-Aug-16	Mn-T	mg/kg	***4880***	1100	460	2040
NNLD2	E217018	24-Aug-16	Se-T	mg/kg	***2.01***		2	2
NNLD3	E217018	24-Aug-16	As-T	mg/kg	***113***	17	5.9	
NNLD3	E217018	24-Aug-16	Cu-T	mg/kg	43.6	197	35.7	172
NNLD3	E217018	24-Aug-16	Fe-T	mg/kg	***125000***	43766	21200	155000
NNLD3	E217018	24-Aug-16	Hg-T	mg/kg	0.240	0.486	0.17	5.72
NNLD3	E217018	24-Aug-16	Mn-T	mg/kg	***3890***	1100	460	2040
NNLD4	E217018	24-Aug-16	As-T	mg/kg	***166***	17	5.9	
NNLD4	E217018	24-Aug-16	Fe-T	mg/kg	***218000***	43766	21200	155000
NNLD4	E217018	24-Aug-16	Hg-T	mg/kg	0.194	0.486	0.17	5.72
NNLD4	E217018	24-Aug-16	Mn-T	mg/kg	***6710***	1100	460	2040
NNLD5	E217018	24-Aug-16	As-T	mg/kg	***106***	17	5.9	
NNLD5	E217018	24-Aug-16	Cd-T	mg/kg	0.682	3.5	0.6	0.9
NNLD5	E217018	24-Aug-16	Cu-T	mg/kg	37.1	197	35.7	172
NNLD5	E217018	24-Aug-16	Fe-T	mg/kg	***176000***	43766	21200	155000
NNLD5	E217018	24-Aug-16	Hg-T	mg/kg	0.208	0.486	0.17	5.72
NNLD5	E217018	24-Aug-16	Mn-T	mg/kg	***6820***	1100	460	2040
NNLI1	E224246	24-Aug-16	As-T	mg/kg	***52.3***	17	5.9	
NNLI1	E224246	24-Aug-16	Fe-T	mg/kg	***59000***	43766	21200	155000
NNLI1	E224246	24-Aug-16	Mn-T	mg/kg	***1210***	1100	460	2040
NNLI2	E224246	24-Aug-16	As-T	mg/kg	***58.7***	17	5.9	
NNLI2	E224246	24-Aug-16	Fe-T	mg/kg	***71700***	43766	21200	155000
NNLI2	E224246	24-Aug-16	Mn-T	mg/kg	***3030***	1100	460	2040
NNLI3	E224246	24-Aug-16	As-T	mg/kg	***42.8***	17	5.9	
NNLI3	E224246	24-Aug-16	Fe-T	mg/kg	***54300***	43766	21200	155000
NNLI3	E224246	24-Aug-16	Mn-T	mg/kg	749	1100	460	2040
NNLI4	E224246	24-Aug-16	As-T	mg/kg	***61.2***	17	5.9	
NNLI4	E224246	24-Aug-16	Fe-T	mg/kg	***80500***	43766	21200	155000
NNLI4	E224246	24-Aug-16	Mn-T	mg/kg	***2010***	1100	460	2040
NNLI5	E224246	24-Aug-16	As-T	mg/kg	***47.8***	17	5.9	
NNLI5	E224246	24-Aug-16	Cd-T	mg/kg	0.655	3.5	0.6	0.9
NNLI5	E224246	24-Aug-16	Fe-T	mg/kg	***71600***	43766	21200	155000
NNLI5	E224246	24-Aug-16	Mn-T	mg/kg	***1970***	1100	460	2040
NNLS1	E292114	24-Aug-16	As-T	mg/kg	***18.3***	17	5.9	
NNLS1	E292114	24-Aug-16	Cu-T	mg/kg	38.6	197	35.7	172
NNLS1	E292114	24-Aug-16	Fe-T	mg/kg	42800	43766	21200	155000
NNLS1	E292114	24-Aug-16	Mn-T	mg/kg	1100	1100	460	2040
NNLS1	E292114	24-Aug-16	Ni-T	mg/kg	***18.2***		16	16
NNLS2	E292114	24-Aug-16	As-T	mg/kg	***24.7***	17	5.9	
NNLS2	E292114	24-Aug-16	Fe-T	mg/kg	***52600***	43766	21200	155000
NNLS2	E292114	24-Aug-16	Mn-T	mg/kg	***1400***	1100	460	2040
NNLS3	E292114	24-Aug-16	As-T	mg/kg	***18.8***	17	5.9	
NNLS3	E292114	24-Aug-16	Fe-T	mg/kg	41200	43766	21200	155000
NNLS3	E292114	24-Aug-16	Mn-T	mg/kg	***1280***	1100	460	2040
NNLS4	E292114	24-Aug-16	As-T	mg/kg	15.5	17	5.9	
NNLS4	E292114	24-Aug-16	Cu-T	mg/kg	40.1	197	35.7	172
NNLS4	E292114	24-Aug-16	Fe-T	mg/kg	***46600***	43766	21200	155000
NNLS4	E292114	24-Aug-16	Mn-T	mg/kg	1010	1100	460	2040
NNLS4	E292114	24-Aug-16	Ni-T	mg/kg	***16.6***		16	16
NNLS5	E292114	24-Aug-16	As-T	mg/kg	14.8	17	5.9	
NNLS5	E292114	24-Aug-16	Cu-T	mg/kg	39.6	197	35.7	172
NNLS5	E292114	24-Aug-16	Fe-T	mg/kg	42400	43766	21200	155000
NNLS5	E292114	24-Aug-16	Mn-T	mg/kg	770	1100	460	2040
NNLS5	E292114	24-Aug-16	Ni-T	mg/kg	***18.2***		16	16
NNO1	E217017	24-Aug-16	As-T	mg/kg	***18.2***	17	5.9	
NNO1	E217017	24-Aug-16	Fe-T	mg/kg	29200	43766	21200	155000
NNO1	E217017	24-Aug-16	Mn-T	mg/kg	***1950***	1100	460	2040
NNO2	E217017	24-Aug-16	As-T	mg/kg	***20.8***	17	5.9	
NNO2	E217017	24-Aug-16	Fe-T	mg/kg	32900	43766	21200	155000
NNO2	E217017	24-Aug-16	Mn-T	mg/kg	***3570***	1100	460	2040
NNO3	E217017	24-Aug-16	As-T	mg/kg	9.43	17	5.9	
NNO4	E217017	24-Aug-16	As-T	mg/kg	11.0	17	5.9	
NNO4	E217017	24-Aug-16	Cd-T	mg/kg	0.729	3.5	0.6	0.9
NNO4	E217017	24-Aug-16	Mn-T	mg/kg	614	1100	460	2040
NNO5	E217017	24-Aug-16	As-T	mg/kg	9.64	17	5.9	
QRDS11	E286930	15-Sep-16	As-T	mg/kg	***39.0***	17	5.9	
QRDS11	E286930	15-Sep-16	Cr-T	mg/kg	***39.5***		37.3	39.7
QRDS11	E286930	15-Sep-16	Cu-T	mg/kg	60.1	197	35.7	172
QRDS11	E286930	15-Sep-16	Fe-T	mg/kg	***62900***	43766	21200	155000
QRDS11	E286930	15-Sep-16	Mn-T	mg/kg	981	1100	460	2040
QRDS11	E286930	15-Sep-16	Ni-T	mg/kg	***34.0***		16	16
QRDS12	E286930	15-Sep-16	As-T	mg/kg	***41.1***	17	5.9	
QRDS12	E286930	15-Sep-16	Cr-T	mg/kg	***41.6***		37.3	39.7
QRDS12	E286930	15-Sep-16	Cu-T	mg/kg	55.9	197	35.7	172
QRDS12	E286930	15-Sep-16	Fe-T	mg/kg	***56400***	43766	21200	155000
QRDS12	E286930	15-Sep-16	Mn-T	mg/kg	1040	1100	460	2040
QRDS12	E286930	15-Sep-16	Ni-T	mg/kg	***30.6***		16	16
QRDS13	E286930	15-Sep-16	As-T	mg/kg	***45.3***	17	5.9	
QRDS13	E286930	15-Sep-16	Cu-T	mg/kg	60.1	197	35.7	172
QRDS13	E286930	15-Sep-16	Fe-T	mg/kg	***59200***	43766	21200	155000
QRDS13	E286930	15-Sep-16	Mn-T	mg/kg	***1130***	1100	460	2040
QRDS13	E286930	15-Sep-16	Ni-T	mg/kg	***30.4***		16	16
QRDS14	E286930	15-Sep-16	As-T	mg/kg	***37.5***	17	5.9	
QRDS14	E286930	15-Sep-16	Cr-T	mg/kg	***37.6***		37.3	39.7
QRDS14	E286930	15-Sep-16	Cu-T	mg/kg	61.1	197	35.7	172
QRDS14	E286930	15-Sep-16	Fe-T	mg/kg	***60700***	43766	21200	155000
QRDS14	E286930	15-Sep-16	Mn-T	mg/kg	***1810***	1100	460	2040
QRDS14	E286930	15-Sep-16	Ni-T	mg/kg	***32.9***		16	16

Bold Red indicates PEL exceedence

Bold Red italics with fill indicates ISQG exceedence

Table 199
2016-17 Annual Report

Summary of Sediment Metal Exceedances - PEL , ISQG & (SQO for comparison only)

Stn.Code	EMS ID	Date	Param.Code	Units	Result	PEL	ISQG	SQO for Long Lake
QRDS15	E286930	15-Sep-16	Cr-T	mg/kg	***37.9***		37.3	39.7
QRDS15	E286930	15-Sep-16	Cu-T	mg/kg	54.3	197	35.7	172
QRDS15	E286930	15-Sep-16	Fe-T	mg/kg	***58000***	43766	21200	155000
QRDS15	E286930	15-Sep-16	Mn-T	mg/kg	1050	1100	460	2040
QRDS15	E286930	15-Sep-16	Ni-T	mg/kg	***26.7***		16	16
WA1	O126402	14-Sep-16	As-T	mg/kg	***24.8***	17	5.9	
WA1	O126402	14-Sep-16	Cd-T	mg/kg	0.671	3.5	0.6	0.9
WA1	O126402	14-Sep-16	Cu-T	mg/kg	86.3	197	35.7	172
WA1	O126402	14-Sep-16	Fe-T	mg/kg	***61400***	43766	21200	155000
WA1	O126402	14-Sep-16	Mn-T	mg/kg	***1230***	1100	460	2040
WA1	O126402	14-Sep-16	Ni-T	mg/kg	***18.2***		16	16
WA2	O126402	14-Sep-16	As-T	mg/kg	***18.2***	17	5.9	
WA2	O126402	14-Sep-16	Cu-T	mg/kg	81.9	197	35.7	172
WA2	O126402	14-Sep-16	Fe-T	mg/kg	35000	43766	21200	155000
WA2	O126402	14-Sep-16	Hg-T	mg/kg	***0.810***	0.486	0.17	5.72
WA2	O126402	14-Sep-16	Mn-T	mg/kg	775	1100	460	2040
WA2	O126402	14-Sep-16	Ni-T	mg/kg	***19.3***		16	16
WA3	O126402	14-Sep-16	As-T	mg/kg	***18.7***	17	5.9	
WA3	O126402	14-Sep-16	Cu-T	mg/kg	85.0	197	35.7	172
WA3	O126402	14-Sep-16	Fe-T	mg/kg	39800	43766	21200	155000
WA3	O126402	14-Sep-16	Mn-T	mg/kg	1010	1100	460	2040
WA3	O126402	14-Sep-16	Ni-T	mg/kg	***19.4***		16	16
WA4	O126402	14-Sep-16	As-T	mg/kg	***18.0***	17	5.9	
WA4	O126402	14-Sep-16	Cu-T	mg/kg	82.9	197	35.7	172
WA4	O126402	14-Sep-16	Fe-T	mg/kg	33900	43766	21200	155000
WA4	O126402	14-Sep-16	Mn-T	mg/kg	850	1100	460	2040
WA4	O126402	14-Sep-16	Ni-T	mg/kg	***19.2***		16	16
WA5	O126402	14-Sep-16	As-T	mg/kg	9.24	17	5.9	
WA5	O126402	14-Sep-16	Cu-T	mg/kg	82.0	197	35.7	172
WA5	O126402	14-Sep-16	Fe-T	mg/kg	39000	43766	21200	155000
WA5	O126402	14-Sep-16	Mn-T	mg/kg	625	1100	460	2040
WA5	O126402	14-Sep-16	Ni-T	mg/kg	***17.3***		16	16

Bold Red indicates PEL exceedence
Bold Red italics with fill indicates ISQG exceedence

Table 200
2016-17 Annual Report

Sediment Metals Exceedances - SQO					
Stn.Code	**Date**	**Param.Code**	**Units**	**Sediment Quality Objectives**	**Result**
7SQR1	19-Sep-16	Ni-T	mg/kg	16	***21.3***
7SQR2	19-Sep-16	Ni-T	mg/kg	16	***18.5***
7SQR3	19-Sep-16	Ni-T	mg/kg	16	***18.6***
7SQR4	19-Sep-16	Ni-T	mg/kg	16	***21.2***
LLI1	31-Aug-16	Ni-T	mg/kg	16	***18.6***
LLI2	31-Aug-16	Ni-T	mg/kg	16	***17.0***
LLI3	31-Aug-16	Ni-T	mg/kg	16	***16.8***
LLM1	30-Aug-16	Mn-T	mg/kg	2040	***3420***
LLM1	30-Aug-16	Ni-T	mg/kg	16	***30.9***
LLM2	30-Aug-16	Mn-T	mg/kg	2040	***3510***
LLM2	30-Aug-16	Ni-T	mg/kg	16	***30.2***
LLM3	30-Aug-16	Cr-T	mg/kg	39.7	***42.2***
LLM3	30-Aug-16	Mn-T	mg/kg	2040	***2790***
LLM3	30-Aug-16	Ni-T	mg/kg	16	***33.1***
LLNS1	31-Aug-16	Ni-T	mg/kg	16	***29.5***
LLNS2	31-Aug-16	Cr-T	mg/kg	39.7	***40.7***
LLNS2	31-Aug-16	Ni-T	mg/kg	16	***34.6***
LLNS3	31-Aug-16	Cr-T	mg/kg	39.7	***40.2***
LLNS3	31-Aug-16	Ni-T	mg/kg	16	***32.1***
LLNS4	31-Aug-16	Ni-T	mg/kg	16	***26.1***
LLNS5	31-Aug-16	Ni-T	mg/kg	16	***29.8***
LLNS6	31-Aug-16	Ni-T	mg/kg	16	***25.8***
LLO1	30-Aug-16	Ni-T	mg/kg	16	***28.3***
LLO2	30-Aug-16	Ni-T	mg/kg	16	***24.7***
LLO3	30-Aug-16	Ni-T	mg/kg	16	***23.9***
LQL1	12-Sep-16	Cd-T	mg/kg	0.9	***1.37***
LQL1	12-Sep-16	Cr-T	mg/kg	39.7	***40.9***
LQL1	12-Sep-16	Ni-T	mg/kg	16	***33.7***
LQL2	12-Sep-16	Cd-T	mg/kg	0.9	***1.47***
LQL2	12-Sep-16	Cr-T	mg/kg	39.7	***42.4***
LQL2	12-Sep-16	Ni-T	mg/kg	16	***34.6***
LQL3	12-Sep-16	Cd-T	mg/kg	0.9	***1.24***
LQL3	12-Sep-16	Ni-T	mg/kg	16	***31.8***
LQL4	12-Sep-16	Cd-T	mg/kg	0.9	***1.33***
LQL4	12-Sep-16	Cr-T	mg/kg	39.7	***41.5***
LQL4	12-Sep-16	Ni-T	mg/kg	16	***34.4***
LQL5	12-Sep-16	Cd-T	mg/kg	0.9	***1.28***
LQL5	12-Sep-16	Cr-T	mg/kg	39.7	***40.2***
LQL5	12-Sep-16	Ni-T	mg/kg	16	***33.5***
LQLI1	12-Sep-16	Cd-T	mg/kg	0.9	***1.37***
LQLI1	12-Sep-16	Cr-T	mg/kg	39.7	***40.4***
LQLI1	12-Sep-16	Ni-T	mg/kg	16	***33.3***
LQLI2	12-Sep-16	Cd-T	mg/kg	0.9	***1.43***
LQLI2	12-Sep-16	Cr-T	mg/kg	39.7	***41.9***
LQLI2	12-Sep-16	Ni-T	mg/kg	16	***33.3***
LQLI3	12-Sep-16	Cd-T	mg/kg	0.9	***1.50***
LQLI3	12-Sep-16	Cr-T	mg/kg	39.7	***42.7***
LQLI3	12-Sep-16	Ni-T	mg/kg	16	***34.2***
LQLI4	12-Sep-16	Cd-T	mg/kg	0.9	***1.37***
LQLI4	12-Sep-16	Cr-T	mg/kg	39.7	***41.9***
LQLI4	12-Sep-16	Ni-T	mg/kg	16	***33.4***
LQLI5	12-Sep-16	Cd-T	mg/kg	0.9	***1.61***
LQLI5	12-Sep-16	Cr-T	mg/kg	39.7	***47.2***
LQLI5	12-Sep-16	Ni-T	mg/kg	16	***36.9***
LQLM1	12-Sep-16	Cd-T	mg/kg	0.9	***1.41***
LQLM1	12-Sep-16	Cr-T	mg/kg	39.7	***44.2***
LQLM1	12-Sep-16	Ni-T	mg/kg	16	***34.1***
LQLM2	12-Sep-16	Cd-T	mg/kg	0.9	***1.35***
LQLM2	12-Sep-16	Cr-T	mg/kg	39.7	***42.8***
LQLM2	12-Sep-16	Ni-T	mg/kg	16	***33.5***
LQLM3	12-Sep-16	Cd-T	mg/kg	0.9	***1.26***
LQLM3	12-Sep-16	Ni-T	mg/kg	16	***31.6***
LQLM4	12-Sep-16	Cd-T	mg/kg	0.9	***1.45***
Highlighted green indicates result exceeds objective					

Table 201
2016-17 Annual Report

Sediment Metals Exceedances - SQO					
Stn.Code	**Date**	**Param.Code**	**Units**	**Sediment Quality Objectives**	**Result**
LQLM4	12-Sep-16	Cr-T	mg/kg	39.7	***48.6***
LQLM4	12-Sep-16	Ni-T	mg/kg	16	***38.1***
LQLM5	12-Sep-16	Cd-T	mg/kg	0.9	***1.39***
LQLM5	12-Sep-16	Cr-T	mg/kg	39.7	***45.3***
LQLM5	12-Sep-16	Ni-T	mg/kg	16	***35.1***
LQLO1	8-Sep-16	Cd-T	mg/kg	0.9	***1.70***
LQLO1	8-Sep-16	Ni-T	mg/kg	16	***29.0***
LQLO2	8-Sep-16	Cd-T	mg/kg	0.9	***1.25***
LQLO2	8-Sep-16	Mn-T	mg/kg	2040	***2390***
LQLO2	8-Sep-16	Ni-T	mg/kg	16	***27.6***
LQLO3	8-Sep-16	Cd-T	mg/kg	0.9	***1.21***
LQLO3	8-Sep-16	Mn-T	mg/kg	2040	***2330***
LQLO3	8-Sep-16	Ni-T	mg/kg	16	***27.1***
LQLO4	8-Sep-16	Cd-T	mg/kg	0.9	***1.41***
LQLO4	8-Sep-16	Cr-T	mg/kg	39.7	***41.2***
LQLO4	8-Sep-16	Mn-T	mg/kg	2040	***2160***
LQLO4	8-Sep-16	Ni-T	mg/kg	16	***31.6***
LQLO5	8-Sep-16	Cd-T	mg/kg	0.9	***1.49***
LQLO5	8-Sep-16	Cr-T	mg/kg	39.7	***42.5***
LQLO5	8-Sep-16	Ni-T	mg/kg	16	***31.6***
LWI3	5-Oct-16	Se-T	mg/kg	2	***2.75***
MGL1	7-Sep-16	Ni-T	mg/kg	16	***19.0***
MGL2	7-Sep-16	Ni-T	mg/kg	16	***19.7***
MGL3	7-Sep-16	Ni-T	mg/kg	16	***19.3***
MGL4	7-Sep-16	Ni-T	mg/kg	16	***16.3***
MGL5	7-Sep-16	Ni-T	mg/kg	16	***20.0***
MQL1	1-Sep-16	Ni-T	mg/kg	16	***16.3***
MQL1	1-Sep-16	Se-T	mg/kg	2	***2.46***
MQL2	1-Sep-16	Ni-T	mg/kg	16	***18.7***
MQL2	1-Sep-16	Se-T	mg/kg	2	***2.72***
MQL3	1-Sep-16	Ni-T	mg/kg	16	***16.3***
MQL3	1-Sep-16	Se-T	mg/kg	2	***2.46***
MQLI1	1-Sep-16	Ni-T	mg/kg	16	***17.8***
MQLI2	1-Sep-16	Ni-T	mg/kg	16	***18.0***
MQLI3	1-Sep-16	Ni-T	mg/kg	16	***17.1***
MQLNS1	1-Sep-16	Ni-T	mg/kg	16	***17.7***
MQLO2	1-Sep-16	Ni-T	mg/kg	16	***17.8***
MQLO3	1-Sep-16	Ni-T	mg/kg	16	***19.3***
MQLO5	1-Sep-16	Ni-T	mg/kg	16	***23.6***
NNLD1	24-Aug-16	Fe-T	mg/kg	155000	***165000***
NNLD1	24-Aug-16	Mn-T	mg/kg	2040	***5340***
NNLD2	24-Aug-16	Fe-T	mg/kg	155000	***181000***
NNLD2	24-Aug-16	Mn-T	mg/kg	2040	***4880***
NNLD2	24-Aug-16	Se-T	mg/kg	2	***2.01***
NNLD3	24-Aug-16	Mn-T	mg/kg	2040	***3890***
NNLD4	24-Aug-16	Fe-T	mg/kg	155000	***218000***
NNLD4	24-Aug-16	Mn-T	mg/kg	2040	***6710***
NNLD5	24-Aug-16	Fe-T	mg/kg	155000	***176000***
NNLD5	24-Aug-16	Mn-T	mg/kg	2040	***6820***
NNLI2	24-Aug-16	Mn-T	mg/kg	2040	***3030***
NNLS1	24-Aug-16	Ni-T	mg/kg	16	***18.2***
NNLS4	24-Aug-16	Ni-T	mg/kg	16	***16.6***
NNLS5	24-Aug-16	Ni-T	mg/kg	16	***18.2***
NNO2	24-Aug-16	Mn-T	mg/kg	2040	***3570***
QRDS11	15-Sep-16	Ni-T	mg/kg	16	***34.0***
QRDS12	15-Sep-16	Cr-T	mg/kg	39.7	***41.6***
QRDS12	15-Sep-16	Ni-T	mg/kg	16	***30.6***
QRDS13	15-Sep-16	Ni-T	mg/kg	16	***30.4***
QRDS14	15-Sep-16	Ni-T	mg/kg	16	***32.9***
QRDS15	15-Sep-16	Ni-T	mg/kg	16	***26.7***
WA1	14-Sep-16	Ni-T	mg/kg	16	***18.2***
WA2	14-Sep-16	Ni-T	mg/kg	16	***19.3***
WA3	14-Sep-16	Ni-T	mg/kg	16	***19.4***
WA4	14-Sep-16	Ni-T	mg/kg	16	***19.2***
WA5	14-Sep-16	Ni-T	mg/kg	16	***17.3***
Highlighted green indicates result exceeds objective					

Table 202
2016-17 Annual Report

Sediment Metals Exceedances - PEL					
Stn.Code	Date	Param.Code	Units	PEL	Result
7SQR1	19-Sep-16	As-T	mg/kg	17	21.0
7SQR4	19-Sep-16	As-T	mg/kg	17	24.9
LLI1	31-Aug-16	As-T	mg/kg	17	50.0
LLI2	31-Aug-16	As-T	mg/kg	17	57.7
LLI2	31-Aug-16	Fe-T	mg/kg	43766	51900
LLI3	31-Aug-16	As-T	mg/kg	17	48.7
LLM1	30-Aug-16	As-T	mg/kg	17	170
LLM1	30-Aug-16	Fe-T	mg/kg	43766	113000
LLM1	30-Aug-16	Mn-T	mg/kg	1100	3420
LLM2	30-Aug-16	As-T	mg/kg	17	152
LLM2	30-Aug-16	Fe-T	mg/kg	43766	119000
LLM2	30-Aug-16	Mn-T	mg/kg	1100	3510
LLM3	30-Aug-16	As-T	mg/kg	17	159
LLM3	30-Aug-16	Fe-T	mg/kg	43766	104000
LLM3	30-Aug-16	Mn-T	mg/kg	1100	2790
LLNS1	31-Aug-16	As-T	mg/kg	17	47.8
LLNS1	31-Aug-16	Fe-T	mg/kg	43766	51000
LLNS2	31-Aug-16	As-T	mg/kg	17	41.4
LLNS2	31-Aug-16	Fe-T	mg/kg	43766	55400
LLNS2	31-Aug-16	Mn-T	mg/kg	1100	1380
LLNS3	31-Aug-16	As-T	mg/kg	17	68.5
LLNS3	31-Aug-16	Fe-T	mg/kg	43766	62000
LLNS4	31-Aug-16	As-T	mg/kg	17	55.2
LLNS4	31-Aug-16	Fe-T	mg/kg	43766	54600
LLNS5	31-Aug-16	As-T	mg/kg	17	44.8
LLNS5	31-Aug-16	Fe-T	mg/kg	43766	51300
LLNS6	31-Aug-16	As-T	mg/kg	17	74.8
LLNS6	31-Aug-16	Fe-T	mg/kg	43766	59000
LLO1	30-Aug-16	As-T	mg/kg	17	46.9
LLO1	30-Aug-16	Fe-T	mg/kg	43766	55900
LLO2	30-Aug-16	As-T	mg/kg	17	49.4
LLO2	30-Aug-16	Fe-T	mg/kg	43766	52200
LLO2	30-Aug-16	Mn-T	mg/kg	1100	1170
LLO3	30-Aug-16	As-T	mg/kg	17	47.3
LLO3	30-Aug-16	Fe-T	mg/kg	43766	51300
LLO3	30-Aug-16	Mn-T	mg/kg	1100	1120
LQL1	12-Sep-16	As-T	mg/kg	17	41.6
LQL1	12-Sep-16	Fe-T	mg/kg	43766	52400
LQL2	12-Sep-16	As-T	mg/kg	17	42.7
LQL2	12-Sep-16	Fe-T	mg/kg	43766	53400
LQL3	12-Sep-16	As-T	mg/kg	17	40.6
LQL3	12-Sep-16	Fe-T	mg/kg	43766	49700
LQL4	12-Sep-16	As-T	mg/kg	17	43.9
LQL4	12-Sep-16	Fe-T	mg/kg	43766	54800
LQL5	12-Sep-16	As-T	mg/kg	17	42.3
LQL5	12-Sep-16	Fe-T	mg/kg	43766	53200
LQLI1	12-Sep-16	As-T	mg/kg	17	33.5
LQLI1	12-Sep-16	Fe-T	mg/kg	43766	50300
LQLI2	12-Sep-16	As-T	mg/kg	17	35.3
LQLI2	12-Sep-16	Fe-T	mg/kg	43766	50200
LQLI3	12-Sep-16	As-T	mg/kg	17	31.5
LQLI3	12-Sep-16	Fe-T	mg/kg	43766	47700
LQLI4	12-Sep-16	As-T	mg/kg	17	36.1
LQLI4	12-Sep-16	Fe-T	mg/kg	43766	53300
LQLI5	12-Sep-16	As-T	mg/kg	17	42.1
LQLI5	12-Sep-16	Fe-T	mg/kg	43766	59300
LQLM1	12-Sep-16	As-T	mg/kg	17	75.3
LQLM1	12-Sep-16	Fe-T	mg/kg	43766	69300
LQLM2	12-Sep-16	As-T	mg/kg	17	107
LQLM2	12-Sep-16	Fe-T	mg/kg	43766	70100
LQLM2	12-Sep-16	Mn-T	mg/kg	1100	1750
LQLM3	12-Sep-16	As-T	mg/kg	17	80.0
LQLM3	12-Sep-16	Fe-T	mg/kg	43766	55800
LQLM3	12-Sep-16	Mn-T	mg/kg	1100	1270
LQLM4	12-Sep-16	As-T	mg/kg	17	98.5
LQLM4	12-Sep-16	Fe-T	mg/kg	43766	74100
LQLM4	12-Sep-16	Mn-T	mg/kg	1100	1520
LQLM5	12-Sep-16	As-T	mg/kg	17	99.3
LQLM5	12-Sep-16	Fe-T	mg/kg	43766	70800
LQLM5	12-Sep-16	Mn-T	mg/kg	1100	1380
LQLO1	8-Sep-16	As-T	mg/kg	17	72.6
LQLO1	8-Sep-16	Fe-T	mg/kg	43766	71500
LQLO1	8-Sep-16	Mn-T	mg/kg	1100	1730
LQLO2	8-Sep-16	As-T	mg/kg	17	90.0
LQLO2	8-Sep-16	Fe-T	mg/kg	43766	71200
LQLO2	8-Sep-16	Mn-T	mg/kg	1100	2390
LQLO3	8-Sep-16	As-T	mg/kg	17	81.7

Red indicates result exceeds PEL

Table 203
2016-17 Annual Report

Sediment Metals Exceedances - PEL					
Stn.Code	Date	Param.Code	Units	PEL	Result
LQLO3	8-Sep-16	Fe-T	mg/kg	43766	67400
LQLO3	8-Sep-16	Mn-T	mg/kg	1100	2330
LQLO4	8-Sep-16	As-T	mg/kg	17	56.3
LQLO4	8-Sep-16	Fe-T	mg/kg	43766	62800
LQLO4	8-Sep-16	Mn-T	mg/kg	1100	2160
LQLO5	8-Sep-16	As-T	mg/kg	17	39.4
LQLO5	8-Sep-16	Fe-T	mg/kg	43766	48900
LQLO5	8-Sep-16	Mn-T	mg/kg	1100	1800
MGL1	7-Sep-16	As-T	mg/kg	17	25.0
MGL1	7-Sep-16	Mn-T	mg/kg	1100	1200
MGL2	7-Sep-16	As-T	mg/kg	17	20.8
MGL3	7-Sep-16	As-T	mg/kg	17	23.4
MGL4	7-Sep-16	As-T	mg/kg	17	17.6
MGL5	7-Sep-16	As-T	mg/kg	17	20.4
MQLNS2	1-Sep-16	Fe-T	mg/kg	43766	51700
MQLNS4	1-Sep-16	Fe-T	mg/kg	43766	48200
MQLO5	1-Sep-16	As-T	mg/kg	17	17.7
NNLD1	24-Aug-16	As-T	mg/kg	17	125
NNLD1	24-Aug-16	Fe-T	mg/kg	43766	165000
NNLD1	24-Aug-16	Mn-T	mg/kg	1100	5340
NNLD2	24-Aug-16	As-T	mg/kg	17	156
NNLD2	24-Aug-16	Fe-T	mg/kg	43766	181000
NNLD2	24-Aug-16	Mn-T	mg/kg	1100	4880
NNLD3	24-Aug-16	As-T	mg/kg	17	113
NNLD3	24-Aug-16	Fe-T	mg/kg	43766	125000
NNLD3	24-Aug-16	Mn-T	mg/kg	1100	3890
NNLD4	24-Aug-16	As-T	mg/kg	17	166
NNLD4	24-Aug-16	Fe-T	mg/kg	43766	218000
NNLD4	24-Aug-16	Mn-T	mg/kg	1100	6710
NNLD5	24-Aug-16	As-T	mg/kg	17	106
NNLD5	24-Aug-16	Fe-T	mg/kg	43766	176000
NNLD5	24-Aug-16	Mn-T	mg/kg	1100	6820
NNLI1	24-Aug-16	As-T	mg/kg	17	52.3
NNLI1	24-Aug-16	Fe-T	mg/kg	43766	59000
NNLI1	24-Aug-16	Mn-T	mg/kg	1100	1210
NNLI2	24-Aug-16	As-T	mg/kg	17	58.7
NNLI2	24-Aug-16	Fe-T	mg/kg	43766	71700
NNLI2	24-Aug-16	Mn-T	mg/kg	1100	3030
NNLI3	24-Aug-16	As-T	mg/kg	17	42.8
NNLI3	24-Aug-16	Fe-T	mg/kg	43766	54300
NNLI4	24-Aug-16	As-T	mg/kg	17	61.2
NNLI4	24-Aug-16	Fe-T	mg/kg	43766	80500
NNLI4	24-Aug-16	Mn-T	mg/kg	1100	2010
NNLI5	24-Aug-16	As-T	mg/kg	17	47.8
NNLI5	24-Aug-16	Fe-T	mg/kg	43766	71600
NNLI5	24-Aug-16	Mn-T	mg/kg	1100	1970
NNLS1	24-Aug-16	As-T	mg/kg	17	18.3
NNLS2	24-Aug-16	As-T	mg/kg	17	24.7
NNLS2	24-Aug-16	Fe-T	mg/kg	43766	52600
NNLS2	24-Aug-16	Mn-T	mg/kg	1100	1400
NNLS3	24-Aug-16	As-T	mg/kg	17	18.8
NNLS3	24-Aug-16	Mn-T	mg/kg	1100	1280
NNLS4	24-Aug-16	Fe-T	mg/kg	43766	46600
NNO1	24-Aug-16	As-T	mg/kg	17	18.2
NNO1	24-Aug-16	Mn-T	mg/kg	1100	1950
NNO2	24-Aug-16	As-T	mg/kg	17	20.8
NNO2	24-Aug-16	Mn-T	mg/kg	1100	3570
QRDS11	15-Sep-16	As-T	mg/kg	17	39.0
QRDS11	15-Sep-16	Fe-T	mg/kg	43766	62900
QRDS12	15-Sep-16	As-T	mg/kg	17	41.1
QRDS12	15-Sep-16	Fe-T	mg/kg	43766	56400
QRDS13	15-Sep-16	As-T	mg/kg	17	45.3
QRDS13	15-Sep-16	Fe-T	mg/kg	43766	59200
QRDS13	15-Sep-16	Mn-T	mg/kg	1100	1130
QRDS14	15-Sep-16	As-T	mg/kg	17	37.5
QRDS14	15-Sep-16	Fe-T	mg/kg	43766	60700
QRDS14	15-Sep-16	Mn-T	mg/kg	1100	1810
QRDS15	15-Sep-16	As-T	mg/kg	17	34.5
QRDS15	15-Sep-16	Fe-T	mg/kg	43766	58000
WA1	14-Sep-16	As-T	mg/kg	17	24.8
WA1	14-Sep-16	Fe-T	mg/kg	43766	61400
WA1	14-Sep-16	Mn-T	mg/kg	1100	1230
WA2	14-Sep-16	As-T	mg/kg	17	18.2
WA2	14-Sep-16	Hg-T	mg/kg	0.486	0.810
WA3	14-Sep-16	As-T	mg/kg	17	18.7
WA4	14-Sep-16	As-T	mg/kg	17	18.0

Red indicates result exceeds PEL

Table 204
2016-17 Annual Report

PAH Exceedances - ISQG &PEL

Stn.Code	Date	Param.Code	Units	Result	ISQG	PEL
7SQR1	19-Sep-16	(2)Methylnaphthalene	mg/kg	0.051	0.0202	0.201
7SQR1	19-Sep-16	Naphthalene	mg/kg	0.037	0.0346	0.391
7SQR1	19-Sep-16	Phenanthrene	mg/kg	0.044	0.0419	0.515
7SQR2	19-Sep-16	(2)Methylnaphthalene	mg/kg	0.082	0.0202	0.201
7SQR2	19-Sep-16	Phenanthrene	mg/kg	0.079	0.0419	0.515
7SQR4	19-Sep-16	(2)Methylnaphthalene	mg/kg	0.021	0.0202	0.201
LLI1	31-Aug-16	(2)Methylnaphthalene	mg/kg	0.089	0.0202	0.201
LLI1	31-Aug-16	Naphthalene	mg/kg	0.057	0.0346	0.391
LLI2	31-Aug-16	(2)Methylnaphthalene	mg/kg	0.062	0.0202	0.201
LLI2	31-Aug-16	Naphthalene	mg/kg	0.042	0.0346	0.391
LLI3	31-Aug-16	(2)Methylnaphthalene	mg/kg	0.090	0.0202	0.201
LLI3	31-Aug-16	Naphthalene	mg/kg	0.061	0.0346	0.391
LLM1	30-Aug-16	(2)Methylnaphthalene	mg/kg	1.0	0.0202	0.201
LLM1	30-Aug-16	Acenaphthene	mg/kg	0.013	0.00671	0.0889
LLM1	30-Aug-16	Acenaphthylene	mg/kg	0.0070	0.00587	0.128
LLM1	30-Aug-16	Anthracene	mg/kg	0.097	0.0469	0.245
LLM1	30-Aug-16	Benzo(a)anthracene	mg/kg	0.056	0.0317	0.385
LLM1	30-Aug-16	Chrysene	mg/kg	0.062	0.0571	0.862
LLM1	30-Aug-16	Dibenz(ah)anthracene	mg/kg	0.0063	0.0062	0.135
LLM1	30-Aug-16	Fluorene	mg/kg	0.056	0.0212	0.144
LLM1	30-Aug-16	Naphthalene	mg/kg	0.70	0.0346	0.391
LLM1	30-Aug-16	Phenanthrene	mg/kg	0.24	0.0419	0.515
LLM1	30-Aug-16	Pyrene	mg/kg	0.081	0.053	0.875
LLM2	30-Aug-16	(2)Methylnaphthalene	mg/kg	1.1	0.0202	0.201
LLM2	30-Aug-16	Acenaphthene	mg/kg	0.015	0.00671	0.0889
LLM2	30-Aug-16	Acenaphthylene	mg/kg	0.0081	0.00587	0.128
LLM2	30-Aug-16	Anthracene	mg/kg	0.13	0.0469	0.245
LLM2	30-Aug-16	Benzo(a)anthracene	mg/kg	0.068	0.0317	0.385
LLM2	30-Aug-16	Benzo(a)pyrene	mg/kg	0.035	0.0319	0.782
LLM2	30-Aug-16	Chrysene	mg/kg	0.074	0.0571	0.862
LLM2	30-Aug-16	Dibenz(ah)anthracene	mg/kg	0.0073	0.0062	0.135
LLM2	30-Aug-16	Fluorene	mg/kg	0.067	0.0212	0.144
LLM2	30-Aug-16	Naphthalene	mg/kg	0.79	0.0346	0.391
LLM2	30-Aug-16	Phenanthrene	mg/kg	0.30	0.0419	0.515
LLM2	30-Aug-16	Pyrene	mg/kg	0.10	0.053	0.875
LLM3	30-Aug-16	(2)Methylnaphthalene	mg/kg	1.1	0.0202	0.201
LLM3	30-Aug-16	Acenaphthene	mg/kg	0.013	0.00671	0.0889
LLM3	30-Aug-16	Anthracene	mg/kg	0.11	0.0469	0.245
LLM3	30-Aug-16	Benzo(a)anthracene	mg/kg	0.054	0.0317	0.385
LLM3	30-Aug-16	Benzo(a)pyrene	mg/kg	0.032	0.0319	0.782
LLM3	30-Aug-16	Chrysene	mg/kg	0.062	0.0571	0.862
LLM3	30-Aug-16	Dibenz(ah)anthracene	mg/kg	0.0071	0.0062	0.135
LLM3	30-Aug-16	Fluorene	mg/kg	0.064	0.0212	0.144
LLM3	30-Aug-16	Naphthalene	mg/kg	0.81	0.0346	0.391
LLM3	30-Aug-16	Phenanthrene	mg/kg	0.27	0.0419	0.515
LLM3	30-Aug-16	Pyrene	mg/kg	0.092	0.053	0.875
LLNS1	31-Aug-16	(2)Methylnaphthalene	mg/kg	0.27	0.0202	0.201
LLNS1	31-Aug-16	Naphthalene	mg/kg	0.19	0.0346	0.391
LLNS1	31-Aug-16	Phenanthrene	mg/kg	0.089	0.0419	0.515
LLNS2	31-Aug-16	(2)Methylnaphthalene	mg/kg	0.31	0.0202	0.201
LLNS2	31-Aug-16	Benzo(a)anthracene	mg/kg	0.036	0.0317	0.385
LLNS2	31-Aug-16	Naphthalene	mg/kg	0.22	0.0346	0.391
LLNS2	31-Aug-16	Phenanthrene	mg/kg	0.11	0.0419	0.515
LLNS3	31-Aug-16	(2)Methylnaphthalene	mg/kg	0.32	0.0202	0.201
LLNS3	31-Aug-16	Acenaphthene	mg/kg	0.0070	0.00671	0.0889
LLNS3	31-Aug-16	Benzo(a)anthracene	mg/kg	0.032	0.0317	0.385
LLNS3	31-Aug-16	Naphthalene	mg/kg	0.22	0.0346	0.391
LLNS3	31-Aug-16	Phenanthrene	mg/kg	0.12	0.0419	0.515
LLNS4	31-Aug-16	(2)Methylnaphthalene	mg/kg	0.35	0.0202	0.201
LLNS4	31-Aug-16	Benzo(a)anthracene	mg/kg	0.033	0.0317	0.385
LLNS4	31-Aug-16	Naphthalene	mg/kg	0.21	0.0346	0.391
LLNS4	31-Aug-16	Phenanthrene	mg/kg	0.12	0.0419	0.515
LLNS5	31-Aug-16	(2)Methylnaphthalene	mg/kg	0.30	0.0202	0.201
LLNS5	31-Aug-16	Acenaphthene	mg/kg	0.0074	0.00671	0.0889
LLNS5	31-Aug-16	Benzo(a)anthracene	mg/kg	0.033	0.0317	0.385
LLNS5	31-Aug-16	Naphthalene	mg/kg	0.21	0.0346	0.391
LLNS5	31-Aug-16	Phenanthrene	mg/kg	0.11	0.0419	0.515
LLNS6	31-Aug-16	(2)Methylnaphthalene	mg/kg	0.36	0.0202	0.201
LLNS6	31-Aug-16	Acenaphthene	mg/kg	0.0083	0.00671	0.0889
LLNS6	31-Aug-16	Anthracene	mg/kg	0.053	0.0469	0.245
LLNS6	31-Aug-16	Benzo(a)anthracene	mg/kg	0.033	0.0317	0.385
LLNS6	31-Aug-16	Naphthalene	mg/kg	0.25	0.0346	0.391
LLNS6	31-Aug-16	Phenanthrene	mg/kg	0.13	0.0419	0.515
LLO1	30-Aug-16	(2)Methylnaphthalene	mg/kg	1.5	0.0202	0.201
LLO1	30-Aug-16	Acenaphthene	mg/kg	0.014	0.00671	0.0889
LLO1	30-Aug-16	Acenaphthylene	mg/kg	0.011	0.00587	0.128
LLO1	30-Aug-16	Anthracene	mg/kg	0.17	0.0469	0.245
LLO1	30-Aug-16	Benzo(a)anthracene	mg/kg	0.083	0.0317	0.385
LLO1	30-Aug-16	Benzo(a)pyrene	mg/kg	0.035	0.0319	0.782
LLO1	30-Aug-16	Chrysene	mg/kg	0.087	0.0571	0.862
LLO1	30-Aug-16	Dibenz(ah)anthracene	mg/kg	0.0068	0.0062	0.135
LLO1	30-Aug-16	Fluorene	mg/kg	0.074	0.0212	0.144
LLO1	30-Aug-16	Naphthalene	mg/kg	1.1	0.0346	0.391
LLO1	30-Aug-16	Phenanthrene	mg/kg	0.39	0.0419	0.515
LLO1	30-Aug-16	Pyrene	mg/kg	0.096	0.053	0.875
LLO2	30-Aug-16	(2)Methylnaphthalene	mg/kg	0.99	0.0202	0.201
LLO2	30-Aug-16	Acenaphthene	mg/kg	0.011	0.00671	0.0889
LLO2	30-Aug-16	Acenaphthylene	mg/kg	0.0079	0.00587	0.128
LLO2	30-Aug-16	Anthracene	mg/kg	0.12	0.0469	0.245
LLO2	30-Aug-16	Benzo(a)anthracene	mg/kg	0.056	0.0317	0.385
LLO2	30-Aug-16	Chrysene	mg/kg	0.061	0.0571	0.862
LLO2	30-Aug-16	Fluorene	mg/kg	0.047	0.0212	0.144
LLO2	30-Aug-16	Naphthalene	mg/kg	0.71	0.0346	0.391

Exceedances highlighted in green are those who exceed the ISQG but do not exceed the BCASQG after TOC compensation.

Bolded red and italicized results indicate that MDL is greater than ISQG

Red indicates results exceeds the ISQG

Highlighted are those parameters that exceed the PEL

Table 205
2016-17 Annual Report

PAH Exceedances - ISQG & PEL

Stn.Code	Date	Param.Code	Units	Result	ISQG	PEL
LLO2	30-Aug-16	Phenanthrene	mg/kg	0.25	0.0419	0.515
LLO2	30-Aug-16	Pyrene	mg/kg	0.066	0.053	0.875
LLO3	30-Aug-16	(2)Methylnaphthalene	mg/kg	0.91	0.0202	0.201
LLO3	30-Aug-16	Acenaphthene	mg/kg	0.012	0.00671	0.0889
LLO3	30-Aug-16	Anthracene	mg/kg	0.12	0.0469	0.245
LLO3	30-Aug-16	Benzo(a)anthracene	mg/kg	0.054	0.0317	0.385
LLO3	30-Aug-16	Fluorene	mg/kg	0.044	0.0212	0.144
LLO3	30-Aug-16	Naphthalene	mg/kg	0.65	0.0346	0.391
LLO3	30-Aug-16	Phenanthrene	mg/kg	0.27	0.0419	0.515
LLO3	30-Aug-16	Pyrene	mg/kg	0.060	0.053	0.875
LLO4	30-Aug-16	(2)Methylnaphthalene	mg/kg	0.55	0.0202	0.201
LLO4	30-Aug-16	Anthracene	mg/kg	0.073	0.0469	0.245
LLO4	30-Aug-16	Fluorene	mg/kg	0.031	0.0212	0.144
LLO4	30-Aug-16	Naphthalene	mg/kg	0.32	0.0346	0.391
LLO4	30-Aug-16	Phenanthrene	mg/kg	0.16	0.0419	0.515
LLO5	30-Aug-16	(2)Methylnaphthalene	mg/kg	0.53	0.0202	0.201
LLO5	30-Aug-16	Acenaphthene	mg/kg	0.0078	0.00671	0.0889
LLO5	30-Aug-16	Anthracene	mg/kg	0.072	0.0469	0.245
LLO5	30-Aug-16	Benzo(a)anthracene	mg/kg	0.033	0.0317	0.385
LLO5	30-Aug-16	Fluorene	mg/kg	0.027	0.0212	0.144
LLO5	30-Aug-16	Naphthalene	mg/kg	0.31	0.0346	0.391
LLO5	30-Aug-16	Phenanthrene	mg/kg	0.15	0.0419	0.515
LQL1	12-Sep-16	(2)Methylnaphthalene	mg/kg	0.15	0.0202	0.201
LQL1	12-Sep-16	Naphthalene	mg/kg	0.10	0.0346	0.391
LQL1	12-Sep-16	Phenanthrene	mg/kg	0.074	0.0419	0.515
LQL2	12-Sep-16	(2)Methylnaphthalene	mg/kg	0.15	0.0202	0.201
LQL2	12-Sep-16	Naphthalene	mg/kg	0.11	0.0346	0.391
LQL2	12-Sep-16	Phenanthrene	mg/kg	0.073	0.0419	0.515
LQL3	12-Sep-16	(2)Methylnaphthalene	mg/kg	0.13	0.0202	0.201
LQL3	12-Sep-16	Naphthalene	mg/kg	0.094	0.0346	0.391
LQL3	12-Sep-16	Phenanthrene	mg/kg	0.064	0.0419	0.515
LQL4	12-Sep-16	(2)Methylnaphthalene	mg/kg	0.13	0.0202	0.201
LQL4	12-Sep-16	Naphthalene	mg/kg	0.095	0.0346	0.391
LQL4	12-Sep-16	Phenanthrene	mg/kg	0.066	0.0419	0.515
LQL5	12-Sep-16	(2)Methylnaphthalene	mg/kg	0.20	0.0202	0.201
LQL5	12-Sep-16	Naphthalene	mg/kg	0.16	0.0346	0.391
LQL5	12-Sep-16	Phenanthrene	mg/kg	0.12	0.0419	0.515
LQLI1	12-Sep-16	(2)Methylnaphthalene	mg/kg	0.16	0.0202	0.201
LQLI1	12-Sep-16	Naphthalene	mg/kg	0.11	0.0346	0.391
LQLI1	12-Sep-16	Phenanthrene	mg/kg	0.077	0.0419	0.515
LQLI2	12-Sep-16	(2)Methylnaphthalene	mg/kg	0.11	0.0202	0.201
LQLI2	12-Sep-16	Naphthalene	mg/kg	0.079	0.0346	0.391
LQLI2	12-Sep-16	Phenanthrene	mg/kg	0.055	0.0419	0.515
LQLI3	12-Sep-16	(2)Methylnaphthalene	mg/kg	0.14	0.0202	0.201
LQLI3	12-Sep-16	Naphthalene	mg/kg	0.10	0.0346	0.391
LQLI3	12-Sep-16	Phenanthrene	mg/kg	0.075	0.0419	0.515
LQLM1	12-Sep-16	(2)Methylnaphthalene	mg/kg	0.15	0.0202	0.201
LQLM1	12-Sep-16	Naphthalene	mg/kg	0.11	0.0346	0.391
LQLM1	12-Sep-16	Phenanthrene	mg/kg	0.084	0.0419	0.515
LQLM2	12-Sep-16	(2)Methylnaphthalene	mg/kg	0.15	0.0202	0.201
LQLM2	12-Sep-16	Naphthalene	mg/kg	0.11	0.0346	0.391
LQLM2	12-Sep-16	Phenanthrene	mg/kg	0.082	0.0419	0.515
LQLM3	12-Sep-16	(2)Methylnaphthalene	mg/kg	0.15	0.0202	0.201
LQLM3	12-Sep-16	Naphthalene	mg/kg	0.11	0.0346	0.391
LQLM3	12-Sep-16	Phenanthrene	mg/kg	0.088	0.0419	0.515
LQLO1	8-Sep-16	(2)Methylnaphthalene	mg/kg	0.085	0.0202	0.201
LQLO1	8-Sep-16	Naphthalene	mg/kg	0.062	0.0346	0.391
LQLO2	8-Sep-16	(2)Methylnaphthalene	mg/kg	0.084	0.0202	0.201
LQLO2	8-Sep-16	Naphthalene	mg/kg	0.062	0.0346	0.391
LQLO3	8-Sep-16	(2)Methylnaphthalene	mg/kg	0.081	0.0202	0.201
LQLO3	8-Sep-16	Naphthalene	mg/kg	0.060	0.0346	0.391
LWM2	5-Oct-16	(2)Methylnaphthalene	mg/kg	0.028	0.0202	0.201
MGL1	7-Sep-16	Pyrene	mg/kg	0.064	0.053	0.875
MGL3	7-Sep-16	Pyrene	mg/kg	0.064	0.053	0.875
MGL4	7-Sep-16	Dibenz(ah)anthracene	mg/kg	0.0063	0.0062	0.135
MGL4	7-Sep-16	Pyrene	mg/kg	0.063	0.053	0.875
MGL5	7-Sep-16	Pyrene	mg/kg	0.072	0.053	0.875
MQL2	1-Sep-16	(2)Methylnaphthalene	mg/kg	0.038	0.0202	0.201
MQL3	1-Sep-16	(2)Methylnaphthalene	mg/kg	0.042	0.0202	0.201
MQLI1	1-Sep-16	(2)Methylnaphthalene	mg/kg	0.036	0.0202	0.201
MQLI2	1-Sep-16	(2)Methylnaphthalene	mg/kg	0.035	0.0202	0.201
MQLI3	1-Sep-16	(2)Methylnaphthalene	mg/kg	0.039	0.0202	0.201
NNLD3	24-Aug-16	(2)Methylnaphthalene	mg/kg	0.021	0.0202	0.201
NNLD5	24-Aug-16	(2)Methylnaphthalene	mg/kg	0.029	0.0202	0.201
NNLI3	22-Sep-16	(2)Methylnaphthalene	mg/kg	0.029	0.0202	0.201
NNLI3	22-Sep-16	Acenaphthene	mg/kg	***<0.0075***	0.00671	0.0889
NNLI3	22-Sep-16	Acenaphthylene	mg/kg	***<0.0075***	0.00587	0.128
NNLI3	22-Sep-16	Dibenz(ah)anthracene	mg/kg	***<0.0075***	0.0062	0.135
NNLI4	24-Aug-16	(2)Methylnaphthalene	mg/kg	0.023	0.0202	0.201
NNLI4	24-Aug-16	Acenaphthylene	mg/kg	***<0.0061***	0.00587	0.128
NNLS1	24-Aug-16	(2)Methylnaphthalene	mg/kg	0.038	0.0202	0.201
NNLS2	24-Aug-16	(2)Methylnaphthalene	mg/kg	0.037	0.0202	0.201
NNLS3	24-Aug-16	(2)Methylnaphthalene	mg/kg	0.035	0.0202	0.201
NNLS4	24-Aug-16	(2)Methylnaphthalene	mg/kg	0.046	0.0202	0.201
NNLS5	24-Aug-16	(2)Methylnaphthalene	mg/kg	0.057	0.0202	0.201
NNLS5	24-Aug-16	Naphthalene	mg/kg	0.036	0.0346	0.391
NNO3	22-Sep-16	Acenaphthylene	mg/kg	***<0.0063***	0.00587	0.128
NNO3	22-Sep-16	Dibenz(ah)anthracene	mg/kg	***<0.0063***	0.0062	0.135
NNO4	24-Aug-16	Acenaphthene	mg/kg	***<0.0076***	0.00671	0.0889
NNO4	24-Aug-16	Acenaphthylene	mg/kg	***<0.0076***	0.00587	0.128
NNO4	24-Aug-16	Dibenz(ah)anthracene	mg/kg	***<0.0076***	0.0062	0.135
NNO5	24-Aug-16	Acenaphthene	mg/kg	***<0.0071***	0.00671	0.0889
NNO5	24-Aug-16	Acenaphthylene	mg/kg	***<0.0071***	0.00587	0.128
NNO5	24-Aug-16	Dibenz(ah)anthracene	mg/kg	***<0.0071***	0.0062	0.135

Exceedances highlighted in green are those who exceed the ISQG but do not exceed the BCASQG after TOC compensation.

Bolded red and italicized results indicate that MDL is greater than ISQG

Red indicates results exceeds the ISQG

Highlighted are those parameters that exceed the PEL

Table 206
2016-17 Annual Report

PAH Exceedances - BCASQG

Stn.Code	Date	Param.Code	Units	BCASQG	Result
LLM1	30-Aug-16	(2)Methylnaphthalene	mg/kg	0.201	1.0
LLM1	30-Aug-16	Naphthalene	mg/kg	0.391	0.70
LLM2	30-Aug-16	(2)Methylnaphthalene	mg/kg	0.201	1.1
LLM2	30-Aug-16	Naphthalene	mg/kg	0.391	0.79
LLM3	30-Aug-16	(2)Methylnaphthalene	mg/kg	0.201	1.1
LLM3	30-Aug-16	Naphthalene	mg/kg	0.391	0.81
LLNS1	31-Aug-16	(2)Methylnaphthalene	mg/kg	0.201	0.27
LLNS2	31-Aug-16	(2)Methylnaphthalene	mg/kg	0.201	0.31
LLNS3	31-Aug-16	(2)Methylnaphthalene	mg/kg	0.201	0.32
LLNS4	31-Aug-16	(2)Methylnaphthalene	mg/kg	0.201	0.35
LLNS5	31-Aug-16	(2)Methylnaphthalene	mg/kg	0.201	0.30
LLNS6	31-Aug-16	(2)Methylnaphthalene	mg/kg	0.201	0.36
LLO1	30-Aug-16	(2)Methylnaphthalene	mg/kg	0.201	1.5
LLO1	30-Aug-16	Naphthalene	mg/kg	0.391	1.1
LLO2	30-Aug-16	(2)Methylnaphthalene	mg/kg	0.201	0.99
LLO2	30-Aug-16	Naphthalene	mg/kg	0.391	0.71
LLO3	30-Aug-16	(2)Methylnaphthalene	mg/kg	0.201	0.91
LLO3	30-Aug-16	Naphthalene	mg/kg	0.391	0.65
LLO4	30-Aug-16	(2)Methylnaphthalene	mg/kg	0.201	0.55
LLO5	30-Aug-16	(2)Methylnaphthalene	mg/kg	0.201	0.53

Red indicates result exceeds BCASQG

Table 207
2016-17 Annual Report

PAH Exceedances - ISQG 1% TOC Adjusted					
Stn.Code	**Date**	**Param.Code**	**Units**	**BCASQG**	**Result**
7SQR1	19-Sep-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.020
LLM1	30-Aug-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.054
LLM2	30-Aug-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.061
LLM3	30-Aug-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.068
LLNS1	31-Aug-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.013
LLNS2	31-Aug-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.018
LLNS3	31-Aug-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.014
LLNS4	31-Aug-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.014
LLNS5	31-Aug-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.015
LLNS6	31-Aug-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.016
LLO1	30-Aug-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.092
LLO2	30-Aug-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.065
LLO3	30-Aug-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.059
LQL1	12-Sep-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.023
LQL2	12-Sep-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.025
LQL3	12-Sep-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.023
LQL4	12-Sep-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.022
LQL5	12-Sep-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.037
LQLI1	12-Sep-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.029
LQLI2	12-Sep-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.020
LQLI3	12-Sep-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.031
LQLM1	12-Sep-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.026
LQLM2	12-Sep-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.026
LQLM3	12-Sep-16	Naphthalene-TOCAdjusted	mg/kg	0.01	0.029

Table 208
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Gooseneck Lake
Gooseneck Lake - Metals (ICPMS)

	Stn.Code			GNL1	GNL2	GNL3	GNL4	GNL5					
	Permit No.			1132502	1132502	1132502	1132502	1132502					
	Depth (m)			15	15	15	15	15					
	Date			7-Sep-16	7-Sep-16	7-Sep-16	7-Sep-16	7-Sep-16					
Parameter	**Units**	**ISQG**	**PEL**						**Minimum**	**Maximum**	**Average**	**SD**	**RSD%**
Total Silver (Ag)	mg/kg	0.5	0.5	0.171	0.184	0.148	0.165	0.169	0.148	0.184	0.167	0.013	7.78%
Total Aluminum (Al)	mg/kg			24000	23800	23800	21100	23500	21100	24000	23240	1209	5.20%
Total Arsenic (As)	mg/kg	5.9	17	**25.0**	**20.8**	**23.4**	**17.6**	**20.4**	17.6	25.0	**21.4**	2.9	13.55%
Total Barium (Ba)	mg/kg			117	118	114	101	116	101	118	113.2	7.0	6.18%
Total Beryllium (Be)	mg/kg			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.00	0.00%
Total Bismuth (Bi)	mg/kg			0.12	0.13	0.11	<0.10	0.12	<0.10	0.13	0.12	0.01	8.33%
Total Calcium (Ca)	mg/kg			8840	9150	8690	7230	9170	7230	9170	8616	801	9.30%
Total Cadmium (Cd)	mg/kg	0.6	3.5	0.627	0.570	0.537	0.473	0.496	0.473	0.627	0.541	0.061	11.28%
Total Cobalt (Co)	mg/kg			13.7	14.1	13.7	11.0	13.0	11.0	14.1	13.1	1.2	9.16%
Total Chromium (Cr)	mg/kg	37.3	90	33.0	32.6	32.0	27.3	34.1	27.3	34.1	31.8	2.6	8.18%
Total Copper (Cu)	mg/kg	35.7	197	68.0	71.1	66.7	58.0	69.2	58.0	71.1	66.6	5.1	7.66%
Total Iron (Fe)	mg/kg	21200	43766	41400	37100	38200	29500	36500	29500	41400	36540	4366	11.95%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.355	0.330	0.355	0.322	0.365	0.322	0.365	0.345	0.018	5.22%
Total Potassium (K)	mg/kg			343	354	339	281	348	281	354	333.0	29.6	8.89%
Total Lithium (Li)	mg/kg			<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.0	0.00%
Total Magnesium (Mg)	mg/kg			4130	4220	4070	3300	4180	3300	4220	3980	384	9.65%
Total Manganese (Mn)	mg/kg	460	1100	**1200**	1000	1010	781	946	781	1200	987	150	15.20%
Total Molybdenum (Mo)	mg/kg			10.5	8.82	9.94	9.14	9.09	8.82	10.5	9.50	0.70	7.37%
Total Sodium (Na)	mg/kg			208	185	175	142	188	142	208	179.6	24.2	13.47%
Total Nickel (Ni)	mg/kg	16	75	19.0	19.7	19.3	16.3	20.0	16.3	20.0	18.9	1.5	7.94%
Total Lead (Pb)	mg/kg	35	91.3	24.3	24.3	23.4	18.9	23.8	18.9	24.3	22.9	2.3	10.04%
Total Phosphorus (P)	mg/kg			1200	1120	1180	1050	1150	1050	1200	1140	58	5.09%
Total Antimony (Sb)	mg/kg			0.42	0.40	0.49	0.32	0.41	0.32	0.49	0.41	0.06	14.63%
Total Selenium (Se)	mg/kg	2	2	1.69	1.56	1.51	1.48	1.54	1.48	1.69	1.56	0.08	5.13%
Total Tin (Sn)	mg/kg			1.02	1.03	1.06	0.81	1.04	0.81	1.06	0.99	0.10	10.10%
Total Strontium (Sr)	mg/kg			32.8	34.1	33.0	27.4	33.2	27.4	34.1	32.1	2.7	8.41%
Total Sulphur (S)	%			0.25	0.22	0.22	0.21	0.21	0.21	0.25	0.22	0.02	9.09%
Total Titanium (Ti)	mg/kg			1060	1100	1080	822	1070	822	1100	1026	115	11.21%
Total Thallium (Tl)	mg/kg			<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	0.00	0.00%
Total Uranium (U)	mg/kg			1.70	1.61	1.60	1.66	1.58	1.58	1.70	1.63	0.05	3.07%
Total Vanadium (V)	mg/kg			106	111	110	90.5	107	90.5	111	104.9	8.3	7.91%
Total Zinc (Zn)	mg/kg	123	315	76.3	81.3	79.6	63.1	81.6	63.1	81.6	76.4	7.7	10.08%
Total Zirconium (Zr)	mg/kg			3.21	2.90	2.71	2.22	2.63	2.22	3.21	2.73	0.36	13.19%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
Factor applied to greater-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
Red font indicates ISQG exceedance
PEL = Probable Effects Level
Red, bolded and underlined *font indicates PEL exceedance*
Blue cell indicates primary parameter of concern
Orange cell indicates secondary parameter of concern
SD = Standard Deviation
RSD% = Relative Standard Deviation

Table 209
2016-17 Annual Report

Results of Sediment Chemistry Analysis in No Name Lake
No Name Lake Inlet - Metals (ICPMS)

	Stn.Code			NNLI1	NNLI2	NNLI3	NNLI4	NNLI5					
	Permit No.					E224246							
	Depth (m)			4.5	4.5	4.5	4.5	4.5					
	Date			24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16					
Parameter	**Units**	**ISQG**	**PEL**						**Minimum**	**Maximum**	**Average**	**SD**	**RSD%**
Total Silver (Ag)	mg/kg	0.5	0.5	0.064	0.067	0.071	0.116	0.097	0.064	0.116	0.083	0.023	27.71%
Total Aluminum (Al)	mg/kg			11500	10000	11500	11400	12000	10000	12000	11280	752	6.67%
Total Arsenic (As)	mg/kg	5.9	17	**52.3**	**58.7**	**42.8**	**61.2**	**47.8**	42.8	61.2	**52.6**	7.6	14.45%
Total Barium (Ba)	mg/kg			33.9	51.3	34.3	49.3	55.0	33.9	55.0	44.8	9.9	22.10%
Total Beryllium (Be)	mg/kg			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.00	0.00%
Total Bismuth (Bi)	mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)	mg/kg			4470	4760	4270	5960	5390	4270	5960	4970	696	14.00%
Total Cadmium (Cd)	mg/kg	0.6	3.5	0.293	0.293	0.324	0.465	0.655	0.293	0.655	0.406	0.156	38.42%
Total Cobalt (Co)	mg/kg			7.93	11.2	8.45	9.29	9.69	7.93	11.2	9.31	1.26	13.53%
Total Chromium (Cr)	mg/kg	37.3	90	18.3	17.0	19.8	22.6	22.9	17.0	22.9	20.1	2.6	12.94%
Total Copper (Cu)	mg/kg	35.7	197	24.2	23.0	25.7	26.6	26.1	23.0	26.6	25.1	1.5	5.98%
Total Iron (Fe)	mg/kg	21200	43766	**59000**	**71700**	**54300**	**80500**	**71600**	54300	80500	**67420**	10605	15.73%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.098	0.094	0.117	0.098	0.101	0.094	0.117	0.102	0.009	8.82%
Total Potassium (K)	mg/kg			166	155	154	184	186	154	186	169.0	15.4	9.11%
Total Lithium (Li)	mg/kg			<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.0	0.00%
Total Magnesium (Mg)	mg/kg			1800	1560	1820	1860	2010	1560	2010	1810	162	8.95%
Total Manganese (Mn)	mg/kg	460	1100	**1210**	**3030**	749	**2010**	**1970**	749	3030	**1794**	871	48.55%
Total Molybdenum (Mo)	mg/kg			6.76	6.50	7.31	7.79	6.84	6.50	7.79	7.04	0.51	7.24%
Total Sodium (Na)	mg/kg			118	<100	134	135	141	<100	141	125.6	16.7	13.30%
Total Nickel (Ni)	mg/kg	16	75	10.3	10.1	11.1	13.4	13.0	10.1	13.4	11.6	1.5	12.93%
Total Lead (Pb)	mg/kg	35	91.3	5.68	6.06	6.73	7.44	6.94	5.68	7.44	6.57	0.70	10.65%
Total Phosphorus (P)	mg/kg			873	793	991	896	1000	793	1000	910	86	9.45%
Total Antimony (Sb)	mg/kg			0.19	0.16	0.16	0.22	0.18	0.16	0.22	0.18	0.02	11.11%
Total Selenium (Se)	mg/kg	2	2	0.56	0.65	0.57	0.88	0.62	0.56	0.88	0.66	0.13	19.70%
Total Tin (Sn)	mg/kg			0.28	0.30	0.34	0.58	0.57	0.28	0.58	0.41	0.15	36.59%
Total Strontium (Sr)	mg/kg			21.7	21.1	20.0	24.7	22.6	20.0	24.7	22.0	1.8	8.18%
Total Sulphur (S)	%			0.33	0.23	0.31	0.30	0.28	0.23	0.33	0.29	0.04	13.79%
Total Titanium (Ti)	mg/kg			600	493	608	615	619	493	619	587	53	9.03%
Total Thallium (Tl)	mg/kg			<0.050	<0.050	0.051	<0.050	<0.050	<0.050	0.051	0.050	0.0004	0.80%
Total Uranium (U)	mg/kg			0.317	0.301	0.332	0.343	0.330	0.301	0.343	0.325	0.016	4.92%
Total Vanadium (V)	mg/kg			94.4	90.2	97.3	96.0	92.7	90.2	97.3	94.1	2.8	2.98%
Total Zinc (Zn)	mg/kg	123	315	49.5	47.7	53.6	54.2	54.1	47.7	54.2	51.8	3.0	5.79%
Total Zirconium (Zr)	mg/kg			1.05	0.55	1.32	1.46	1.34	0.55	1.46	1.14	0.36	31.58%

Notes:

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Factor applied to greater-than results when calculating statistics: 1.0

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RSD% = Relative Standard Deviation

Table 210
2016-17 Annual Report

Results of Sediment Chemistry Analysis in No Name Lake
No Name Lake Deep - Metals (ICPMS)

Parameter	Stn.Code Permit No. Depth (m) Date Units	ISQG	PEL	NNLD1 E217018 12 24-Aug-16	NNLD2 E217018 12 24-Aug-16	NNLD3 E217018 12 24-Aug-16	NNLD4 E217018 12 24-Aug-16	NNLD5 E217018 12 24-Aug-16	Minimum	Maximum	Average	SD	RSD%
Total Silver (Ag)	mg/kg	0.5	0.5	0.161	0.189	0.201	0.198	0.233	0.161	0.233	0.196	0.026	13.27%
Total Aluminum (Al)	mg/kg			12700	14400	15000	12200	13900	12200	15000	13640	1167	8.56%
Total Arsenic (As)	mg/kg	5.9	17	**125**	**156**	**113**	**166**	**106**	106	166	**133.2**	26.5	19.89%
Total Barium (Ba)	mg/kg			194	213	186	295	222	186	295	222	43	19.37%
Total Beryllium (Be)	mg/kg			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.00	0.00%
Total Bismuth (Bi)	mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)	mg/kg			6160	7210	5150	6910	6830	5150	7210	6452	822	12.74%
Total Cadmium (Cd)	mg/kg	0.6	3.5	0.386	0.469	0.495	0.579	0.682	0.386	0.682	0.522	0.113	21.65%
Total Cobalt (Co)	mg/kg			42.4	46.2	46.5	49.4	48.8	42.4	49.4	46.7	2.8	6.00%
Total Chromium (Cr)	mg/kg	37.3	90	21.0	24.6	24.6	19.9	21.0	19.9	24.6	22.2	2.2	9.91%
Total Copper (Cu)	mg/kg	35.7	197	38.7	42.2	43.6	32.6	37.1	32.6	43.6	38.8	4.4	11.34%
Total Iron (Fe)	mg/kg	21200	43766	**165000**	**181000**	**125000**	**218000**	**176000**	125000	218000	**173000**	33414	19.31%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.209	0.243	0.240	0.194	0.208	0.194	0.243	0.219	0.022	10.05%
Total Potassium (K)	mg/kg			157	174	177	147	177	147	177	166.4	13.7	8.23%
Total Lithium (Li)	mg/kg			<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.0	0.00%
Total Magnesium (Mg)	mg/kg			1640	1870	1920	1720	1940	1640	1940	1818	131	7.21%
Total Manganese (Mn)	mg/kg	460	1100	**5340**	**4880**	**3890**	**6710**	**6820**	3890	6820	**5528**	1245	22.52%
Total Molybdenum (Mo)	mg/kg			12.6	13.7	12.0	15.6	13.7	12.0	15.6	13.5	1.4	10.37%
Total Sodium (Na)	mg/kg			<100	116	117	109	112	<100	117	110.8	6.8	6.14%
Total Nickel (Ni)	mg/kg	16	75	11.1	13.1	13.0	11.1	11.5	11.1	13.1	12.0	1.0	8.33%
Total Lead (Pb)	mg/kg	35	91.3	6.27	7.92	8.13	7.14	9.27	6.27	9.27	7.75	1.12	14.45%
Total Phosphorus (P)	mg/kg			1750	1960	1780	1820	1650	1650	1960	1792	113	6.31%
Total Antimony (Sb)	mg/kg			0.16	0.20	0.20	0.19	0.19	0.16	0.20	0.19	0.02	10.53%
Total Selenium (Se)	mg/kg	2	2	1.68	2.01	1.51	1.37	1.57	1.37	2.01	1.63	0.24	14.72%
Total Tin (Sn)	mg/kg			0.48	0.53	1.17	1.01	0.38	0.38	1.17	0.71	0.35	49.30%
Total Strontium (Sr)	mg/kg			37.6	46.1	38.2	44.1	43.0	37.6	46.1	41.8	3.7	8.85%
Total Sulphur (S)	%			0.47	0.54	0.54	0.52	0.49	0.47	0.54	0.51	0.03	5.88%
Total Titanium (Ti)	mg/kg			541	649	663	538	608	538	663	599	58	9.68%
Total Thallium (Tl)	mg/kg			0.059	0.073	0.071	0.059	0.071	0.059	0.073	0.067	0.007	10.45%
Total Uranium (U)	mg/kg			0.417	0.475	0.476	0.401	0.453	0.401	0.476	0.444	0.034	7.66%
Total Vanadium (V)	mg/kg			119	136	132	109	118	109	136	122.8	11.0	8.96%
Total Zinc (Zn)	mg/kg	123	315	60.6	70.2	67.2	63.9	61.2	60.6	70.2	64.6	4.1	6.35%
Total Zirconium (Zr)	mg/kg			1.18	1.25	1.55	1.77	1.78	1.18	1.78	1.51	0.28	18.54%

Notes:

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Table 211
2016-17 Annual Report

Results of Sediment Chemistry Analysis in No Name Lake
No Name Lake Near Seep - Metals (ICPMS)

	Stn.Code			NNLS1	NNLS2	NNLS3	NNLS4	NNLS5					
	Permit No.			E292114	E292114	E292114	E292114	E292114					
	Depth (m)			5.6	5.6	5.6	5.6	5.6					
	Date			24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16					
Parameter	**Units**	**ISQG**	**PEL**						**Minimum**	**Maximum**	**Average**	**SD**	**RSD%**
Total Silver (Ag)	mg/kg	0.5	0.5	0.111	0.095	0.080	0.151	0.128	0.080	0.151	0.113	0.028	24.78%
Total Aluminum (Al)	mg/kg			13400	11900	10700	14800	15100	10700	15100	13180	1880	14.26%
Total Arsenic (As)	mg/kg	5.9	17	**18.3**	**24.7**	**18.8**	15.5	14.8	14.8	24.7	**18.4**	3.9	21.20%
Total Barium (Ba)	mg/kg			52.4	57.4	50.8	59.2	54.1	50.8	59.2	54.8	3.5	6.39%
Total Beryllium (Be)	mg/kg			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.00	0.00%
Total Bismuth (Bi)	mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)	mg/kg			3600	4090	4550	5480	5530	3600	5530	4650	849	18.26%
Total Cadmium (Cd)	mg/kg	0.6	3.5	0.349	0.353	0.314	0.559	0.486	0.314	0.559	0.412	0.105	25.49%
Total Cobalt (Co)	mg/kg			14.8	12.6	10.4	14.5	13.6	10.4	14.8	13.2	1.8	13.64%
Total Chromium (Cr)	mg/kg	37.3	90	27.6	22.0	20.1	25.3	26.4	20.1	27.6	24.3	3.1	12.76%
Total Copper (Cu)	mg/kg	35.7	197	38.6	32.4	28.8	40.1	39.6	28.8	40.1	35.9	5.0	13.93%
Total Iron (Fe)	mg/kg	21200	43766	42800	**52600**	41200	**46600**	42400	41200	52600	**45120**	4644	10.29%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.133	0.128	0.111	0.156	0.131	0.111	0.156	0.132	0.016	12.12%
Total Potassium (K)	mg/kg			225	238	204	249	257	204	257	234.6	20.9	8.91%
Total Lithium (Li)	mg/kg			12.9	9.2	7.3	11.1	14.0	7.3	14.0	10.9	2.7	24.77%
Total Magnesium (Mg)	mg/kg			2500	2150	1810	2580	2950	1810	2950	2398	434	18.10%
Total Manganese (Mn)	mg/kg	460	1100	1100	**1400**	**1280**	1010	770	770	1400	**1112**	244	21.94%
Total Molybdenum (Mo)	mg/kg			3.61	4.07	3.57	4.08	2.97	2.97	4.08	3.66	0.46	12.57%
Total Sodium (Na)	mg/kg			<100	<100	<100	126	105	<100	126	106.2	11.3	10.64%
Total Nickel (Ni)	mg/kg	16	75	18.2	14.4	12.9	16.6	18.2	12.9	18.2	16.1	2.4	14.91%
Total Lead (Pb)	mg/kg	35	91.3	6.65	5.98	5.30	7.21	7.41	5.30	7.41	6.51	0.88	13.52%
Total Phosphorus (P)	mg/kg			965	1030	763	1060	1010	763	1060	965	118	12.23%
Total Antimony (Sb)	mg/kg			0.20	0.17	0.16	0.17	0.18	0.16	0.20	0.18	0.02	11.11%
Total Selenium (Se)	mg/kg	2	2	0.68	0.67	0.70	0.90	0.80	0.67	0.90	0.75	0.10	13.33%
Total Tin (Sn)	mg/kg			0.47	0.41	0.32	0.42	0.43	0.32	0.47	0.41	0.06	14.63%
Total Strontium (Sr)	mg/kg			22.8	22.3	20.7	30.9	29.3	20.7	30.9	25.2	4.6	18.25%
Total Sulphur (S)	%			0.33	0.53	0.39	0.50	0.56	0.33	0.56	0.46	0.10	21.74%
Total Titanium (Ti)	mg/kg			317	302	291	384	354	291	384	329.6	38.6	11.71%
Total Thallium (Tl)	mg/kg			0.083	0.072	0.066	0.070	0.079	0.066	0.083	0.074	0.007	9.46%
Total Uranium (U)	mg/kg			0.334	0.318	0.278	0.379	0.355	0.278	0.379	0.333	0.038	11.41%
Total Vanadium (V)	mg/kg			92.5	84.5	78.8	98.6	91.2	78.8	98.6	89.1	7.6	8.53%
Total Zinc (Zn)	mg/kg	123	315	69.6	60.4	54.0	75.3	78.1	54.0	78.1	67.5	10.1	14.96%
Total Zirconium (Zr)	mg/kg			0.88	0.84	0.51	1.66	1.46	0.51	1.66	1.07	0.48	44.86%

Notes:

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Table 212
2016-17 Annual Report

Results of Sediment Chemistry Analysis in No Name Lake
No Name Lake Outlet - Metals (ICPMS)

	Stn.Code			NNO1	NNO2	NNO3	NNO4	NNO5					
	Permit No.			E217017	E217017	E217017	E217017	E217017					
	Depth (m)			3.5	3.5	3.5	3.5	3.5					
	Date			24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16					
Parameter	**Units**	**ISQG**	**PEL**						**Minimum**	**Maximum**	**Average**	**SD**	**RSD%**
Total Silver (Ag)	mg/kg	0.5	0.5	0.081	0.090	0.070	0.100	0.090	0.070	0.100	0.086	0.011	12.79%
Total Aluminum (Al)	mg/kg			9450	10200	8030	9400	7720	7720	10200	8960	1045	11.66%
Total Arsenic (As)	mg/kg	5.9	17	**18.2**	**20.8**	9.43	11.0	9.64	9.43	20.8	13.8	5.31	38.45%
Total Barium (Ba)	mg/kg			53.8	61.2	29.0	43.4	38.1	29.0	61.2	45.1	12.7	28.16%
Total Beryllium (Be)	mg/kg			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.00	0.00%
Total Bismuth (Bi)	mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)	mg/kg			4550	6020	5570	6560	5640	4550	6560	5668	738	13.02%
Total Cadmium (Cd)	mg/kg	0.6	3.5	0.440	0.425	0.355	0.729	0.598	0.355	0.729	0.509	0.152	29.86%
Total Cobalt (Co)	mg/kg			9.21	12.8	6.82	7.82	7.68	6.82	12.8	8.87	2.36	26.61%
Total Chromium (Cr)	mg/kg	37.3	90	19.7	19.8	16.8	20.2	17.8	16.8	20.2	18.9	1.5	7.94%
Total Copper (Cu)	mg/kg	35.7	197	27.9	29.3	27.4	30.0	25.9	25.9	30.0	28.1	1.6	5.69%
Total Iron (Fe)	mg/kg	21200	43766	29200	32900	14800	18700	14600	14600	32900	22040	8487	38.51%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.118	0.115	0.099	0.125	0.100	0.099	0.125	0.111	0.011	9.91%
Total Potassium (K)	mg/kg			157	188	111	176	129	111	188	152.2	32.0	21.02%
Total Lithium (Li)	mg/kg			<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.0	0.00%
Total Magnesium (Mg)	mg/kg			1470	1660	1180	1560	1320	1180	1660	1438	190	13.21%
Total Manganese (Mn)	mg/kg	460	1100	**1950**	**3570**	364	614	430	364	3570	**1386**	1382	99.71%
Total Molybdenum (Mo)	mg/kg			3.72	4.31	3.34	2.92	2.50	2.50	4.31	3.36	0.70	20.83%
Total Sodium (Na)	mg/kg			<100	119	102	166	103	<100	166	118.0	27.9	23.64%
Total Nickel (Ni)	mg/kg	16	75	12.2	12.7	10.7	13.2	11.9	10.7	13.2	12.1	0.9	7.44%
Total Lead (Pb)	mg/kg	35	91.3	8.62	11.0	3.97	11.1	9.39	3.97	11.1	8.82	2.91	32.99%
Total Phosphorus (P)	mg/kg			586	664	339	434	358	339	664	476	143	30.04%
Total Antimony (Sb)	mg/kg			0.18	0.18	0.13	0.20	0.18	0.13	0.20	0.17	0.03	17.65%
Total Selenium (Se)	mg/kg	2	2	0.75	0.66	0.86	0.73	0.57	0.57	0.86	0.71	0.11	15.49%
Total Tin (Sn)	mg/kg			0.45	0.45	0.36	0.46	0.56	0.36	0.56	0.46	0.07	15.22%
Total Strontium (Sr)	mg/kg			20.4	28.4	19.4	25.2	23.1	19.4	28.4	23.3	3.6	15.45%
Total Sulphur (S)	%			0.30	0.30	0.36	0.39	0.43	0.30	0.43	0.36	0.06	16.67%
Total Titanium (Ti)	mg/kg			427	472	326	443	412	326	472	416	55	13.22%
Total Thallium (Tl)	mg/kg			<0.050	0.054	<0.050	<0.050	<0.050	<0.050	0.054	0.051	0.002	3.92%
Total Uranium (U)	mg/kg			0.290	0.304	0.274	0.320	0.246	0.246	0.320	0.287	0.028	9.76%
Total Vanadium (V)	mg/kg			79.9	85.6	62.4	76.8	64.5	62.4	85.6	73.8	10.0	13.55%
Total Zinc (Zn)	mg/kg	123	315	50.4	53.8	51.9	59.1	54.6	50.4	59.1	54.0	3.3	6.11%
Total Zirconium (Zr)	mg/kg			0.59	0.53	0.91	1.95	1.66	0.53	1.95	1.13	0.64	56.64%

Notes:

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Table 213
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Long Lake
Long Lake Inlet - Metals (ICPMS)

Parameter	Stn.Code / Permit No. / Depth (m) / Date	Units	ISQG	SQO	LLI1 E292121 5 31-Aug-16	LLI2 E292121 5 31-Aug-16	LLI3 E292121 5 31-Aug-16	Minimum	Maximum	Average	SD	RSD%
Total Silver (Ag)		mg/kg	0.5		0.103	0.098	0.109	0.098	0.109	0.103	0.006	5.83%
Total Aluminum (Al)		mg/kg			16200	17400	15300	15300	17400	16300	1053	6.46%
Total Arsenic (As)		mg/kg	5.9	89	50.0	57.7	48.7	48.7	57.7	52.1	4.9	9.40%
Total Barium (Ba)		mg/kg			65.2	64.5	60.7	60.7	65.2	63.5	2.4	3.78%
Total Beryllium (Be)		mg/kg			<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.00	0.00%
Total Bismuth (Bi)		mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)		mg/kg			12300	11800	11500	11500	12300	11866	404	3.40%
Total Cadmium (Cd)		mg/kg	0.6	0.9	0.637	0.655	0.635	0.635	0.655	0.642	0.011	1.71%
Total Cobalt (Co)		mg/kg			13.5	12.5	11.8	11.8	13.5	12.6	0.9	7.14%
Total Chromium (Cr)		mg/kg	37.3	39.7	24.6	22.0	20.7	20.7	24.6	22.4	2.0	8.93%
Total Copper (Cu)		mg/kg	35.7	172	36.6	35.2	33.0	33.0	36.6	34.9	1.8	5.16%
Total Iron (Fe)		mg/kg	21200	155000	43400	51900	40200	40200	51900	45167	6046	13.39%
Total Mercury (Hg)		mg/kg	0.17	5.72	0.114	0.115	0.115	0.114	0.115	0.115	0.001	0.87%
Total Potassium (K)		mg/kg			300	308	291	291	308	299.7	8.5	2.84%
Total Lithium (Li)		mg/kg			8.0	7.1	7.3	7.1	8.0	7.5	0.5	6.67%
Total Magnesium (Mg)		mg/kg			3530	3460	3240	3240	3530	3410	151	4.43%
Total Manganese (Mn)		mg/kg	460	2040	783	684	717	684	783	728	50.4	6.92%
Total Molybdenum (Mo)		mg/kg			4.96	5.36	4.04	4.04	5.36	4.79	0.68	14.20%
Total Sodium (Na)		mg/kg			432	429	412	412	432	424.3	10.8	2.55%
Total Nickel (Ni)		mg/kg	16	16	***18.6***	***17.0***	***16.8***	16.8	18.6	***17.5***	1.0	5.71%
Total Lead (Pb)		mg/kg	35	35	5.84	6.75	4.82	4.82	6.75	5.80	0.97	16.72%
Total Phosphorus (P)		mg/kg			902	1000	837	837	1000	913	82	8.98%
Total Antimony (Sb)		mg/kg			0.25	0.22	0.24	0.22	0.25	0.24	0.02	8.33%
Total Selenium (Se)		mg/kg	2	2	0.83	0.99	0.74	0.74	0.99	0.85	0.13	15.29%
Total Tin (Sn)		mg/kg			0.39	0.49	0.34	0.34	0.49	0.41	0.08	19.51%
Total Strontium (Sr)		mg/kg			94.7	85.9	87.1	85.9	94.7	89.2	4.8	5.38%
Total Sulphur (S)		%			1.6	1.6	1.3	1.3	1.6	1.5	0.2	13.33%
Total Titanium (Ti)		mg/kg			778	948	802	778	948	842	92	10.93%
Total Thallium (Tl)		mg/kg			0.065	0.071	0.064	0.064	0.071	0.067	0.004	5.97%
Total Uranium (U)		mg/kg			0.919	0.827	0.836	0.827	0.919	0.861	0.051	5.92%
Total Vanadium (V)		mg/kg			86.8	92.0	78.5	78.5	92.0	85.8	6.8	7.93%
Total Zinc (Zn)		mg/kg	123		66.6	68.5	61.0	61.0	68.5	65.4	3.9	5.96%
Total Zirconium (Zr)		mg/kg			2.53	2.22	1.85	1.85	2.53	2.20	0.34	15.45%

Notes:

Factor applied to less-than results when calculating statistics: 1.0

Factor applied to greater-than results when calculating statistics: 1.0

ISQG = Interim Sediment Quality Guidelines (BC)

Red font indicates ISQG exceedance

SQO = Sediment Quality Objectives

Green *font indicates SQO exceedance*

Blue cell indicates primary parameter of concern

Orange cell indicates secondary parameter of concern

SD = Standard Deviation

RSD% = Relative Standard Deviation

Table 214
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Long Lake
Long Lake Deep - Metals (ICPMS)

	Stn.Code			LLM1	LLM2	LLM3					
	Permit No.			E292122	E292122	E292122					
	Depth (m)			19.5	19.5	19.5					
	Date			30-Aug-16	30-Aug-16	30-Aug-16					
Parameter	**Units**	**ISQG**	**SQO**				**Minimum**	**Maximum**	**Average**	**SD**	**RSD%**
Total Silver (Ag)	mg/kg	0.5		0.238	0.226	0.231	0.226	0.238	0.232	0.006	2.59%
Total Aluminum (Al)	mg/kg			20800	21200	22200	20800	22200	21400	721	3.37%
Total Arsenic (As)	mg/kg	5.9	246	170	152	159	152	170	160	9.1	5.68%
Total Barium (Ba)	mg/kg			172	161	158	158	172	163.7	7.4	4.52%
Total Beryllium (Be)	mg/kg			0.46	<0.40	0.43	<0.40	0.46	0.43	0.03	6.98%
Total Bismuth (Bi)	mg/kg			0.11	0.11	0.13	0.11	0.13	0.12	0.01	8.33%
Total Calcium (Ca)	mg/kg			8640	8620	8730	8620	8730	8663	58	0.67%
Total Cadmium (Cd)	mg/kg	0.6	0.9	0.586	0.574	0.582	0.574	0.586	0.581	0.006	1.03%
Total Cobalt (Co)	mg/kg			31.9	35.8	29.4	29.4	35.8	32.4	3.2	9.88%
Total Chromium (Cr)	mg/kg	37.3	39.7	38.8	38.5	***42.2***	38.5	42.2	***39.8***	2.1	5.28%
Total Copper (Cu)	mg/kg	35.7	172	70.0	69.1	74.4	69.1	74.4	71.2	2.8	3.93%
Total Iron (Fe)	mg/kg	21200	155000	113000	119000	104000	104000	119000	112000	7549	6.74%
Total Mercury (Hg)	mg/kg	0.17	5.72	0.244	0.251	0.257	0.244	0.257	0.251	0.007	2.79%
Total Potassium (K)	mg/kg			588	591	626	588	626	601.7	21.1	3.51%
Total Lithium (Li)	mg/kg			19.2	17.9	20.1	17.9	20.1	19.1	1.1	5.76%
Total Magnesium (Mg)	mg/kg			5020	4850	5250	4850	5250	5040	200	3.97%
Total Manganese (Mn)	mg/kg	460	2040	***3420***	***3510***	***2790***	2790	3510	***3240***	392	12.10%
Total Molybdenum (Mo)	mg/kg			11.7	11.2	11.3	11.2	11.7	11.4	0.3	2.63%
Total Sodium (Na)	mg/kg			377	393	405	377	405	391.7	14.0	3.57%
Total Nickel (Ni)	mg/kg	16	16	***30.9***	***30.2***	***33.1***	30.2	33.1	***31.4***	1.5	4.78%
Total Lead (Pb)	mg/kg	35	35	11.1	12.7	11.5	11.1	12.7	11.8	0.8	6.78%
Total Phosphorus (P)	mg/kg			1700	1750	1690	1690	1750	1713.3	32.1	1.87%
Total Antimony (Sb)	mg/kg			0.45	0.40	0.46	0.40	0.46	0.44	0.03	6.82%
Total Selenium (Se)	mg/kg	2	2	1.41	1.41	1.56	1.41	1.56	1.46	0.09	6.16%
Total Tin (Sn)	mg/kg			0.62	0.68	0.63	0.62	0.68	0.64	0.03	4.69%
Total Strontium (Sr)	mg/kg			69.7	70.7	71.3	69.7	71.3	70.6	0.8	1.13%
Total Sulphur (S)	%			0.64	0.73	0.62	0.62	0.73	0.66	0.06	9.09%
Total Titanium (Ti)	mg/kg			323	340	365	323	365	342.7	21.1	6.16%
Total Thallium (Tl)	mg/kg			0.073	0.070	0.075	0.070	0.075	0.073	0.003	4.11%
Total Uranium (U)	mg/kg			0.660	0.677	0.725	0.660	0.725	0.687	0.034	4.95%
Total Vanadium (V)	mg/kg			124	130	137	124	137	130.3	6.5	4.99%
Total Zinc (Zn)	mg/kg	123		97.5	100	103	97.5	103	100.2	2.8	2.79%
Total Zirconium (Zr)	mg/kg			1.44	1.49	1.31	1.31	1.49	1.41	0.09	6.38%

Notes:

Factor applied to less-than results when calculating statistics: 1.0

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RSD% = Relative Standard Deviation

Table 215
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Long Lake
Long Lake Near Seep - Metals (ICPMS)

Parameter	Stn.Code / Permit No. / Depth (m) / Date	Units	ISQG	SQO	LLNS1 E292123 15.7 31-Aug-16	LLNS2 E292123 15.7 31-Aug-16	LLNS3 E292123 15.7 31-Aug-16	LLNS4 E292123 15.7 31-Aug-16	LLNS5 E292123 15.7 31-Aug-16	LLNS6 E292123 15.7 31-Aug-16	Minimum	Maximum	Average	SD	RSD%
Total Silver (Ag)		mg/kg	0.5		0.160	0.144	0.180	0.156	0.142	0.177	0.142	0.180	0.160	0.016	10.00%
Total Aluminum (Al)		mg/kg			17700	18200	20400	18000	18600	17000	17000	20400	18316	1153	6.30%
Total Arsenic (As)		mg/kg	5.9	89	47.8	41.4	68.5	55.2	44.8	74.8	41.4	74.8	55.4	13.5	24.37%
Total Barium (Ba)		mg/kg			94.3	122	103	115	104	75.9	75.9	122	102.4	16.2	15.82%
Total Beryllium (Be)		mg/kg			0.46	<0.40	0.44	<0.40	0.41	<0.40	<0.40	0.46	0.42	0.03	7.14%
Total Bismuth (Bi)		mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)		mg/kg			8810	8130	10500	9180	9070	9470	8130	10500	9193	784	8.53%
Total Cadmium (Cd)		mg/kg	0.6	0.9	0.542	0.556	0.622	0.519	0.600	0.609	0.519	0.622	0.575	0.041	7.13%
Total Cobalt (Co)		mg/kg			20.3	24.7	22.4	18.2	20.0	20.0	18.2	24.7	20.9	2.3	11.00%
Total Chromium (Cr)		mg/kg	37.3	39.7	35.7	***40.7***	***40.2***	34.2	37.0	32.2	32.2	40.7	36.7	3.3	8.99%
Total Copper (Cu)		mg/kg	35.7	172	64.6	76.8	67.9	58.0	66.4	55.5	55.5	76.8	64.9	7.6	11.71%
Total Iron (Fe)		mg/kg	21200	155000	51000	55400	62000	54600	51300	59000	51000	62000	55550	4317	7.77%
Total Mercury (Hg)		mg/kg	0.17	5.72	0.217	0.154	0.233	0.199	0.192	0.212	0.154	0.233	0.201	0.027	13.43%
Total Potassium (K)		mg/kg			375	384	461	382	403	370	370	461	395.8	33.9	8.56%
Total Lithium (Li)		mg/kg			20.4	25.7	22.7	19.3	22.7	16.2	16.2	25.7	21.2	3.3	15.57%
Total Magnesium (Mg)		mg/kg			3690	4120	4100	3550	3790	3430	3430	4120	3780	283	7.49%
Total Manganese (Mn)		mg/kg	460	2040	811	1380	987	922	804	737	737	1380	940	233	24.79%
Total Molybdenum (Mo)		mg/kg			5.05	4.11	5.77	4.21	4.76	7.24	4.11	7.24	5.19	1.17	22.54%
Total Sodium (Na)		mg/kg			413	461	483	761	444	417	413	761	496	132	26.61%
Total Nickel (Ni)		mg/kg	16	16	***29.5***	***34.6***	***32.1***	***26.1***	***29.8***	***25.8***	25.8	34.6	***29.7***	3.4	11.45%
Total Lead (Pb)		mg/kg	35	35	8.75	7.46	10.8	8.59	8.37	9.81	7.46	10.8	8.96	1.17	13.06%
Total Phosphorus (P)		mg/kg			1150	933	1470	1720	1220	1400	933	1720	1315	274	20.84%
Total Antimony (Sb)		mg/kg			0.35	0.41	0.38	0.35	0.37	0.35	0.35	0.41	0.37	0.02	5.41%
Total Selenium (Se)		mg/kg	2	2	1.15	0.90	1.22	1.05	1.02	1.22	0.90	1.22	1.09	0.13	11.93%
Total Tin (Sn)		mg/kg			6.24	0.61	0.72	0.52	0.58	0.51	0.51	6.24	1.53	2.31	150.98%
Total Strontium (Sr)		mg/kg			77.3	65.4	88.8	81.1	77.1	84.7	65.4	88.8	79.1	8.1	10.24%
Total Sulphur (S)		%			0.84	1.1	0.79	0.75	0.80	0.95	0.75	1.1	0.87	0.13	14.94%
Total Titanium (Ti)		mg/kg			368	250	457	389	351	377	250	457	365	67	18.36%
Total Thallium (Tl)		mg/kg			0.081	0.086	0.087	0.075	0.086	0.080	0.075	0.087	0.083	0.005	6.02%
Total Uranium (U)		mg/kg			0.671	0.596	0.743	0.635	0.694	0.776	0.596	0.776	0.686	0.067	9.77%
Total Vanadium (V)		mg/kg			117	114	128	115	116	112	112	128	117.0	5.7	4.87%
Total Zinc (Zn)		mg/kg	123		82.4	88.7	96.0	80.6	84.7	82.5	80.6	96.0	85.8	5.7	6.64%
Total Zirconium (Zr)		mg/kg			1.41	1.91	1.48	1.28	1.39	1.50	1.28	1.91	1.49	0.22	14.77%

Notes:

Factor applied to less-than results when calculating statistics: 1.0

Factor applied to greater-than results when calculating statistics: 1.0

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RSD% = Relative Standard Deviation

Table 216
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Long Lake
Long Lake Outlet - Metals (ICPMS)

Parameter	Stn.Code Permit No. Depth (m) Date Units	ISQG	SQO	LLO1 E219412 5.3 30-Aug-16	LLO2 E219412 5.3 30-Aug-16	LLO3 E219412 5.3 30-Aug-16	Minimum	Maximum	Average	SD	RSD%
Total Silver (Ag)	mg/kg	0.5		0.105	0.105	0.116	0.105	0.116	0.109	0.006	5.50%
Total Aluminum (Al)	mg/kg			17300	16000	15200	15200	17300	16166	1059	6.55%
Total Arsenic (As)	mg/kg	5.9	1046	46.9	49.4	47.3	46.9	49.4	47.9	1.3	2.71%
Total Barium (Ba)	mg/kg			65.6	75.3	69.9	65.6	75.3	70.3	4.9	6.97%
Total Beryllium (Be)	mg/kg			0.41	<0.40	<0.40	<0.40	0.41	0.40	0.01	2.50%
Total Bismuth (Bi)	mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)	mg/kg			10700	9350	8740	8740	10700	9596	1003	10.45%
Total Cadmium (Cd)	mg/kg	0.6	0.9	0.460	0.407	0.452	0.407	0.460	0.440	0.029	6.59%
Total Cobalt (Co)	mg/kg			18.9	18.5	17.4	17.4	18.9	18.3	0.8	4.37%
Total Chromium (Cr)	mg/kg	37.3	39.7	30.6	26.5	24.2	24.2	30.6	27.1	3.2	11.81%
Total Copper (Cu)	mg/kg	35.7	172	57.2	48.9	46.3	46.3	57.2	50.8	5.7	11.22%
Total Iron (Fe)	mg/kg	21200	155000	55900	52200	51300	51300	55900	53133	2437	4.59%
Total Mercury (Hg)	mg/kg	0.17	5.72	0.127	0.130	0.124	0.124	0.130	0.127	0.003	2.36%
Total Potassium (K)	mg/kg			678	620	576	576	678	624	51	8.17%
Total Lithium (Li)	mg/kg			17.2	15.5	13.7	13.7	17.2	15.5	1.8	11.61%
Total Magnesium (Mg)	mg/kg			4960	4210	3960	3960	4960	4376	520	11.88%
Total Manganese (Mn)	mg/kg	460	2040	813	1170	1120	813	1170	1034	193	18.67%
Total Molybdenum (Mo)	mg/kg			3.01	3.19	3.13	3.01	3.19	3.11	0.09	2.89%
Total Sodium (Na)	mg/kg			450	430	420	420	450	433.3	15.3	3.53%
Total Nickel (Ni)	mg/kg	16	16	***28.3***	***24.7***	***23.9***	23.9	28.3	***25.6***	2.3	8.98%
Total Lead (Pb)	mg/kg	35	35	8.96	8.76	8.41	8.41	8.96	8.71	0.28	3.21%
Total Phosphorus (P)	mg/kg			851	822	809	809	851	827.3	21.5	2.60%
Total Antimony (Sb)	mg/kg			0.36	0.32	0.27	0.27	0.36	0.32	0.05	15.63%
Total Selenium (Se)	mg/kg	2	2	0.77	0.71	0.68	0.68	0.77	0.72	0.05	6.94%
Total Tin (Sn)	mg/kg			0.51	0.47	0.41	0.41	0.51	0.46	0.05	10.87%
Total Strontium (Sr)	mg/kg			68.6	62.2	60.1	60.1	68.6	63.6	4.4	6.92%
Total Sulphur (S)	%			1.2	0.84	0.81	0.81	1.2	0.95	0.22	23.16%
Total Titanium (Ti)	mg/kg			405	373	322	322	405	366.7	41.9	11.43%
Total Thallium (Tl)	mg/kg			0.071	0.069	0.069	0.069	0.071	0.070	0.001	1.43%
Total Uranium (U)	mg/kg			0.595	0.531	0.512	0.512	0.595	0.546	0.043	7.88%
Total Vanadium (V)	mg/kg			88.2	82.1	77.3	77.3	88.2	82.5	5.5	6.67%
Total Zinc (Zn)	mg/kg	123		101	91.9	88.9	88.9	101	93.9	6.3	6.71%
Total Zirconium (Zr)	mg/kg			1.41	0.99	1.16	0.99	1.41	1.19	0.21	17.65%

Notes:

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RSD% = Relative Standard Deviation

Table 217
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Middle Quinsam Lake
Middle Quinsam Lake Inlet - Metals (ICPMS)

Parameter	Stn.Code / Permit No. / Depth (m) / Date	ISQG	PEL	MQLI1 E206901 1.5 1-Sep-16	MQLI2 E206901 1.5 1-Sep-16	MQLI3 E206901 1.5 1-Sep-16	Minimum	Maximum	Average	SD	RSD%
Total Silver (Ag)	mg/kg	0.5	0.5	0.099	0.101	0.096	0.096	0.101	0.099	0.003	3.03%
Total Aluminum (Al)	mg/kg			19300	19900	18900	18900	19900	19366	503	2.60%
Total Arsenic (As)	mg/kg	5.9	17	7.83	8.29	8.08	7.83	8.29	8.07	0.23	2.85%
Total Barium (Ba)	mg/kg			75.1	75.1	75.8	75.1	75.8	75.3	0.4	0.53%
Total Beryllium (Be)	mg/kg			<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.00	0.00%
Total Bismuth (Bi)	mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)	mg/kg			10200	10600	10100	10100	10600	10300	264	2.56%
Total Cadmium (Cd)	mg/kg	0.6	3.5	0.554	0.480	0.509	0.480	0.554	0.514	0.037	7.20%
Total Cobalt (Co)	mg/kg			12.6	12.8	12.7	12.6	12.8	12.7	0.1	0.79%
Total Chromium (Cr)	mg/kg	37.3	90	25.6	26.8	25.7	25.6	26.8	26.0	0.7	2.69%
Total Copper (Cu)	mg/kg	35.7	197	60.5	61.8	58.7	58.7	61.8	60.3	1.6	2.65%
Total Iron (Fe)	mg/kg	21200	43766	30100	31700	30500	30100	31700	30766	832	2.70%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.106	0.112	0.097	0.097	0.112	0.105	0.008	7.62%
Total Potassium (K)	mg/kg			410	403	372	372	410	395.0	20.2	5.11%
Total Lithium (Li)	mg/kg			<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.0	0.00%
Total Magnesium (Mg)	mg/kg			4430	4610	4400	4400	4610	4480	113	2.52%
Total Manganese (Mn)	mg/kg	460	1100	728	631	730	631	730	696	56.6	8.13%
Total Molybdenum (Mo)	mg/kg			1.78	1.87	1.82	1.78	1.87	1.82	0.05	2.75%
Total Sodium (Na)	mg/kg			487	468	470	468	487	475.0	10.4	2.19%
Total Nickel (Ni)	mg/kg	16	75	17.8	18.0	17.1	17.1	18.0	17.6	0.5	2.84%
Total Lead (Pb)	mg/kg	35	91.3	5.27	6.39	5.46	5.27	6.39	5.71	0.60	10.51%
Total Phosphorus (P)	mg/kg			495	517	499	495	517	503.7	11.7	2.32%
Total Antimony (Sb)	mg/kg			0.17	0.16	0.16	0.16	0.17	0.16	0.01	6.25%
Total Selenium (Se)	mg/kg	2	2	1.43	1.42	1.40	1.40	1.43	1.42	0.02	1.41%
Total Tin (Sn)	mg/kg			0.44	0.48	0.46	0.44	0.48	0.46	0.02	4.35%
Total Strontium (Sr)	mg/kg			49.0	50.1	47.9	47.9	50.1	49.0	1.1	2.24%
Total Sulphur (S)	%			1.2	1.2	1.3	1.2	1.3	1.2	0.1	8.33%
Total Titanium (Ti)	mg/kg			1200	1210	1100	1100	1210	1170	60	5.13%
Total Thallium (Tl)	mg/kg			<0.050	<0.050	<0.050	<0.050	<0.050	0.050	0.000	0.00%
Total Uranium (U)	mg/kg			0.736	0.778	0.703	0.703	0.778	0.739	0.038	5.14%
Total Vanadium (V)	mg/kg			78.5	79.7	74.8	74.8	79.7	77.7	2.6	3.35%
Total Zinc (Zn)	mg/kg	123	315	55.4	58.8	54.8	54.8	58.8	56.3	2.2	3.91%
Total Zirconium (Zr)	mg/kg			3.29	3.49	3.35	3.29	3.49	3.38	0.10	2.96%

Notes:

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Factor applied to greater-than results when calculating statistics: 1.0

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RSD% = Relative Standard Devation

Table 218
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Middle Quinsam Lake
Middle Quinsam Lake Deep - Metals (ICPMS)

Parameter	Stn.Code Permit No. Depth (m) Date Units	ISQG	PEL	MQL1 E292115 13.5 1-Sep-16	RSD% E292115 13.5 1-Sep-16	MQL3 E292115 13.5 1-Sep-16	Minimum	Maximum	Average	SD	RSD%
Total Silver (Ag)	mg/kg	0.5	0.5	0.195	0.253	0.188	0.188	0.253	0.212	0.036	16.98%
Total Aluminum (Al)	mg/kg			19100	21400	18900	18900	21400	19800	1389	7.02%
Total Arsenic (As)	mg/kg	5.9	17	11.8	13.7	12.9	11.8	13.7	12.8	1.0	7.81%
Total Barium (Ba)	mg/kg			47.6	56.5	47.6	47.6	56.5	50.6	5.1	10.08%
Total Beryllium (Be)	mg/kg			<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.00	0.00%
Total Bismuth (Bi)	mg/kg			0.10	0.12	<0.10	0.10	0.12	0.11	0.01	9.09%
Total Calcium (Ca)	mg/kg			10200	11800	10400	10200	11800	10800	871	8.06%
Total Cadmium (Cd)	mg/kg	0.6	3.5	0.599	0.642	0.595	0.595	0.642	0.612	0.026	4.25%
Total Cobalt (Co)	mg/kg			9.75	11.2	10.1	9.75	11.2	10.35	0.76	7.34%
Total Chromium (Cr)	mg/kg	37.3	90	30.1	34.1	30.1	30.1	34.1	31.4	2.3	7.32%
Total Copper (Cu)	mg/kg	35.7	197	69.8	80.7	69.9	69.8	80.7	73.5	6.3	8.57%
Total Iron (Fe)	mg/kg	21200	43766	32800	40700	35700	32800	40700	36400	3996	10.98%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.207	0.235	0.200	0.200	0.235	0.214	0.019	8.88%
Total Potassium (K)	mg/kg			333	389	339	333	389	353.7	30.7	8.68%
Total Lithium (Li)	mg/kg			<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.00	0.00%
Total Magnesium (Mg)	mg/kg			4100	4870	4190	4100	4870	4386	420	9.58%
Total Manganese (Mn)	mg/kg	460	1100	330	386	345	330	386	354	29.0	8.20%
Total Molybdenum (Mo)	mg/kg			3.54	3.69	3.41	3.41	3.69	3.55	0.14	3.94%
Total Sodium (Na)	mg/kg			786	809	788	786	809	794.3	12.7	1.60%
Total Nickel (Ni)	mg/kg	16	75	16.3	18.7	16.3	16.3	18.7	17.1	1.4	8.19%
Total Lead (Pb)	mg/kg	35	91.3	15.2	18.3	13.1	13.1	18.3	15.5	2.6	16.77%
Total Phosphorus (P)	mg/kg			816	955	848	816	955	873	72	8.25%
Total Antimony (Sb)	mg/kg			0.23	0.25	0.21	0.21	0.25	0.23	0.02	8.70%
Total Selenium (Se)	mg/kg	2	2	**2.46**	**2.72**	**2.46**	2.46	2.72	**2.55**	0.15	5.88%
Total Tin (Sn)	mg/kg			0.50	0.60	0.48	0.48	0.60	0.53	0.06	11.32%
Total Strontium (Sr)	mg/kg			52.5	58.7	53.0	52.5	58.7	54.7	3.4	6.22%
Total Sulphur (S)	%			0.91	0.94	0.86	0.86	0.94	0.90	0.04	4.44%
Total Titanium (Ti)	mg/kg			800	894	765	765	894	819	66	8.06%
Total Thallium (Tl)	mg/kg			<0.050	<0.050	<0.050	<0.050	<0.050	0.050	0.00	0.00%
Total Uranium (U)	mg/kg			0.897	1.04	0.904	0.897	1.04	0.947	0.081	8.55%
Total Vanadium (V)	mg/kg			90.1	101	88.7	88.7	101	93.3	6.7	7.18%
Total Zinc (Zn)	mg/kg	123	315	62.0	73.0	62.3	62.0	73.0	65.8	6.3	9.57%
Total Zirconium (Zr)	mg/kg			2.47	3.14	2.72	2.47	3.14	2.78	0.34	12.23%

Notes:

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Table 219
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Middle Quinsam Lake
Middle Quinsam Lake Near Seep - Metals (ICPMS)

Parameter	Stn.Code Permit No. Depth (m) Date Units	ISQG	PEL	MQLNS1 E292116 1 1-Sep-16	MQLNS2 E292116 1 1-Sep-16	MQLNS3 E292116 1 1-Sep-16	MQLNS4 E292116 1 1-Sep-16	MQLNS5 E292116 1 1-Sep-16	Minimum	Maximum	Average	SD	RSD%
Total Silver (Ag)	mg/kg	0.5	0.5	0.134	0.104	0.094	0.103	0.096	0.094	0.134	0.106	0.016	15.09%
Total Aluminum (Al)	mg/kg			17200	14700	13800	15100	13300	13300	17200	14820	1508	10.18%
Total Arsenic (As)	mg/kg	5.9	17	9.12	10.4	6.88	12.1	8.39	6.88	12.1	9.38	1.98	21.11%
Total Barium (Ba)	mg/kg			48.4	42.2	50.1	52.2	47.1	42.2	52.2	48.0	3.8	7.92%
Total Beryllium (Be)	mg/kg			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.00000001	0.00%
Total Bismuth (Bi)	mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.000000002	0.00%
Total Calcium (Ca)	mg/kg			12900	12200	15600	13600	11700	11700	15600	13200	1521	11.52%
Total Cadmium (Cd)	mg/kg	0.6	3.5	0.633	0.492	0.407	0.465	0.479	0.407	0.633	0.495	0.084	16.97%
Total Cobalt (Co)	mg/kg			11.2	10.0	8.68	10.0	8.51	8.51	11.2	9.68	1.10	11.36%
Total Chromium (Cr)	mg/kg	37.3	90	26.8	24.2	24.8	23.3	22.9	22.9	26.8	24.4	1.5	6.15%
Total Copper (Cu)	mg/kg	35.7	197	57.7	49.2	45.9	45.7	45.1	45.1	57.7	48.7	5.3	10.88%
Total Iron (Fe)	mg/kg	21200	43766	43400	**51700**	32700	**48200**	43200	32700	51700	**43840**	7167	16.35%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.085	0.070	0.090	0.100	0.090	0.070	0.100	0.087	0.011	12.64%
Total Potassium (K)	mg/kg			360	285	294	291	252	252	360	296	39	13.18%
Total Lithium (Li)	mg/kg			6.0	<5.0	<5.0	<5.0	<5.0	<5.0	6.0	5.2	0.4	7.69%
Total Magnesium (Mg)	mg/kg			4640	4050	4200	4270	3790	3790	4640	4190	311	7.42%
Total Manganese (Mn)	mg/kg	460	1100	410	351	380	357	399	351	410	379	25.6	6.75%
Total Molybdenum (Mo)	mg/kg			3.29	3.54	3.02	4.08	3.16	3.02	4.08	3.42	0.42	12.28%
Total Sodium (Na)	mg/kg			1090	1200	974	1040	1380	974	1380	1136	159	14.00%
Total Nickel (Ni)	mg/kg	16	75	17.7	15.0	15.3	14.1	14.1	14.1	17.7	15.2	1.5	9.87%
Total Lead (Pb)	mg/kg	35	91.3	7.86	7.27	6.92	9.03	8.65	6.92	9.03	7.95	0.89	11.19%
Total Phosphorus (P)	mg/kg			504	432	406	418	409	406	504	433.8	40.5	9.34%
Total Antimony (Sb)	mg/kg			0.19	0.18	0.20	0.18	0.18	0.18	0.20	0.19	0.01	5.26%
Total Selenium (Se)	mg/kg	2	2	1.63	1.37	1.18	1.41	1.40	1.18	1.63	1.40	0.16	11.43%
Total Tin (Sn)	mg/kg			0.49	0.55	0.62	0.49	0.49	0.49	0.62	0.53	0.06	11.32%
Total Strontium (Sr)	mg/kg			93.3	84.1	90.9	86.0	85.3	84.1	93.3	87.9	4.0	4.55%
Total Sulphur (S)	%			0.81	3.5	2.8	3.8	3.7	0.81	3.8	2.92	1.24	42.47%
Total Titanium (Ti)	mg/kg			1010	831	793	771	731	731	1010	827	108	13.06%
Total Thallium (Tl)	mg/kg			<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	0.00	0.00%
Total Uranium (U)	mg/kg			0.836	0.669	0.996	0.821	0.627	0.627	0.996	0.790	0.147	18.61%
Total Vanadium (V)	mg/kg			81.8	83.6	72.1	84.9	74.5	72.1	84.9	79.4	5.7	7.18%
Total Zinc (Zn)	mg/kg	123	315	56.5	45.2	40.2	47.6	66.2	40.2	66.2	51.1	10.3	20.16%
Total Zirconium (Zr)	mg/kg			5.31	4.81	4.11	4.12	4.00	4.00	5.31	4.47	0.57	12.75%

Notes:

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Table 220
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Middle Quinsam Lake
Middle Quinsam Lake Outlet - Metals (ICPMS)

	Stn.Code			MQLO1	MQLO2	MQLO3	MQLO5					
	Permit No.			0900504	0900504	0900504	0900504					
	Depth (m)			2	2	2	2					
	Date			1-Sep-16	1-Sep-16	1-Sep-16	1-Sep-16					
Parameter	**Units**	**ISQG**	**PEL**					**Minimum**	**Maximum**	**Average**	**SD**	**RSD%**
Total Silver (Ag)	mg/kg	0.5	0.5	0.081	0.106	0.105	0.126	0.081	0.126	0.104	0.018	17.31%
Total Aluminum (Al)	mg/kg			16000	19000	19800	21000	16000	21000	18950	2131	11.25%
Total Arsenic (As)	mg/kg	5.9	17	8.02	10.5	10.6	**17.7**	8.02	17.7	11.7	4.17	35.64%
Total Barium (Ba)	mg/kg			72.3	90.5	92.6	97.6	72.3	97.6	88.2	11.0	12.47%
Total Beryllium (Be)	mg/kg			<0.40	0.42	0.46	<0.40	<0.40	0.46	0.42	0.03	7.14%
Total Bismuth (Bi)	mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)	mg/kg			8800	10000	9840	10500	8800	10500	9785	714	7.30%
Total Cadmium (Cd)	mg/kg	0.6	3.5	0.552	0.687	0.689	0.589	0.552	0.689	0.629	0.070	11.13%
Total Cobalt (Co)	mg/kg			11.4	13.4	14.1	16.4	11.4	16.4	13.8	2.1	15.22%
Total Chromium (Cr)	mg/kg	37.3	90	25.6	29.3	30.9	36.5	25.6	36.5	30.6	4.5	14.71%
Total Copper (Cu)	mg/kg	35.7	197	41.3	49.5	53.1	60.1	41.3	60.1	51.0	7.8	15.29%
Total Iron (Fe)	mg/kg	21200	43766	20000	29700	28400	34300	20000	34300	28100	5963	21.22%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.077	0.114	0.108	0.126	0.077	0.126	0.106	0.021	19.81%
Total Potassium (K)	mg/kg			223	286	301	386	223	386	299	67	22.41%
Total Lithium (Li)	mg/kg			5.2	7.2	7.3	9.0	5.2	9.0	7.2	1.6	22.22%
Total Magnesium (Mg)	mg/kg			3240	3850	4210	4780	3240	4780	4020	645	16.04%
Total Manganese (Mn)	mg/kg	460	1100	472	791	902	953	472	953	780	215	27.56%
Total Molybdenum (Mo)	mg/kg			2.77	3.02	2.91	4.04	2.77	4.04	3.18	0.58	18.24%
Total Sodium (Na)	mg/kg			392	441	455	520	392	520	452	52	11.50%
Total Nickel (Ni)	mg/kg	16	75	15.4	17.8	19.3	23.6	15.4	23.6	19.0	3.4	17.89%
Total Lead (Pb)	mg/kg	35	91.3	5.74	10.5	7.46	12.1	5.74	12.1	8.95	2.88	32.18%
Total Phosphorus (P)	mg/kg			301	374	373	510	301	510	389	87	22.37%
Total Antimony (Sb)	mg/kg			0.11	0.18	0.18	0.33	0.11	0.33	0.20	0.09	45.00%
Total Selenium (Se)	mg/kg	2	2	0.85	1.02	1.00	1.19	0.85	1.19	1.02	0.14	13.73%
Total Tin (Sn)	mg/kg			0.52	0.56	0.77	3.39	0.52	3.39	1.31	1.39	106.11%
Total Strontium (Sr)	mg/kg			40.5	46.8	45.0	42.3	40.5	46.8	43.7	2.8	6.41%
Total Sulphur (S)	%			0.86	1.0	0.76	0.90	0.76	1.0	0.88	0.10	11.36%
Total Titanium (Ti)	mg/kg			881	956	1020	1070	881	1070	981	81	8.26%
Total Thallium (Tl)	mg/kg			<0.050	0.057	0.055	0.063	<0.050	0.063	0.056	0.005	8.93%
Total Uranium (U)	mg/kg			0.567	0.709	0.728	0.770	0.567	0.770	0.693	0.088	12.70%
Total Vanadium (V)	mg/kg			80.6	97.0	98.0	104	80.6	104	94.9	10.0	10.54%
Total Zinc (Zn)	mg/kg	123	315	51.3	81.6	79.9	96.8	51.3	96.8	77.4	19.0	24.55%
Total Zirconium (Zr)	mg/kg			3.04	3.07	3.27	3.78	3.04	3.78	3.29	0.34	10.33%

Notes:

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Table 221
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Lower Quinsam Lake
Lower Quinsam Lake Inlet - Metals (ICPMS)

	Stn.Code			LQLI1	LQLI2	LQLI3	LQLI4	LQLI5					
	Permit No.			E292117	E292117	E292117	E292117	E292117					
	Depth (m)			15.5	15.5	15.5	15.5	15.5					
	Date			12-Sep-16	12-Sep-16	12-Sep-16	12-Sep-16	12-Sep-16					
Parameter	**Units**	**ISQG**	**PEL**						**Minimum**	**Maximum**	**Average**	**SD**	**RSD%**
Total Silver (Ag)	mg/kg	0.5	0.5	0.141	0.123	0.128	0.125	0.136	0.123	0.141	0.131	0.008	6.11%
Total Aluminum (Al)	mg/kg			20900	20700	21600	21400	22400	20700	22400	21400	667	3.12%
Total Arsenic (As)	mg/kg	5.9	17	**33.5**	**35.3**	**31.5**	**36.1**	**42.1**	31.5	42.1	**35.7**	4.0	11.20%
Total Barium (Ba)	mg/kg			76.7	79.2	85.8	82.1	91.0	76.7	91.0	83.0	5.6	6.75%
Total Beryllium (Be)	mg/kg			<0.40	0.43	0.42	0.50	0.62	<0.40	0.62	0.47	0.09	19.15%
Total Bismuth (Bi)	mg/kg			<0.10	<0.10	0.10	0.16	<0.10	<0.10	0.16	0.11	0.03	27.27%
Total Calcium (Ca)	mg/kg			7260	7310	8890	7700	7110	7110	8890	7654	724	9.46%
Total Cadmium (Cd)	mg/kg	0.6	3.5	1.37	1.43	1.50	1.37	1.61	1.37	1.61	1.46	0.10	6.85%
Total Cobalt (Co)	mg/kg			19.5	19.0	20.0	19.4	20.8	19.0	20.8	19.7	0.7	3.55%
Total Chromium (Cr)	mg/kg	37.3	90	40.4	41.9	42.7	41.9	47.2	40.4	47.2	42.8	2.6	6.07%
Total Copper (Cu)	mg/kg	35.7	197	72.7	71.8	75.8	72.2	80.1	71.8	80.1	74.5	3.5	4.70%
Total Iron (Fe)	mg/kg	21200	43766	**50300**	**50200**	**47700**	**53300**	**59300**	47700	59300	**52160**	4457	8.54%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.075	0.085	0.075	0.075	0.094	0.075	0.094	0.081	0.009	11.11%
Total Potassium (K)	mg/kg			498	500	496	541	575	496	575	522.0	35.0	6.70%
Total Lithium (Li)	mg/kg			14.4	14.3	14.8	15.3	16.0	14.3	16.0	15.0	0.7	4.67%
Total Magnesium (Mg)	mg/kg			6740	6710	6960	6850	7170	6710	7170	6886	186	2.70%
Total Manganese (Mn)	mg/kg	460	1100	482	472	661	494	534	472	661	529	77	14.56%
Total Molybdenum (Mo)	mg/kg			1.68	1.65	1.86	1.73	1.98	1.65	1.98	1.78	0.14	7.87%
Total Sodium (Na)	mg/kg			304	285	296	308	316	285	316	301.8	11.8	3.91%
Total Nickel (Ni)	mg/kg	16	75	33.3	33.3	34.2	33.4	36.9	33.3	36.9	34.2	1.5	4.39%
Total Lead (Pb)	mg/kg	35	91.3	5.10	5.37	5.46	5.32	5.87	5.10	5.87	5.42	0.28	5.17%
Total Phosphorus (P)	mg/kg			687	697	665	706	765	665	765	704	37	5.26%
Total Antimony (Sb)	mg/kg			0.80	0.89	0.91	0.89	0.98	0.80	0.98	0.89	0.06	6.74%
Total Selenium (Se)	mg/kg	2	2	1.38	1.48	1.49	1.49	1.90	1.38	1.90	1.55	0.20	12.90%
Total Tin (Sn)	mg/kg			0.42	0.41	0.42	0.54	0.53	0.41	0.54	0.46	0.07	15.22%
Total Strontium (Sr)	mg/kg			51.3	50.2	58.8	55.4	56.9	50.2	58.8	54.5	3.7	6.79%
Total Sulphur (S)	%			0.28	0.24	0.17	0.17	0.24	0.17	0.28	0.22	0.05	22.73%
Total Titanium (Ti)	mg/kg			833	808	714	941	859	714	941	831	82	9.87%
Total Thallium (Tl)	mg/kg			0.141	0.150	0.134	0.140	0.151	0.134	0.151	0.143	0.007	4.90%
Total Uranium (U)	mg/kg			0.852	0.841	0.871	0.883	0.970	0.841	0.970	0.883	0.051	5.78%
Total Vanadium (V)	mg/kg			139	143	148	150	160	139	160	148.0	8.0	5.41%
Total Zinc (Zn)	mg/kg	123	315	116	112	118	114	123	112	123	116.6	4.2	3.60%
Total Zirconium (Zr)	mg/kg			2.99	2.93	2.06	3.45	3.41	2.06	3.45	2.97	0.56	18.86%

Notes:

Factor applied to less-than results when calculating statistics: 1.0

Factor applied to greater-than results when calculating statistics: 1.0

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RSD% = Relative Standard Deviation

Table 222
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Lower Quinsam Lake
Lower Quinsam Lake Deep Site 1 - Metals (ICPMS)

	Stn.Code			LQL1	LQL2	LQL3	LQL4	LQL5					
	Permit No.			E292118	E292118	E292118	E292118	E292118					
	Depth (m)			16.5	16.5	16.5	16.5	16.5					
	Date			12-Sep-16	12-Sep-16	12-Sep-16	12-Sep-16	12-Sep-16					
	Sample Class			M	M	M	M	M					
Parameter	**Units**	**ISQG**	**PEL**						**Minimum**	**Maximum**	**Average**	**SD**	**RSD%**
Total Silver (Ag)	mg/kg	0.5	0.5	0.149	0.162	0.134	0.167	0.146	0.134	0.167	0.152	0.013	8.55%
Total Aluminum (Al)	mg/kg			21500	22500	20900	22600	21100	20900	22600	21720	788	3.63%
Total Arsenic (As)	mg/kg	5.9	17	**41.6**	**42.7**	**40.6**	**43.9**	**42.3**	40.6	43.9	**42.2**	1.2	2.84%
Total Barium (Ba)	mg/kg			85.5	87.3	82.7	87.6	85.3	82.7	87.6	85.7	2.0	2.33%
Total Beryllium (Be)	mg/kg			0.42	0.40	<0.40	0.40	0.44	0.40	0.44	0.41	0.02	4.88%
Total Bismuth (Bi)	mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)	mg/kg			7760	7920	7540	8160	7860	7540	8160	7848	226	2.88%
Total Cadmium (Cd)	mg/kg	0.6	3.5	1.37	1.47	1.24	1.33	1.28	1.24	1.47	1.34	0.09	6.72%
Total Cobalt (Co)	mg/kg			21.7	21.6	19.9	21.3	21.1	19.9	21.7	21.1	0.7	3.32%
Total Chromium (Cr)	mg/kg	37.3	90	40.9	42.4	38.3	41.5	40.2	38.3	42.4	40.7	1.5	3.69%
Total Copper (Cu)	mg/kg	35.7	197	71.9	73.6	68.5	72.7	71.9	68.5	73.6	71.7	1.9	2.65%
Total Iron (Fe)	mg/kg	21200	43766	**52400**	**53400**	**49700**	**54800**	**53200**	49700	54800	52700	1886	3.58%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.089	0.102	0.090	0.105	0.100	0.089	0.105	0.097	0.007	7.22%
Total Potassium (K)	mg/kg			545	564	527	583	526	526	583	549.0	24.5	4.46%
Total Lithium (Li)	mg/kg			14.1	14.2	13.4	14.5	13.1	13.1	14.5	13.9	0.6	4.32%
Total Magnesium (Mg)	mg/kg			6760	6860	6480	7020	6940	6480	7020	6812	209	3.07%
Total Manganese (Mn)	mg/kg	460	1100	638	665	595	666	631	595	666	639	29.2	4.57%
Total Molybdenum (Mo)	mg/kg			1.69	1.74	1.58	1.69	1.68	1.58	1.74	1.68	0.06	3.57%
Total Sodium (Na)	mg/kg			326	354	339	365	346	326	365	346.0	14.8	4.28%
Total Nickel (Ni)	mg/kg	16	75	33.7	34.6	31.8	34.4	33.5	31.8	34.6	33.6	1.1	3.27%
Total Lead (Pb)	mg/kg	35	91.3	5.39	5.48	5.06	5.39	5.82	5.06	5.82	5.43	0.27	4.97%
Total Phosphorus (P)	mg/kg			756	768	728	780	740	728	780	754.4	20.9	2.77%
Total Antimony (Sb)	mg/kg			0.81	0.84	0.79	0.88	0.79	0.79	0.88	0.82	0.04	4.88%
Total Selenium (Se)	mg/kg	2	2	1.45	1.56	1.54	1.47	1.57	1.45	1.57	1.52	0.05	3.29%
Total Tin (Sn)	mg/kg			0.39	0.41	0.38	0.45	0.38	0.38	0.45	0.40	0.03	7.50%
Total Strontium (Sr)	mg/kg			52.0	53.3	48.5	53.2	49.5	48.5	53.3	51.3	2.2	4.29%
Total Sulphur (S)	%			0.30	0.35	0.32	0.32	0.32	0.30	0.35	0.32	0.02	6.25%
Total Titanium (Ti)	mg/kg			811	861	757	880	709	709	880	803	71	8.84%
Total Thallium (Tl)	mg/kg			0.152	0.152	0.137	0.147	0.131	0.131	0.152	0.144	0.009	6.25%
Total Uranium (U)	mg/kg			0.862	0.876	0.779	0.860	0.871	0.779	0.876	0.850	0.040	4.71%
Total Vanadium (V)	mg/kg			135	137	127	133	131	127	137	132.6	3.8	2.87%
Total Zinc (Zn)	mg/kg	123	315	113	115	109	115	113	109	115	113.0	2.4	2.12%
Total Zirconium (Zr)	mg/kg			3.22	3.07	2.84	2.94	2.97	2.84	3.22	3.01	0.14	4.65%

Notes:

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Table 223
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Lower Quinsam Lake
Lower Quinsam Lake Deep Site 2 - Metals (ICPMS)

	Stn.Code			LQLM1	LQLM2	LQLM3	LQLM4	LQLM5					
	Permit No.			E292119	E292119	E292119	E292119	E292119					
	Depth (m)			15	15	15	15	15					
	Date			12-Sep-16	12-Sep-16	12-Sep-16	12-Sep-16	12-Sep-16					
	Sample Class			M	M	M	M	M					
Parameter	**Units**	**ISQG**	**PEL**						**Minimum**	**Maximum**	**Average**	**SD**	**RSD%**
Total Silver (Ag)	mg/kg	0.5	0.5	0.189	0.173	0.151	0.179	0.183	0.151	0.189	0.175	0.015	8.57%
Total Aluminum (Al)	mg/kg			24700	24100	20900	23700	25900	20900	25900	23860	1851	7.76%
Total Arsenic (As)	mg/kg	5.9	17	**75.3**	**107**	**80.0**	**98.5**	**99.3**	75.3	107	**92.0**	13.6	14.78%
Total Barium (Ba)	mg/kg			100	145	123	141	140	100	145	129.8	18.7	14.41%
Total Beryllium (Be)	mg/kg			0.55	0.47	0.41	0.55	<0.40	<0.40	0.55	0.48	0.07	14.58%
Total Bismuth (Bi)	mg/kg			0.11	0.13	<0.10	0.12	0.11	<0.10	0.13	0.11	0.01	9.09%
Total Calcium (Ca)	mg/kg			8460	8100	6630	7590	8490	6630	8490	7854	774	9.85%
Total Cadmium (Cd)	mg/kg	0.6	3.5	1.41	1.35	1.26	1.45	1.39	1.26	1.45	1.37	0.07	5.11%
Total Cobalt (Co)	mg/kg			22.6	24.4	22.8	28.9	25.2	22.6	28.9	24.8	2.5	10.08%
Total Chromium (Cr)	mg/kg	37.3	90	44.2	42.8	37.6	48.6	45.3	37.6	48.6	43.7	4.0	9.15%
Total Copper (Cu)	mg/kg	35.7	197	74.7	73.8	69.4	82.1	79.4	69.4	82.1	75.9	5.0	6.59%
Total Iron (Fe)	mg/kg	21200	43766	**69300**	**70100**	**55800**	**74100**	**70800**	55800	74100	**68020**	7070	10.39%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.135	0.128	0.121	0.144	0.128	0.121	0.144	0.131	0.009	6.87%
Total Potassium (K)	mg/kg			649	624	516	609	677	516	677	615	61	9.92%
Total Lithium (Li)	mg/kg			13.5	12.8	11.8	13.6	14.1	11.8	14.1	13.2	0.9	6.82%
Total Magnesium (Mg)	mg/kg			7330	7070	5930	6960	7320	5930	7330	6922	577	8.34%
Total Manganese (Mn)	mg/kg	460	1100	995	**1750**	**1270**	**1520**	**1380**	995	1750	**1383**	281	20.32%
Total Molybdenum (Mo)	mg/kg			2.74	3.01	2.67	3.26	3.19	2.67	3.26	2.97	0.26	8.75%
Total Sodium (Na)	mg/kg			449	425	369	418	436	369	449	419.4	30.5	7.27%
Total Nickel (Ni)	mg/kg	16	75	34.1	33.5	31.6	38.1	35.1	31.6	38.1	34.5	2.4	6.96%
Total Lead (Pb)	mg/kg	35	91.3	10.5	17.9	10.4	11.1	10.4	10.4	17.9	12.1	3.3	27.27%
Total Phosphorus (P)	mg/kg			936	985	847	1070	1040	847	1070	975	88	9.03%
Total Antimony (Sb)	mg/kg			0.81	0.84	0.74	0.86	0.77	0.74	0.86	0.80	0.05	6.25%
Total Selenium (Se)	mg/kg	2	2	1.59	1.80	1.58	1.99	1.83	1.58	1.99	1.76	0.17	9.66%
Total Tin (Sn)	mg/kg			0.50	0.52	0.42	0.64	0.61	0.42	0.64	0.54	0.09	16.67%
Total Strontium (Sr)	mg/kg			54.3	52.4	47.7	55.3	55.8	47.7	55.8	53.1	3.3	6.21%
Total Sulphur (S)	%			0.29	0.36	0.29	0.28	0.37	0.28	0.37	0.32	0.04	12.50%
Total Titanium (Ti)	mg/kg			838	806	700	805	869	700	869	803	63	7.85%
Total Thallium (Tl)	mg/kg			0.147	0.172	0.136	0.167	0.137	0.136	0.172	0.152	0.017	11.18%
Total Uranium (U)	mg/kg			0.843	0.803	0.739	0.899	0.917	0.739	0.917	0.840	0.072	8.57%
Total Vanadium (V)	mg/kg			145	139	126	160	150	126	160	144.0	12.7	8.82%
Total Zinc (Zn)	mg/kg	123	315	113	114	106	123	118	106	123	114.8	6.3	5.49%
Total Zirconium (Zr)	mg/kg			2.59	2.20	2.29	3.52	3.14	2.20	3.52	2.75	0.57	20.73%

Notes:

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Table 224
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Lower Quinsam Lake
Lower Quinsam Lake Outlet - Metals (ICPMS)

	Stn.Code			LQLO1	LQLO2	LQLO3	LQLO4	LQLO5					
	Permit No.			E292120	E292120	E292120	E292120	E292120					
	Depth (m)			2.3	2.3	2.3	2.3	2.3					
	Date			8-Sep-16	8-Sep-16	8-Sep-16	8-Sep-16	8-Sep-16					
Parameter	**Units**	**ISQG**	**PEL**						**Minimum**	**Maximum**	**Average**	**SD**	**RSD%**
Total Silver (Ag)	mg/kg	0.5	0.5	0.145	0.125	0.139	0.139	0.156	0.125	0.156	0.141	0.011	7.80%
Total Aluminum (Al)	mg/kg			20000	18400	19000	21700	20900	18400	21700	20000	1347	6.74%
Total Arsenic (As)	mg/kg	5.9	17	**72.6**	**90.0**	**81.7**	**56.3**	**39.4**	39.4	90.0	**68.0**	20.3	29.85%
Total Barium (Ba)	mg/kg			113	136	136	142	127	113	142	130.8	11.3	8.64%
Total Beryllium (Be)	mg/kg			0.44	0.43	0.41	<0.40	<0.40	<0.40	0.44	0.42	0.02	4.76%
Total Bismuth (Bi)	mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)	mg/kg			7790	6930	7070	7340	7600	6930	7790	7346	357	4.86%
Total Cadmium (Cd)	mg/kg	0.6	3.5	1.70	1.25	1.21	1.41	1.49	1.21	1.70	1.41	0.20	14.18%
Total Cobalt (Co)	mg/kg			20.3	18.4	19.1	22.0	19.7	18.4	22.0	19.9	1.4	7.04%
Total Chromium (Cr)	mg/kg	37.3	90	36.9	35.4	35.0	41.2	42.5	35.0	42.5	38.2	3.4	8.90%
Total Copper (Cu)	mg/kg	35.7	197	61.1	53.8	51.7	63.5	63.2	51.7	63.5	58.7	5.5	9.37%
Total Iron (Fe)	mg/kg	21200	43766	**71500**	**71200**	**67400**	**62800**	**48900**	48900	71500	**64360**	9333	14.50%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.116	0.099	0.096	0.127	0.116	0.096	0.127	0.111	0.013	11.71%
Total Potassium (K)	mg/kg			613	558	614	647	565	558	647	599.4	37.3	6.22%
Total Lithium (Li)	mg/kg			11.5	11.1	11.0	12.1	11.4	11.0	12.1	11.4	0.4	3.51%
Total Magnesium (Mg)	mg/kg			5930	5640	5750	6010	5970	5640	6010	5860	158	2.70%
Total Manganese (Mn)	mg/kg	460	1100	**1730**	**2390**	**2330**	**2160**	**1800**	1730	2390	**2082**	302	14.51%
Total Molybdenum (Mo)	mg/kg			2.03	1.71	1.68	1.87	1.91	1.68	2.03	1.84	0.15	8.15%
Total Sodium (Na)	mg/kg			456	431	443	437	382	382	456	429.8	28.3	6.58%
Total Nickel (Ni)	mg/kg	16	75	29.0	27.6	27.1	31.6	31.6	27.1	31.6	29.4	2.1	7.14%
Total Lead (Pb)	mg/kg	35	91.3	7.98	6.00	6.44	8.33	26.8	6.00	26.8	11.11	8.83	79.48%
Total Phosphorus (P)	mg/kg			852	714	666	693	520	520	852	689	118	17.13%
Total Antimony (Sb)	mg/kg			0.58	0.49	0.49	0.56	0.87	0.49	0.87	0.60	0.16	26.67%
Total Selenium (Se)	mg/kg	2	2	1.76	1.28	1.15	1.26	1.37	1.15	1.76	1.36	0.23	16.91%
Total Tin (Sn)	mg/kg			0.49	0.46	0.46	0.53	0.55	0.46	0.55	0.50	0.04	8.00%
Total Strontium (Sr)	mg/kg			46.1	42.7	42.3	46.9	46.9	42.3	46.9	45.0	2.3	5.11%
Total Sulphur (S)	%			1.1	0.30	0.24	0.47	0.15	0.15	1.1	0.45	0.38	84.44%
Total Titanium (Ti)	mg/kg			650	514	591	643	603	514	650	600	54	9.00%
Total Thallium (Tl)	mg/kg			0.146	0.123	0.121	0.135	0.098	0.098	0.146	0.125	0.018	14.40%
Total Uranium (U)	mg/kg			0.749	0.607	0.594	0.717	0.714	0.594	0.749	0.676	0.071	10.50%
Total Vanadium (V)	mg/kg			118	106	110	123	128	106	128	117.0	9.1	7.78%
Total Zinc (Zn)	mg/kg	123	315	101	93.6	91.7	98.7	96.8	91.7	101	96.4	3.8	3.94%
Total Zirconium (Zr)	mg/kg			2.81	1.44	1.42	2.47	2.40	1.42	2.81	2.11	0.64	30.33%

Notes:

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Table 225
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Lower Wetland
Lower Wetland Inlet - Metals (ICPMS)

Parameter	Stn.Code Permit No. Depth (m) Date Units	ISQG	PEL	LWI1 E292124 0.4 5-Oct-16	LWI2 E292124 0.4 5-Oct-16	LWI3 E292124 0.4 5-Oct-16	Minimum	Maximum	Average	SD	RSD%
Total Silver (Ag)	mg/kg	0.5	0.5	0.059	0.052	0.063	0.052	0.063	0.058	0.006	10.34%
Total Aluminum (Al)	mg/kg			5400	5580	5020	5020	5580	5333	285	5.34%
Total Arsenic (As)	mg/kg	5.9	17	4.54	4.70	4.56	4.54	4.70	4.60	0.09	1.96%
Total Barium (Ba)	mg/kg			19.1	19.0	15.3	15.3	19.1	17.8	2.2	12.36%
Total Beryllium (Be)	mg/kg			<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.00	0.00%
Total Bismuth (Bi)	mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)	mg/kg			10500	8870	11200	8870	11200	10190	1195	11.73%
Total Cadmium (Cd)	mg/kg	0.6	3.5	0.211	0.206	0.285	0.206	0.285	0.234	0.044	18.80%
Total Cobalt (Co)	mg/kg			1.97	1.88	1.62	1.62	1.97	1.82	0.18	9.89%
Total Chromium (Cr)	mg/kg	37.3	90	11.3	11.0	9.4	9.4	11.3	10.6	1.0	9.43%
Total Copper (Cu)	mg/kg	35.7	197	18.5	19.4	22.1	18.5	22.1	20.0	1.9	9.50%
Total Iron (Fe)	mg/kg	21200	43766	6410	6110	5020	5020	6410	5846	731	12.50%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.074	0.076	0.087	0.074	0.087	0.079	0.007	8.86%
Total Potassium (K)	mg/kg			370	308	223	223	370	300	73	24.33%
Total Lithium (Li)	mg/kg			<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.0	0.00%
Total Magnesium (Mg)	mg/kg			1080	1030	905	905	1080	1005	90	8.96%
Total Manganese (Mn)	mg/kg	460	1100	69.0	62.0	46.9	46.9	69.0	59.3	11.3	19.06%
Total Molybdenum (Mo)	mg/kg			0.94	0.80	0.74	0.74	0.94	0.83	0.10	12.05%
Total Sodium (Na)	mg/kg			175	160	135	135	175	156.7	20.2	12.89%
Total Nickel (Ni)	mg/kg	16	75	5.81	6.00	4.80	4.80	6.00	5.54	0.65	11.73%
Total Lead (Pb)	mg/kg	35	91.3	8.90	9.11	9.01	8.90	9.11	9.01	0.11	1.22%
Total Phosphorus (P)	mg/kg			982	940	929	929	982	950.3	28.0	2.95%
Total Antimony (Sb)	mg/kg			0.24	0.25	0.28	0.24	0.28	0.26	0.02	7.69%
Total Selenium (Se)	mg/kg	2	2	1.79	1.75	2.75	1.75	2.75	2.10	0.57	27.14%
Total Tin (Sn)	mg/kg			0.32	0.28	0.29	0.28	0.32	0.30	0.02	6.67%
Total Strontium (Sr)	mg/kg			41.9	37.6	44.3	37.6	44.3	41.3	3.4	8.23%
Total Sulphur (S)	%			0.43	0.41	0.45	0.41	0.45	0.43	0.02	4.65%
Total Titanium (Ti)	mg/kg			198	200	144	144	200	180.7	31.8	17.60%
Total Thallium (Tl)	mg/kg			<0.050	<0.050	<0.050	<0.050	<0.050	0.050	0.00	0.00%
Total Uranium (U)	mg/kg			0.232	0.245	0.263	0.232	0.263	0.247	0.016	6.48%
Total Vanadium (V)	mg/kg			33.0	35.1	31.8	31.8	35.1	33.3	1.7	5.11%
Total Zinc (Zn)	mg/kg	123	315	9.7	8.8	6.6	6.6	9.7	8.4	1.6	19.05%
Total Zirconium (Zr)	mg/kg			0.67	<0.50	<0.50	<0.50	0.67	0.56	0.10	17.86%

Notes:

Factor applied to less-than results when calculating statistics: 1.0

Factor applied to greater-than results when calculating statistics: 1.0

ISQG = Interim Sediment Quality Guidelines (BC)

Red font indicates ISQG exceedance

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Table 226
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Lower Wetland
Lower Wetland Middle - Metals (ICPMS)

Parameter	Stn.Code / Permit No. / Depth (m) / Date	Units	ISQG	PEL	LWM1 E292125 0.4 5-Oct-16	LWM2 E292125 0.4 5-Oct-16	LWM3 E292125 0.4 5-Oct-16	Minimum	Maximum	Average	SD	RSD%
Total Silver (Ag)		mg/kg	0.5	0.5	0.076	0.071	0.067	0.067	0.076	0.071	0.005	7.04%
Total Aluminum (Al)		mg/kg			10900	12000	9050	9050	12000	10650	1490	13.99%
Total Arsenic (As)		mg/kg	5.9	17	8.16	10.5	11.3	8.16	11.3	10.0	1.63	16.32%
Total Barium (Ba)		mg/kg			42.7	44.4	36.9	36.9	44.4	41.3	3.9	9.44%
Total Beryllium (Be)		mg/kg			<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.00	0.00%
Total Bismuth (Bi)		mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)		mg/kg			6990	6210	7420	6210	7420	6873	613	8.92%
Total Cadmium (Cd)		mg/kg	0.6	3.5	0.263	0.310	0.233	0.233	0.310	0.269	0.039	14.50%
Total Cobalt (Co)		mg/kg			7.23	8.69	8.31	7.23	8.69	8.08	0.76	9.41%
Total Chromium (Cr)		mg/kg	37.3	90	19.6	20.6	17.2	17.2	20.6	19.1	1.7	8.90%
Total Copper (Cu)		mg/kg	35.7	197	28.1	29.7	21.2	21.2	29.7	26.3	4.5	17.11%
Total Iron (Fe)		mg/kg	21200	43766	16600	21300	22500	16600	22500	20133	3118	15.49%
Total Mercury (Hg)		mg/kg	0.17	0.486	0.093	0.077	0.078	0.077	0.093	0.083	0.009	10.84%
Total Potassium (K)		mg/kg			357	328	397	328	397	360.7	34.6	9.59%
Total Lithium (Li)		mg/kg			<5.0	<5.0	<5.0	<5.0	<5.0	5.0	0.0	0.00%
Total Magnesium (Mg)		mg/kg			2140	2310	1520	1520	2310	1990	415	20.85%
Total Manganese (Mn)		mg/kg	460	1100	325	413	598	325	598	445	139	31.24%
Total Molybdenum (Mo)		mg/kg			0.85	0.92	0.96	0.85	0.96	0.91	0.06	6.59%
Total Sodium (Na)		mg/kg			285	276	302	276	302	287.7	13.2	4.59%
Total Nickel (Ni)		mg/kg	16	75	10.9	11.4	8.86	8.86	11.4	10.39	1.35	12.99%
Total Lead (Pb)		mg/kg	35	91.3	8.32	8.36	8.08	8.08	8.36	8.25	0.15	1.82%
Total Phosphorus (P)		mg/kg			884	872	900	872	900	885.3	14.0	1.58%
Total Antimony (Sb)		mg/kg			0.17	0.21	0.21	0.17	0.21	0.20	0.02	10.00%
Total Selenium (Se)		mg/kg	2	2	0.67	0.58	0.85	0.58	0.85	0.70	0.14	20.00%
Total Tin (Sn)		mg/kg			0.32	0.36	0.72	0.32	0.72	0.47	0.22	46.81%
Total Strontium (Sr)		mg/kg			34.5	29.5	32.8	29.5	34.5	32.3	2.5	7.74%
Total Sulphur (S)		%			0.29	0.27	0.27	0.27	0.29	0.28	0.01	3.57%
Total Titanium (Ti)		mg/kg			411	447	340	340	447	399	54	13.53%
Total Thallium (Tl)		mg/kg			<0.050	<0.050	<0.050	<0.050	<0.050	0.050	0.00	0.00%
Total Uranium (U)		mg/kg			0.385	0.380	0.322	0.322	0.385	0.362	0.035	9.67%
Total Vanadium (V)		mg/kg			74.3	84.5	73.2	73.2	84.5	77.3	6.2	8.02%
Total Zinc (Zn)		mg/kg	123	315	21.0	29.2	14.5	14.5	29.2	21.6	7.4	34.26%
Total Zirconium (Zr)		mg/kg			1.24	1.08	0.62	0.62	1.24	0.98	0.32	32.65%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
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Table 227
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Lower Wetland
Lower Wetland Outlet - Metals (ICPMS)

	Stn.Code			LWO1	LWO2	LWO3	LWO4	LWO5					
	Permit No.			E292112	E292112	E292112	E292112	E292112					
	Depth (m)			1	1	1	1	1					
	Date			13-Sep-16	13-Sep-16	13-Sep-16	13-Sep-16	13-Sep-16					
Parameter	**Units**	**ISQG**	**PEL**						**Minimum**	**Maximum**	**Average**	**SD**	**RSD%**
Total Silver (Ag)	mg/kg	0.5	0.5	0.057	<0.050	0.061	0.053	<0.050	<0.050	0.061	0.054	0.005	9.26%
Total Aluminum (Al)	mg/kg			14600	15000	15600	14900	14300	14300	15600	14880	486	3.27%
Total Arsenic (As)	mg/kg	5.9	17	4.86	5.02	5.09	4.71	4.65	4.65	5.09	4.87	0.19	3.90%
Total Barium (Ba)	mg/kg			42.3	43.4	47.1	44.9	42.9	42.3	47.1	44.1	1.9	4.31%
Total Beryllium (Be)	mg/kg			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	0.00	0.00%
Total Bismuth (Bi)	mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)	mg/kg			7700	7760	7870	7300	6990	6990	7870	7524	368	4.89%
Total Cadmium (Cd)	mg/kg	0.6	3.5	0.238	0.235	0.268	0.220	0.181	0.181	0.268	0.228	0.032	14.04%
Total Cobalt (Co)	mg/kg			6.99	7.47	7.82	7.49	7.05	6.99	7.82	7.36	0.34	4.62%
Total Chromium (Cr)	mg/kg	37.3	90	25.8	25.2	26.6	24.1	23.8	23.8	26.6	25.1	1.2	4.78%
Total Copper (Cu)	mg/kg	35.7	197	29.9	30.8	32.9	29.4	28.8	28.8	32.9	30.4	1.6	5.26%
Total Iron (Fe)	mg/kg	21200	43766	12700	13500	13700	13200	12600	12600	13700	13140	482	3.67%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.160	0.107	0.115	0.102	0.101	0.101	0.160	0.117	0.025	21.37%
Total Potassium (K)	mg/kg			207	203	205	208	195	195	208	203.6	5.2	2.55%
Total Lithium (Li)	mg/kg			<5.0	<5.0	5.1	<5.0	<5.0	<5.0	5.1	5.0	0.04	0.80%
Total Magnesium (Mg)	mg/kg			2840	2980	3090	2950	2860	2840	3090	2944	100	3.40%
Total Manganese (Mn)	mg/kg	460	1100	195	203	210	197	192	192	210	199.4	7.2	3.61%
Total Molybdenum (Mo)	mg/kg			0.52	0.54	0.56	0.50	0.47	0.47	0.56	0.52	0.03	5.77%
Total Sodium (Na)	mg/kg			215	209	204	209	198	198	215	207.0	6.4	3.09%
Total Nickel (Ni)	mg/kg	16	75	14.1	14.7	15.2	13.7	13.2	13.2	15.2	14.2	0.8	5.63%
Total Lead (Pb)	mg/kg	35	91.3	3.24	2.93	3.00	2.74	2.61	2.61	3.24	2.90	0.24	8.28%
Total Phosphorus (P)	mg/kg			513	518	537	474	465	465	537	501.4	30.6	6.10%
Total Antimony (Sb)	mg/kg			0.21	0.17	0.20	0.21	0.20	0.17	0.21	0.20	0.02	10.00%
Total Selenium (Se)	mg/kg	2	2	0.87	0.69	0.75	0.60	0.57	0.57	0.87	0.70	0.12	17.14%
Total Tin (Sn)	mg/kg			0.42	0.38	0.36	0.36	0.36	0.36	0.42	0.38	0.03	7.89%
Total Strontium (Sr)	mg/kg			33.3	33.0	34.1	32.2	31.6	31.6	34.1	32.8	1.0	3.05%
Total Sulphur (S)	%			0.18	0.14	0.15	0.14	0.18	0.14	0.18	0.16	0.02	12.50%
Total Titanium (Ti)	mg/kg			903	940	887	946	886	886	946	912.4	28.8	3.16%
Total Thallium (Tl)	mg/kg			<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	0.00	0.00%
Total Uranium (U)	mg/kg			0.565	0.457	0.479	0.427	0.442	0.427	0.565	0.474	0.054	11.39%
Total Vanadium (V)	mg/kg			78.8	82.3	85.4	81.8	79.3	78.8	85.4	81.5	2.6	3.19%
Total Zinc (Zn)	mg/kg	123	315	29.0	31.1	32.0	30.2	28.5	28.5	32.0	30.2	1.4	4.64%
Total Zirconium (Zr)	mg/kg			2.02	1.40	1.62	1.48	1.38	1.38	2.02	1.58	0.26	16.46%

Notes:

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Table 228
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Quinsam River
Quinsam River at Argonaut Bridge (Upstream of Mine Influence) - Metals (ICPMS)

	Stn.Code			WA1	WA2	WA3	WA4	WA5					
	Permit No.					126402							
	Depth (m)			0.7	0.7	0.7	0.7	0.7					
	Date			14-Sep-16	14-Sep-16	14-Sep-16	14-Sep-16	14-Sep-16					
	Sample Class			M	M	M	M	M					
Parameter	**Units**	**ISQG**	**PEL**						**Minimum**	**Maximum**	**Average**	**SD**	**RSD%**
Total Silver (Ag)	mg/kg	0.5	0.5	0.137	0.115	0.115	0.113	0.123	0.113	0.137	0.121	0.010	8.26%
Total Aluminum (Al)	mg/kg			26200	36500	31700	33500	31800	26200	36500	31940	3750	11.74%
Total Arsenic (As)	mg/kg	5.9	17	**24.8**	**18.2**	**18.7**	**18.0**	9.24	9.24	24.8	**17.8**	5.55	31.20%
Total Barium (Ba)	mg/kg			68.1	106	87.4	96.5	79.4	68.1	106	87.5	14.7	16.80%
Total Beryllium (Be)	mg/kg			<0.40	0.51	0.48	0.41	0.47	<0.40	0.51	0.45	0.05	11.11%
Total Bismuth (Bi)	mg/kg			0.55	<0.10	0.14	<0.10	<0.10	<0.10	0.55	0.20	0.20	100.00%
Total Calcium (Ca)	mg/kg			31900	16600	18400	15100	11400	11400	31900	18680	7826	41.90%
Total Cadmium (Cd)	mg/kg	0.6	3.5	0.671	0.337	0.469	0.391	0.426	0.337	0.671	0.459	0.128	27.89%
Total Cobalt (Co)	mg/kg			16.9	12.8	14.6	13.2	12.3	12.3	16.9	14.0	1.9	13.57%
Total Chromium (Cr)	mg/kg	37.3	90	31.5	29.8	33.2	31.8	32.0	29.8	33.2	31.7	1.2	3.79%
Total Copper (Cu)	mg/kg	35.7	197	86.3	81.9	85.0	82.9	82.0	81.9	86.3	83.6	1.9	2.27%
Total Iron (Fe)	mg/kg	21200	43766	**61400**	35000	39800	33900	39000	33900	61400	41820	11232	26.86%
Total Mercury (Hg)	mg/kg	0.17	0.486	0.073	**0.810**	0.093	0.098	0.063	0.063	0.810	0.227	0.326	143.61%
Total Potassium (K)	mg/kg			461	979	679	831	374	374	979	664	251	37.80%
Total Lithium (Li)	mg/kg			<5.0	5.0	5.0	5.2	<5.0	<5.0	5.2	5.0	0.1	2.00%
Total Magnesium (Mg)	mg/kg			6440	7600	7540	7820	6240	6240	7820	7128	730	10.24%
Total Manganese (Mn)	mg/kg	460	1100	**1230**	775	1010	850	625	625	1230	898	231	25.72%
Total Molybdenum (Mo)	mg/kg			1.35	1.00	1.11	0.99	1.03	0.99	1.35	1.10	0.15	13.64%
Total Sodium (Na)	mg/kg			381	597	530	535	382	381	597	485	98	20.21%
Total Nickel (Ni)	mg/kg	16	75	18.2	19.3	19.4	19.2	17.3	17.3	19.4	18.7	0.9	4.81%
Total Lead (Pb)	mg/kg	35	91.3	6.93	5.72	5.86	5.70	4.18	4.18	6.93	5.68	0.98	17.25%
Total Phosphorus (P)	mg/kg			575	460	544	476	509	460	575	512	47	9.18%
Total Antimony (Sb)	mg/kg			0.25	0.20	0.24	0.20	0.18	0.18	0.25	0.21	0.03	14.29%
Total Selenium (Se)	mg/kg	2	2	1.02	<0.50	0.98	0.85	<0.50	<0.50	1.02	0.77	0.25	32.47%
Total Tin (Sn)	mg/kg			0.59	0.50	0.53	0.51	0.57	0.50	0.59	0.54	0.04	7.41%
Total Strontium (Sr)	mg/kg			47.4	72.9	63.0	66.3	52.4	47.4	72.9	60.4	10.4	17.22%
Total Sulphur (S)	%			0.25	0.077	0.092	0.079	0.061	0.061	0.25	0.112	0.078	69.64%
Total Titanium (Ti)	mg/kg			1720	1940	2010	1760	2720	1720	2720	2030	404	19.90%
Total Thallium (Tl)	mg/kg			<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	0.00	0.00%
Total Uranium (U)	mg/kg			1.13	0.740	0.907	0.841	0.536	0.536	1.13	0.831	0.218	26.23%
Total Vanadium (V)	mg/kg			112	110	116	109	146	109	146	118.6	15.5	13.07%
Total Zinc (Zn)	mg/kg	123	315	75.5	63.3	79.4	64.4	45.5	45.5	79.4	65.6	13.2	20.12%
Total Zirconium (Zr)	mg/kg			5.21	5.36	4.75	4.61	10.9	4.61	10.9	6.17	2.66	43.11%

Notes:

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Table 229
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Quinsam River
Quinsam River Downstream of North Mining Operation - Metals (ICPMS)

	Stn.Code			QRDS11	QRDS12	QRDS13	QRDS14	QRDS15					
	Permit No.					E286930							
	Depth (m)			0.7	0.7	0.7	0.7	0.7					
	Date			15-Sep-16	15-Sep-16	15-Sep-16	15-Sep-16	15-Sep-16					
Parameter	**Units**	**ISQG**	**PEL**						**Minimum**	**Maximum**	**Average**	**SD**	**RSD%**
Total Silver (Ag)	mg/kg	0.5	0.5	0.077	0.061	<0.050	0.072	<0.050	<0.050	0.077	0.062	0.012	19.35%
Total Aluminum (Al)	mg/kg			15700	13900	13900	14200	12700	12700	15700	14080	1073	7.62%
Total Arsenic (As)	mg/kg	5.9	17	39.0	41.1	45.3	37.5	34.5	34.5	45.3	39.5	4.0	10.13%
Total Barium (Ba)	mg/kg			70.0	63.5	75.6	71.6	69.3	63.5	75.6	70.0	4.4	6.29%
Total Beryllium (Be)	mg/kg			<0.40	0.41	<0.40	<0.40	<0.40	<0.40	0.41	0.40	0.004	1.00%
Total Bismuth (Bi)	mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)	mg/kg			9390	8040	7900	9190	8130	7900	9390	8530	702	8.23%
Total Cadmium (Cd)	mg/kg	0.6	3.5	0.356	0.326	0.318	0.390	0.317	0.317	0.390	0.341	0.031	9.09%
Total Cobalt (Co)	mg/kg			20.8	19.0	20.1	21.0	18.3	18.3	21.0	19.8	1.2	6.06%
Total Chromium (Cr)	mg/kg	37.3	90	39.5	41.6	36.3	37.6	37.9	36.3	41.6	38.6	2.0	5.18%
Total Copper (Cu)	mg/kg	35.7	197	60.1	55.9	60.1	61.1	54.3	54.3	61.1	58.3	3.0	5.15%
Total Iron (Fe)	mg/kg	21200	43766	**62900**	**56400**	**59200**	**60700**	**58000**	56400	62900	**59440**	2496	4.20%
Total Mercury (Hg)	mg/kg	0.17	0.486	<0.050	<0.050	<0.050	<0.050	0.066	<0.050	0.066	0.053	0.007	13.21%
Total Potassium (K)	mg/kg			582	593	584	539	479	479	593	555	47	8.47%
Total Lithium (Li)	mg/kg			8.7	7.7	7.7	8.1	7.8	7.7	8.7	8.0	0.4	5.00%
Total Magnesium (Mg)	mg/kg			5630	4210	4150	5150	3970	3970	5630	4622	726	15.71%
Total Manganese (Mn)	mg/kg	460	1100	981	1040	1130	1810	1050	981	1810	**1202**	343	28.54%
Total Molybdenum (Mo)	mg/kg			1.32	1.67	1.34	1.40	1.29	1.29	1.67	1.40	0.15	10.71%
Total Sodium (Na)	mg/kg			529	404	412	443	343	343	529	426	67	15.73%
Total Nickel (Ni)	mg/kg	16	75	34.0	30.6	30.4	32.9	26.7	26.7	34.0	30.9	2.8	9.06%
Total Lead (Pb)	mg/kg	35	91.3	4.63	4.09	4.46	4.25	3.55	3.55	4.63	4.20	0.42	10.00%
Total Phosphorus (P)	mg/kg			388	423	446	447	453	388	453	431.4	26.8	6.21%
Total Antimony (Sb)	mg/kg			0.59	0.63	0.62	0.46	0.53	0.46	0.63	0.57	0.07	12.28%
Total Selenium (Se)	mg/kg	2	2	<0.50	<0.50	<0.50	0.63	<0.50	<0.50	0.63	0.53	0.06	11.32%
Total Tin (Sn)	mg/kg			1.08	0.49	0.46	0.57	0.58	0.46	1.08	0.64	0.25	39.06%
Total Strontium (Sr)	mg/kg			38.5	36.6	37.9	43.6	33.9	33.9	43.6	38.1	3.5	9.19%
Total Sulphur (S)	%			0.29	0.30	0.36	0.35	0.30	0.29	0.36	0.32	0.03	9.38%
Total Titanium (Ti)	mg/kg			1500	1110	1010	1180	966	966	1500	1153	211	18.30%
Total Thallium (Tl)	mg/kg			<0.050	<0.050	0.057	0.053	<0.050	<0.050	0.057	0.052	0.003	5.77%
Total Uranium (U)	mg/kg			0.446	0.459	0.494	0.532	0.418	0.418	0.532	0.470	0.044	9.36%
Total Vanadium (V)	mg/kg			167	150	149	147	161	147	167	154.8	8.7	5.62%
Total Zinc (Zn)	mg/kg	123	315	82.4	73.8	77.5	80.2	75.9	73.8	82.4	78.0	3.4	4.36%
Total Zirconium (Zr)	mg/kg			6.91	4.62	3.53	4.29	4.05	3.53	6.91	4.68	1.31	27.99%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
Factor applied to greater-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
Red font indicates ISQG exceedance
PEL = Probable Effects Level
Red, bolded and underlined *font indicates PEL exceedance*
Blue cell indicates primary parameter of concern
Orange cell indicates secondary parameter of concern
SD = Standard Deviation
RSD% = Relative Standard Deviation

Table 230
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Quinsam River
Quinsam River Downstream of 7-South Mining Operation - Metals (ICPMS)

	Stn.Code			7SQR1	7SQR2	7SQR3	7SQR4	7SQR5					
	Permit No.					E292113							
	Depth (m)			0.9	0.9	0.9	0.9	0.9					
	Date			19-Sep-16	19-Sep-16	19-Sep-16	19-Sep-16	19-Sep-16					
	Sample Class			M	M	M	M	M					
Parameter	**Units**	**ISQG**	**PEL**						**Minimum**	**Maximu**	**Average**	**SD**	**RSD%**
Total Silver (Ag)	mg/kg	0.5	0.5	0.074	<0.050	<0.050	0.083	<0.050	<0.050	0.083	0.061	0.016	26.23%
Total Aluminum (Al)	mg/kg			19500	18000	17000	19800	14100	14100	19800	17680	2301	13.01%
Total Arsenic (As)	mg/kg	5.9	17	**21.0**	15.6	15.5	**24.9**	8.82	8.82	24.9	**17.2**	6.11	35.61%
Total Barium (Ba)	mg/kg			72.3	52.0	51.2	67.5	38.2	38.2	72.3	56.2	13.7	24.38%
Total Beryllium (Be)	mg/kg			0.44	<0.40	<0.40	<0.40	<0.40	<0.40	0.44	0.41	0.02	4.88%
Total Bismuth (Bi)	mg/kg			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.00	0.00%
Total Calcium (Ca)	mg/kg			8740	9610	9490	9030	8680	8680	9610	9110	425	4.67%
Total Cadmium (Cd)	mg/kg	0.6	3.5	0.682	0.345	0.371	0.613	0.316	0.316	0.682	0.465	0.169	36.34%
Total Cobalt (Co)	mg/kg			14.5	11.1	11.9	13.9	9.42	9.42	14.5	12.16	2.07	17.02%
Total Chromium (Cr)	mg/kg	37.3	90	30.9	29.9	28.9	32.4	21.8	21.8	32.4	28.8	4.1	14.24%
Total Copper (Cu)	mg/kg	35.7	197	44.6	39.3	39.8	47.1	29.6	29.6	47.1	40.1	6.7	16.71%
Total Iron (Fe)	mg/kg	21200	43766	35700	27300	29100	39200	21200	21200	39200	30500	7096	23.27%
Total Mercury (Hg)	mg/kg	0.17	0.486	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	0	0.00%
Total Potassium (K)	mg/kg			319	286	285	329	213	213	329	286	45	15.73%
Total Lithium (Li)	mg/kg			8.9	7.5	7.5	9.1	6.4	6.4	9.1	7.9	1.1	13.92%
Total Magnesium (Mg)	mg/kg			5260	4470	4110	5320	3760	3760	5320	4584	691	15.07%
Total Manganese (Mn)	mg/kg	460	1100	608	349	340	554	304	304	608	431	139	32.25%
Total Molybdenum (Mo)	mg/kg			1.48	0.93	0.70	1.48	0.63	0.63	1.48	1.04	0.41	39.42%
Total Sodium (Na)	mg/kg			326	324	367	331	278	278	367	325.2	31.7	9.75%
Total Nickel (Ni)	mg/kg	16	75	21.3	18.5	18.6	21.2	15.1	15.1	21.3	18.9	2.5	13.23%
Total Lead (Pb)	mg/kg	35	91.3	3.26	3.42	2.88	3.23	2.61	2.61	3.42	3.08	0.33	10.71%
Total Phosphorus (P)	mg/kg			446	463	486	491	442	442	491	465.6	22.4	4.81%
Total Antimony (Sb)	mg/kg			0.52	0.24	0.20	0.43	0.15	0.15	0.52	0.31	0.16	51.61%
Total Selenium (Se)	mg/kg	2	2	0.82	0.56	0.58	0.69	<0.50	<0.50	0.82	0.63	0.13	20.63%
Total Tin (Sn)	mg/kg			0.42	0.41	0.38	0.38	0.31	0.31	0.42	0.38	0.04	10.53%
Total Strontium (Sr)	mg/kg			44.3	39.0	41.1	42.4	31.7	31.7	44.3	39.7	4.9	12.34%
Total Sulphur (S)	%			0.17	0.27	0.31	0.10	0.14	0.10	0.31	0.20	0.09	45.00%
Total Titanium (Ti)	mg/kg			1060	1350	1330	1130	1190	1060	1350	1212	125	10.31%
Total Thallium (Tl)	mg/kg			0.096	<0.050	<0.050	0.099	<0.050	<0.050	0.099	0.069	0.026	37.68%
Total Uranium (U)	mg/kg			0.602	0.501	0.512	0.634	0.389	0.389	0.634	0.528	0.096	18.18%
Total Vanadium (V)	mg/kg			123	110	103	127	86.7	86.7	127	109.9	16.2	14.74%
Total Zinc (Zn)	mg/kg	123	315	63.6	53.1	51.6	63.0	42.7	42.7	63.6	54.8	8.7	15.88%
Total Zirconium (Zr)	mg/kg			1.57	3.26	3.29	1.74	3.03	1.57	3.29	2.58	0.85	32.95%

Notes:

Factor applied to less-than results when calculating statistics: 1.0

Factor applied to greater-than results when calculating statistics: 1.0

ISQG = Interim Sediment Quality Guidelines (BC)

Red font indicates ISQG exceedance

PEL = Probable Effects Level

Red, bolded and underlined *font indicates PEL exceedance*

Blue cell indicates primary parameter of concern

Orange cell indicates secondary parameter of concern

SD = Standard Deviation

RSD% = Relative Standard Deviation

Table 231
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Gooseneck Lake
Middle Gooseneck Lake - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code			MGL1	MGL2	MGL3	MGL4	MGL5					
	Permit No.			1132502	1132502	1132502	1132502	1132502					
	Depth (m)			15	15	15	15	15					
	Date			7-Sep-16	7-Sep-16	7-Sep-16	7-Sep-16	7-Sep-16					
	Sample Class			M	M	M	M	M					
	Units	ISQG	PEL						Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	0.014	0.013	0.0094	0.012	0.0096	0.0094	0.014	0.012	0.0020	17.24%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0036	<0.0038	<0.0037	<0.0041	<0.0036	<0.0036	<0.0041	0.0038	0.00020	5.26%
Acenaphthylene	mg/kg	0.00587	0.128	0.0050	<0.0038	<0.0037	<0.0041	0.0040	<0.0037	0.0050	0.0041	0.00050	12.20%
Anthracene	mg/kg	0.0469	0.245	0.012	<0.0076	0.0078	0.0089	0.012	<0.0076	0.012	0.0097	0.0022	22.68%
Benzo(a)anthracene	mg/kg	0.0317	0.385	0.016	0.012	0.015	0.015	0.018	0.012	0.018	0.015	0.0020	13.33%
Benzo(a)pyrene	mg/kg	0.0319	0.782	0.020	0.015	0.019	0.021	0.022	0.015	0.022	0.019	0.0030	15.79%
Benzo(b&j)fluoranthene	mg/kg			0.073	0.058	0.067	0.078	0.078	0.058	0.078	0.071	0.0080	11.27%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	0.067	0.045	0.056	0.073	0.070	0.045	0.073	0.062	0.012	19.35%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	0.019	0.013	0.016	0.018	0.020	0.013	0.020	0.017	0.0030	17.65%
Chrysene	mg/kg	0.0571	0.862	0.044	0.035	0.041	0.043	0.045	0.035	0.045	0.042	0.0040	9.52%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.0036	0.0046	0.0047	0.0063	0.0042	<0.0036	0.0063	0.0047	0.0010	21.28%
Fluoranthene	mg/kg	0.111	2.355	0.069	0.055	0.066	0.061	0.074	0.055	0.074	0.065	0.0070	10.77%
Fluorene	mg/kg	0.0212	0.144	<0.0072	<0.0076	<0.0073	<0.0082	<0.0071	<0.0071	<0.0082	0.0075	0.00040	5.33%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	0.049	0.033	0.041	0.053	0.051	0.033	0.053	0.045	0.0080	17.78%
Naphthalene	mg/kg	0.0346	0.391	0.017	0.016	0.014	0.014	0.014	0.014	0.017	0.015	0.0010	6.67%
Phenanthrene	mg/kg	0.0419	0.515	0.030	0.024	0.033	0.029	0.032	0.024	0.033	0.030	0.0040	13.33%
Pyrene	mg/kg	0.053	0.875	0.064	0.053	0.064	0.063	0.072	0.053	0.072	0.063	0.0070	11.11%
Total PAH	mg/kg	4	35	0.29	0.23	0.27	0.27	0.31	0.23	0.31	0.27	0.030	10.83%
PAH Normalized to 1% TOC		**BCASQG**											
Total Organic Carbon	mg/kg			140000	130000	130000	130000	140000	130000	140000	134000	5477	4.09%
2-Methylnaphthalene	mg/kg			0.0010	0.0010	0.00072	0.00092	0.00069	0.00069	0.0010	0.00087	0.00015	17.55%
Acenaphthene	mg/kg	0.15		0.00026	0.00029	0.00029	0.00032	0.00026	0.00026	0.00032	0.00028	0.000025	8.90%
Acenaphthylene	mg/kg			0.00036	0.00029	0.00029	0.00032	0.00029	0.00029	0.00036	0.00031	0.000030	9.77%
Anthracene	mg/kg	0.60		0.00086	0.00059	0.00060	0.00069	0.00086	0.00059	0.00086	0.00072	0.00013	18.69%
Benzo(a)anthracene	mg/kg	0.2		0.0011	0.00092	0.0012	0.0012	0.0013	0.00092	0.0013	0.0011	0.00013	11.67%
Benzo(a)pyrene	mg/kg	0.06		0.0014	0.0012	0.0015	0.0016	0.0016	0.0012	0.0016	0.0015	0.00018	12.41%
Benzo(bj)fluoranthene	mg/kg			0.0052	0.0045	0.0052	0.0060	0.0056	0.0045	0.0060	0.0053	0.00057	10.80%
Benzo(ghi)perylene	mg/kg			0.0048	0.0035	0.0043	0.0056	0.0050	0.0035	0.0056	0.0046	0.00081	17.46%
Benzo(k)fluoranthene	mg/kg			0.0014	0.0010	0.0012	0.0014	0.0014	0.0010	0.0014	0.0013	0.00017	13.28%
Chrysene	mg/kg			0.0031	0.0027	0.0032	0.0033	0.0032	0.0027	0.0033	0.0031	0.00024	7.74%
Dibenz(a,h)anthracene	mg/kg			0.00026	0.00035	0.00036	0.00049	0.00030	0.00026	0.00049	0.00035	0.000086	24.43%
Fluoranthene	mg/kg	2		0.0049	0.0042	0.0051	0.0047	0.0053	0.0042	0.0053	0.0048	0.00041	8.47%
Fluorene	mg/kg	0.2		0.00051	0.00059	0.00056	0.00063	0.00051	0.00051	0.00063	0.00056	0.000051	9.11%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0035	0.0025	0.0032	0.0041	0.0036	0.0025	0.0041	0.0034	0.00058	17.16%
Naphthalene	mg/kg	0.01		0.0012	0.0012	0.0011	0.0011	0.0010	0.0010	0.0012	0.0011	0.00010	8.93%
Phenanthrene	mg/kg	0.04		0.0021	0.0019	0.0025	0.0022	0.0023	0.0019	0.0025	0.0022	0.00025	11.31%
Pyrene	mg/kg			0.0046	0.0041	0.0049	0.0049	0.0051	0.0041	0.0051	0.0047	0.00041	8.70%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 232
2016-17 Annual Report

Results of Sediment Chemistry Analysis on No Name Lake
No Name Lake Inlet - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code Permit No. Depth (m) Date Sample Class Units	ISQG	PEL	NNLI1 E224246 4.5 24-Aug-16 M	NNLI2 E224246 4.5 24-Aug-16 M	NNLI3 E224246 4.5 22-Sep-16 X	NNLI4 E224246 4.5 24-Aug-16 M	NNLI5 E224246 4.5 24-Aug-16 M	Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	<0.011	0.012	0.029	0.023	0.016	<0.011	0.029	0.018	0.00766	42.10%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0053	<0.0054	<0.0075	<0.0061	<0.0056	<0.0053	0.0075	0.0060	0.00090	15.12%
Acenaphthylene	mg/kg	0.00587	0.128	<0.0053	<0.0054	<0.0075	<0.0061	<0.0056	<0.0053	0.0075	0.0060	0.00090	15.12%
Anthracene	mg/kg	0.0469	0.245	<0.011	<0.011	<0.015	<0.012	<0.011	<0.011	0.015	0.012	0.0017	14.43%
Benzo(a)anthracene	mg/kg	0.0317	0.385	<0.011	<0.011	<0.015	<0.012	<0.011	<0.011	0.015	0.012	0.0017	14.43%
Benzo(a)pyrene	mg/kg	0.0319	0.782	<0.011	<0.011	<0.015	<0.012	<0.011	<0.011	0.015	0.012	0.0017	14.43%
Benzo(b&j)fluoranthene	mg/kg			<0.011	<0.011	<0.015	<0.012	<0.011	<0.011	0.015	0.012	0.0017	14.43%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	<0.021	<0.021	<0.030	<0.024	<0.022	<0.021	0.03	0.024	0.0038	16.03%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.011	<0.011	<0.015	<0.012	<0.011	<0.011	0.015	0.012	0.0017	14.43%
Chrysene	mg/kg	0.0571	0.862	<0.011	<0.011	<0.015	<0.012	<0.011	<0.011	0.015	0.012	0.0017	14.43%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.0053	<0.0054	<0.0075	<0.0061	<0.0056	<0.0053	0.0075	0.0060	0.00090	15.12%
Fluoranthene	mg/kg	0.111	2.355	<0.011	<0.011	<0.015	<0.012	<0.011	<0.011	0.015	0.012	0.0017	14.43%
Fluorene	mg/kg	0.0212	0.144	<0.011	<0.011	<0.015	<0.012	<0.011	<0.011	0.015	0.012	0.00173	14.43%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.021	<0.021	<0.030	<0.024	<0.022	<0.021	0.03	0.024	0.0038	16.03%
Naphthalene	mg/kg	0.0346	0.391	<0.011	<0.011	0.021	0.014	<0.011	<0.011	0.021	0.014	0.0043	31.88%
Phenanthrene	mg/kg	0.0419	0.515	<0.011	<0.011	<0.015	<0.012	<0.011	<0.011	0.015	0.012	0.0017	14.43%
Pyrene	mg/kg	0.053	0.875	<0.011	<0.011	<0.015	<0.012	<0.011	<0.011	0.015	0.012	0.0017	14.43%
Total PAH	mg/kg	4	35	<0.011	0.012	0.050	0.037	0.016	<0.011	0.050	0.025	0.0179	71.09%
PAH Normalized to 1% TOC		**BCASQG**											
Total Organic Carbon	mg/kg			130000	110000	140000	150000	140000	110000	150000	134000	15166	11.32%
2-Methylnaphthalene	mg/kg			0.00085	0.0011	0.0021	0.0015	0.0011	0.00085	0.0021	0.0013	0.00048	35.88%
Acenaphthene	mg/kg	0.15		0.00041	0.00049	0.00054	0.00041	0.00040	0.00040	0.00054	0.00045	0.000062	13.75%
Acenaphthylene	mg/kg			0.00041	0.00049	0.00054	0.00041	0.00040	0.00040	0.00054	0.00045	0.000062	13.75%
Anthracene	mg/kg	0.60		0.00085	0.0010	0.0011	0.00080	0.00079	0.00079	0.0011	0.00090	0.00013	14.21%
Benzo(a)anthracene	mg/kg	0.2		0.00085	0.0010	0.0011	0.00080	0.00079	0.00079	0.0011	0.00090	0.00013	14.21%
Benzo(a)pyrene	mg/kg	0.06		0.00085	0.0010	0.0011	0.00080	0.00079	0.00079	0.0011	0.00090	0.00013	14.21%
Benzo(bj)fluoranthene	mg/kg			0.00085	0.0010	0.0011	0.00080	0.00079	0.00079	0.0011	0.00090	0.00013	14.21%
Benzo(ghi)perylene	mg/kg			0.0016	0.0019	0.0021	0.0016	0.0016	0.0016	0.0021	0.0018	0.00025	14.13%
Benzo(k)fluoranthene	mg/kg			0.00085	0.0010	0.0011	0.00080	0.00079	0.00079	0.0011	0.00090	0.00013	14.21%
Chrysene	mg/kg			0.00085	0.0010	0.0011	0.0008	0.00079	0.00079	0.0011	0.00090	0.00013	14.21%
Dibenz(a,h)anthracene	mg/kg			0.00041	0.00049	0.00054	0.00041	0.00040	0.00040	0.00054	0.00045	0.000062	13.75%
Fluoranthene	mg/kg	2		0.00085	0.0010	0.0011	0.00080	0.00079	0.00079	0.0011	0.00090	0.00013	14.21%
Fluorene	mg/kg	0.2		0.00085	0.0010	0.0011	0.00080	0.00079	0.00079	0.0011	0.00090	0.00013	14.21%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0016	0.0019	0.0021	0.0016	0.0016	0.0016	0.0021	0.0018	0.00025	14.13%
Naphthalene	mg/kg	0.01		0.00085	0.0010	0.0015	0.00093	0.00079	0.00079	0.0015	0.0010	0.00028	28.04%
Phenanthrene	mg/kg	0.04		0.00085	0.0010	0.0011	0.00080	0.00079	0.00079	0.0011	0.00090	0.00013	14.21%
Pyrene	mg/kg			0.00085	0.0010	0.0011	0.00080	0.00079	0.00079	0.0011	0.00090	0.00013	14.17%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
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BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 233
2016-17 Annual Report

Results of Sediment Chemistry Analysis on No Name Lake

No Name Lake Deep - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code			NNLD1	NNLD2	NNLD3	NNLD4	NNLD5					
	Permit No.			E217018	E217018	E217018	E217018	E217018					
	Depth (m)			12	12	12	12	12					
	Date			24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16					
	Sample Class			M	M	M	M	M					
	Units	ISQG	PEL						Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	<0.0092	0.016	0.021	0.017	0.029	<0.0092	0.029	0.0184	0.00730	39.67%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0046	<0.0047	<0.0039	<0.0038	<0.0046	<0.0038	<0.0047	0.0043	0.00040	9.30%
Acenaphthylene	mg/kg	0.00587	0.128	<0.0046	<0.0047	<0.0039	<0.0038	<0.0046	<0.0038	<0.0047	0.0043	0.00040	9.30%
Anthracene	mg/kg	0.0469	0.245	<0.0092	<0.0093	<0.0078	<0.0076	<0.0091	<0.0076	<0.0093	0.0086	0.00080	9.30%
Benzo(a)anthracene	mg/kg	0.0317	0.385	<0.0092	<0.0093	<0.0078	<0.0076	<0.0091	<0.0076	<0.0093	0.0086	0.00080	9.30%
Benzo(a)pyrene	mg/kg	0.0319	0.782	<0.0092	<0.0093	<0.0078	<0.0076	<0.0091	<0.0076	<0.0093	0.0086	0.00080	9.30%
Benzo(b&j)fluoranthene	mg/kg			0.017	0.028	0.015	0.029	0.028	0.015	0.029	0.023	0.0070	30.43%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	0.021	0.024	0.017	0.027	0.025	0.017	0.027	0.023	0.0040	17.39%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.0092	<0.0093	<0.0078	<0.0076	<0.0091	<0.0076	<0.0093	0.0086	0.00080	9.30%
Chrysene	mg/kg	0.0571	0.862	<0.0092	<0.0093	<0.0078	0.012	0.012	<0.0078	0.012	0.010	0.0019	18.81%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.0046	<0.0047	<0.0039	<0.0038	<0.0046	<0.0038	<0.0047	0.0043	0.00040	9.30%
Fluoranthene	mg/kg	0.111	2.355	0.012	0.013	0.013	0.018	0.019	0.012	0.019	0.015	0.0030	20.00%
Fluorene	mg/kg	0.0212	0.144	<0.0092	<0.0093	<0.0078	<0.0076	<0.0091	<0.0076	<0.0093	0.0086	0.00080	9.30%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	0.019	0.021	<0.016	0.021	0.021	<0.016	0.021	0.020	0.0020	10.00%
Naphthalene	mg/kg	0.0346	0.391	0.014	0.011	0.014	0.012	0.021	0.011	0.021	0.014	0.0040	28.57%
Phenanthrene	mg/kg	0.0419	0.515	0.011	0.010	0.011	0.012	0.015	0.010	0.015	0.012	0.0020	16.67%
Pyrene	mg/kg	0.053	0.875	0.015	0.015	0.013	0.018	0.020	0.013	0.020	0.016	0.0030	18.75%
Total PAH	mg/kg	4	35	0.052	0.065	0.072	0.088	0.12	0.052	0.120	0.079	0.0261	32.93%
PAH Normalized to 1% TOC		**BCASQG**											
Total Organic Carbon	mg/kg			120000	120000	120000	120000	140000	120000	140000	124000	8944	7.21%
2-Methylnaphthalene	mg/kg			0.00077	0.0013	0.0018	0.0014	0.0021	0.00077	0.0021	0.0015	0.00049	33.33%
Acenaphthene	mg/kg	0.15		0.00038	0.00039	0.00033	0.00032	0.00033	0.00032	0.00039	0.00035	0.000035	10.03%
Acenaphthylene	mg/kg			0.00038	0.00039	0.00033	0.00032	0.00033	0.00032	0.00039	0.00035	0.000035	10.03%
Anthracene	mg/kg	0.60		0.00077	0.00078	0.00065	0.00063	0.00065	0.00063	0.00078	0.00070	0.000070	10.07%
Benzo(a)anthracene	mg/kg	0.2		0.00077	0.00078	0.00065	0.00063	0.00065	0.00063	0.00078	0.00070	0.000070	10.07%
Benzo(a)pyrene	mg/kg	0.06		0.00077	0.00078	0.00065	0.00063	0.00065	0.00063	0.00078	0.00070	0.000070	10.07%
Benzo(bj)fluoranthene	mg/kg			0.0014	0.0023	0.0013	0.0024	0.0020	0.0013	0.0024	0.0019	0.00053	28.19%
Benzo(ghi)perylene	mg/kg			0.0018	0.0020	0.0014	0.0023	0.0018	0.0014	0.0023	0.0018	0.00031	16.85%
Benzo(k)fluoranthene	mg/kg			0.00077	0.00078	0.00065	0.00063	0.00065	0.00063	0.00078	0.00070	0.000070	10.07%
Chrysene	mg/kg			0.00077	0.00078	0.00065	0.0010	0.00086	0.00065	0.0010	0.00081	0.00013	15.93%
Dibenz(a,h)anthracene	mg/kg			0.00038	0.00039	0.00033	0.00032	0.00033	0.00032	0.00039	0.00035	0.000035	10.03%
Fluoranthene	mg/kg	2		0.0010	0.0011	0.0011	0.0015	0.0014	0.0010	0.0015	0.0012	0.00021	17.50%
Fluorene	mg/kg	0.2		0.00077	0.00078	0.00065	0.00063	0.00065	0.00063	0.00078	0.00070	0.000070	10.07%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0016	0.0018	0.0013	0.0018	0.0015	0.0013	0.0018	0.0016	0.00018	11.39%
Naphthalene	mg/kg	0.01		0.0012	0.0009	0.0012	0.0010	0.0015	0.00092	0.0015	0.0012	0.00022	19.46%
Phenanthrene	mg/kg	0.04		0.00092	0.00083	0.00092	0.0010	0.00107	0.00083	0.0011	0.0009	0.000090	9.50%
Pyrene	mg/kg			0.0013	0.0013	0.0011	0.0015	0.0014	0.0011	0.0015	0.0013	0.00017	13.08%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 234
2016-17 Annual Report

Results of Sediment Chemistry Analysis on No Name Lake

No Name Lake Near Seep - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code			NNLS1	NNLS2	NNLS3	NNLS4	NNLS5					
	Permit No.			E292114	E292114	E292114	E292114	E292114					
	Depth (m)			5.6	5.6	5.6	5.6	5.6					
	Date			24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16	24-Aug-16					
	Sample Class			M	M	M	M	M					
	Units	ISQG	PEL						Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	0.038	0.037	0.035	0.046	0.057	0.035	0.057	0.043	0.0090	20.93%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0038	<0.0044	<0.0046	<0.0044	<0.0042	<0.0038	<0.0046	0.0043	0.00030	6.98%
Acenaphthylene	mg/kg	0.00587	0.128	<0.0038	<0.0044	<0.0046	<0.0044	<0.0042	<0.0038	<0.0046	0.0043	0.00030	6.98%
Anthracene	mg/kg	0.0469	0.245	0.016	0.015	0.017	0.014	0.014	0.014	0.017	0.015	0.0010	6.67%
Benzo(a)anthracene	mg/kg	0.0317	0.385	<0.0075	<0.0088	<0.0091	<0.0087	<0.0083	<0.0075	<0.0091	0.0085	0.00060	7.06%
Benzo(a)pyrene	mg/kg	0.0319	0.782	<0.0075	<0.0088	<0.0091	<0.0087	<0.0083	<0.0075	<0.0091	0.0085	0.0006	7.06%
Benzo(b&j)fluoranthene	mg/kg			0.013	0.0091	0.0094	0.017	0.025	0.0091	0.025	0.015	0.0066	44.90%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	0.016	<0.018	<0.018	0.021	0.024	0.016	0.024	0.019	0.0030	15.79%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.0075	<0.0088	<0.0091	<0.0087	<0.0083	<0.0075	<0.0091	0.0085	0.0006	7.06%
Chrysene	mg/kg	0.0571	0.862	0.011	<0.0088	<0.0091	0.014	0.015	<0.0088	0.015	0.012	0.0028	24.14%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.0038	<0.0044	<0.0046	<0.0044	<0.0042	<0.0038	<0.0046	0.0043	0.00030	6.98%
Fluoranthene	mg/kg	0.111	2.355	0.013	<0.0088	0.0094	0.015	0.020	<0.0088	0.020	0.0132	0.0046	34.85%
Fluorene	mg/kg	0.0212	0.144	<0.0075	<0.0088	<0.0091	<0.0087	<0.0083	<0.0075	<0.0091	0.0085	0.0006	7.06%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.015	<0.018	<0.018	<0.017	0.018	<0.015	0.018	0.017	0.0010	5.88%
Naphthalene	mg/kg	0.0346	0.391	0.021	0.023	0.023	0.028	0.036	0.021	0.036	0.026	0.0060	23.08%
Phenanthrene	mg/kg	0.0419	0.515	0.021	0.018	0.021	0.019	0.030	0.018	0.030	0.022	0.0050	22.73%
Pyrene	mg/kg	0.053	0.875	0.012	<0.0088	<0.0091	0.013	0.018	<0.0088	0.018	0.012	0.0037	30.33%
Total PAH	mg/kg	4	35	0.13	0.093	0.100	0.15	0.19	0.093	0.190	0.133	0.0395	29.77%
PAH Normalized to 1% TOC		**BCASQG**											
Total Organic Carbon	mg/kg			99000	110000	110000	120000	120000	99000	120000	111800	8729	7.81%
2-Methylnaphthalene	mg/kg			0.0038	0.0034	0.0032	0.0038	0.0048	0.0032	0.0048	0.0038	0.00061	16.09%
Acenaphthene	mg/kg	0.15		0.00038	0.00040	0.00042	0.00037	0.00035	0.00035	0.00042	0.00038	0.000027	7.03%
Acenaphthylene	mg/kg			0.00038	0.00040	0.00042	0.00037	0.00035	0.00035	0.00042	0.00038	0.000027	7.03%
Anthracene	mg/kg	0.60		0.0016	0.0014	0.0016	0.0012	0.0012	0.0012	0.0016	0.0014	0.00021	15.33%
Benzo(a)anthracene	mg/kg	0.2		0.00076	0.00080	0.00083	0.00073	0.00069	0.00069	0.00083	0.00076	0.000055	7.24%
Benzo(a)pyrene	mg/kg	0.06		0.00076	0.00080	0.00083	0.00073	0.00069	0.00069	0.00083	0.00076	0.000055	7.24%
Benzo(bj)fluoranthene	mg/kg			0.0013	0.00083	0.00086	0.0014	0.0021	0.00083	0.0021	0.0013	0.00051	39.37%
Benzo(ghi)perylene	mg/kg			0.0016	0.0016	0.0016	0.0018	0.0020	0.0016	0.0020	0.0017	0.00016	9.25%
Benzo(k)fluoranthene	mg/kg			0.00076	0.00080	0.00083	0.00073	0.00069	0.00069	0.00083	0.00076	0.000055	7.24%
Chrysene	mg/kg			0.0011	0.00080	0.00083	0.0012	0.0013	0.00080	0.0013	0.0010	0.00021	19.88%
Dibenz(a,h)anthracene	mg/kg			0.00038	0.00040	0.00042	0.00037	0.00035	0.00035	0.00042	0.00038	0.000027	7.03%
Fluoranthene	mg/kg	2		0.0013	0.00080	0.00086	0.0013	0.0017	0.00080	0.0017	0.0012	0.00036	30.42%
Fluorene	mg/kg	0.2		0.00076	0.00080	0.00083	0.00073	0.00069	0.00069	0.0008	0.00076	0.000055	7.24%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0015	0.0016	0.0016	0.0014	0.0015	0.0014	0.0016	0.0015	0.00010	6.49%
Naphthalene	mg/kg	0.01		0.0021	0.0021	0.0021	0.0023	0.0030	0.0021	0.0030	0.0023	0.00039	16.74%
Phenanthrene	mg/kg	0.04		0.0021	0.0016	0.0019	0.0016	0.0025	0.0016	0.0025	0.0020	0.00038	19.49%
Pyrene	mg/kg			0.0012	0.00080	0.00083	0.0011	0.0015	0.0008	0.0015	0.0011	0.00029	26.78%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 235
2016-17 Annual Report

Results of Sediment Chemistry Analysis on No Name Lake

No Name Lake Outlet - Polycyclic Aromatic Hydrocarbons (GCMS)

Stn.Code Permit No. Depth (m) Date Sample Class Units				NNO1 E217017 3.5 22-Sep-16 X	NNO2 E217017 3.5 22-Sep-16 X	NNO3 E217017 3.5 22-Sep-16 X	NNO4 E217017 3.5 24-Aug-16 M	NNO5 E217017 3.5 24-Aug-16 M					
		ISQG	PEL						Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	0.013	<0.010	<0.013	0.019	0.020	<0.010	0.02	0.015	0.0043	28.67%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0058	<0.0052	<0.0063	<0.0076	<0.0071	<0.0052	0.0076	0.006	0.0010	15.11%
Acenaphthylene	mg/kg	0.00587	0.128	<0.0058	<0.0052	<0.0063	<0.0076	<0.0071	<0.0052	0.0076	0.006	0.0010	15.11%
Anthracene	mg/kg	0.0469	0.245	<0.012	<0.010	<0.013	<0.015	<0.014	<0.010	0.015	0.013	0.0019	15.03%
Benzo(a)anthracene	mg/kg	0.0317	0.385	<0.012	<0.010	<0.013	<0.015	<0.014	<0.010	0.015	0.013	0.0019	15.03%
Benzo(a)pyrene	mg/kg	0.0319	0.782	<0.012	<0.010	<0.013	<0.015	<0.014	<0.010	0.015	0.013	0.0019	15.03%
Benzo(b&j)fluoranthene	mg/kg			<0.012	<0.010	<0.013	<0.015	<0.014	<0.010	0.015	0.013	0.0019	15.03%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	<0.023	<0.021	<0.025	0.051	<0.028	<0.021	0.051	0.030	0.0122	41.35%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.012	<0.010	<0.013	<0.015	<0.014	<0.010	0.015	0.013	0.0019	15.03%
Chrysene	mg/kg	0.0571	0.862	<0.012	<0.010	<0.013	<0.015	<0.014	<0.010	0.015	0.013	0.0019	15.03%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.0058	<0.0052	<0.0063	<0.0076	<0.0071	<0.0052	0.0076	0.006	0.0010	15.11%
Fluoranthene	mg/kg	0.111	2.355	<0.012	<0.010	<0.013	<0.015	<0.014	<0.010	0.015	0.013	0.0019	15.03%
Fluorene	mg/kg	0.0212	0.144	<0.012	<0.010	<0.013	<0.015	<0.014	<0.010	0.015	0.013	0.0019	15.03%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.023	<0.021	<0.025	<0.030	<0.028	<0.021	0.03	0.025	0.0036	14.36%
Naphthalene	mg/kg	0.0346	0.391	<0.012	<0.010	0.014	<0.015	0.015	<0.010	0.015	0.013	0.0022	16.42%
Phenanthrene	mg/kg	0.0419	0.515	0.016	<0.010	0.017	<0.015	<0.014	<0.010	0.017	0.014	0.0027	18.76%
Pyrene	mg/kg	0.053	0.875	<0.012	<0.010	<0.013	<0.015	<0.014	<0.010	0.015	0.013	0.0019	15.03%
Total PAH	mg/kg	4	35	0.029	0.01	0.044	0.019	0.034	<0.010	0.044	0.027	0.0132	48.45%
PAH Normalized to 1% TOC		**BCASQG**											
Total Organic Carbon	mg/kg			160000	160000	200000	210000	220000	160000	220000	190000	28284	14.89%
2-Methylnaphthalene	mg/kg			0.00081	0.00063	0.00065	0.00091	0.00091	0.00063	0.00091	0.00078	0.00014	17.44%
Acenaphthene	mg/kg	0.15		0.00036	0.00033	0.00032	0.00036	0.00032	0.00032	0.00036	0.00034	0.000023	6.80%
Acenaphthylene	mg/kg			0.00036	0.00033	0.00032	0.00036	0.00032	0.00032	0.00036	0.00034	0.000023	6.80%
Anthracene	mg/kg	0.60		0.00075	0.00063	0.00065	0.00071	0.00064	0.00063	0.00075	0.00068	0.000054	8.04%
Benzo(a)anthracene	mg/kg	0.2		0.00075	0.00063	0.00065	0.00071	0.00064	0.00063	0.00075	0.00068	0.000054	8.04%
Benzo(a)pyrene	mg/kg	0.06		0.00075	0.00063	0.00065	0.00071	0.00064	0.00063	0.00075	0.00068	0.000054	8.04%
Benzo(bj)fluoranthene	mg/kg			0.00075	0.00063	0.00065	0.00071	0.00064	0.00063	0.00075	0.00068	0.000054	8.04%
Benzo(ghi)perylene	mg/kg			0.0014	0.0013	0.0013	0.0024	0.0013	0.0013	0.0024	0.0015	0.00050	32.66%
Benzo(k)fluoranthene	mg/kg			0.00075	0.00063	0.00065	0.00071	0.00064	0.00063	0.00075	0.00068	0.000054	8.04%
Chrysene	mg/kg			0.00075	0.00063	0.00065	0.00071	0.00064	0.00063	0.00075	0.00068	0.000054	8.04%
Dibenz(a,h)anthracene	mg/kg			0.00036	0.00033	0.00032	0.00036	0.00032	0.00032	0.00036	0.00034	0.000023	6.80%
Fluoranthene	mg/kg	2		0.00075	0.00063	0.00065	0.00071	0.00064	0.00063	0.00075	0.00068	0.000054	8.04%
Fluorene	mg/kg	0.2		0.00075	0.00063	0.00065	0.00071	0.00064	0.00063	0.00075	0.00068	0.000054	8.04%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0014	0.0013	0.0013	0.0014	0.0013	0.0013	0.0014	0.0013	0.000089	6.61%
Naphthalene	mg/kg	0.01		0.00075	0.00063	0.00070	0.00071	0.00068	0.00063	0.00075	0.00069	0.000046	6.63%
Phenanthrene	mg/kg	0.04		0.0010	0.00063	0.00085	0.00071	0.00064	0.00063	0.0010	0.00077	0.00016	20.78%
Pyrene	mg/kg			0.00075	0.00063	0.00065	0.00071	0.00064	0.00063	0.00075	0.00068	0.000054	8.04%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 236
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Long Lake
Long Lake Inlet- Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code Permit No. Depth (m) Date Sample Class Units			LLI1 E292121 5 31-Aug-16 M	LLI2 E292121 5 31-Aug-16 M	LLI3 E292121 5 31-Aug-16 M					
		ISQG	PEL				Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	0.089	0.062	0.090	0.062	0.090	0.080	0.016	20.00%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0035	<0.0035	<0.0038	<0.0035	<0.0038	0.0036	0.00020	5.56%
Acenaphthylene	mg/kg	0.00587	0.128	<0.0035	<0.0035	<0.0038	<0.0035	<0.0038	0.0036	0.00020	5.56%
Anthracene	mg/kg	0.0469	0.245	0.018	0.012	0.024	0.012	0.024	0.018	0.0060	33.33%
Benzo(a)anthracene	mg/kg	0.0317	0.385	0.0073	<0.0069	<0.0075	<0.0069	<0.0075	0.0072	0.00030	4.17%
Benzo(a)pyrene	mg/kg	0.0319	0.782	<0.0070	<0.0069	<0.0075	<0.0069	<0.0075	0.0071	0.00030	4.23%
Benzo(b&j)fluoranthene	mg/kg			0.0080	0.0088	0.0076	0.0076	0.0088	0.0081	0.00060	7.41%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	<0.014	<0.014	<0.015	<0.014	<0.015	0.014	0.0010	7.14%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.0070	<0.0069	<0.0075	<0.0069	<0.0075	0.0071	0.00030	4.23%
Chrysene	mg/kg	0.0571	0.862	0.0094	0.0088	0.0099	0.0088	0.0099	0.0094	0.00060	6.38%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.0035	<0.0035	<0.0038	<0.0035	<0.0038	0.0036	0.00020	5.56%
Fluoranthene	mg/kg	0.111	2.355	0.014	0.012	0.014	0.012	0.014	0.013	0.0010	7.69%
Fluorene	mg/kg	0.0212	0.144	0.0080	<0.0069	<0.0075	<0.0069	0.0080	0.0075	0.00060	8.00%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.014	<0.014	<0.015	<0.014	<0.015	0.014	0.0010	7.14%
Naphthalene	mg/kg	0.0346	0.391	0.057	0.042	0.061	0.042	0.061	0.053	0.010	18.87%
Phenanthrene	mg/kg	0.0419	0.515	0.030	0.026	0.033	0.026	0.033	0.030	0.0040	13.33%
Pyrene	mg/kg	0.053	0.875	0.0094	0.0088	0.011	0.0088	0.011	0.0097	0.0011	11.34%
Total PAH	mg/kg	4	35	0.24	0.17	0.24	0.17	0.24	0.22	0.0404	18.62%
PAH Normalized to 1% TOC		**BCASQG**									
Total Organic Carbon	mg/kg			150000	150000	150000	150000	150000	150000	0	0.00%
2-Methylnaphthalene	mg/kg			0.0059	0.0041	0.0060	0.0041	0.0060	0.0054	0.0011	19.81%
Acenaphthene	mg/kg	0.15		0.00023	0.00023	0.00025	0.00023	0.00025	0.00024	0.000012	5.00%
Acenaphthylene	mg/kg			0.00023	0.00023	0.00025	0.00023	0.00025	0.00024	0.000012	5.00%
Anthracene	mg/kg	0.60		0.0012	0.00080	0.0016	0.00080	0.0016	0.0012	0.00040	33.33%
Benzo(a)anthracene	mg/kg	0.2		0.00049	0.00046	0.00050	0.00046	0.00050	0.00048	0.000020	4.15%
Benzo(a)pyrene	mg/kg	0.06		0.00047	0.00046	0.00050	0.00046	0.00050	0.00048	0.000021	4.41%
Benzo(bj)fluoranthene	mg/kg			0.00053	0.00059	0.00051	0.00051	0.00059	0.00054	0.000041	7.56%
Benzo(ghi)perylene	mg/kg			0.00093	0.00093	0.0010	0.00093	0.0010	0.00096	0.000039	4.08%
Benzo(k)fluoranthene	mg/kg			0.00047	0.00046	0.00050	0.00046	0.00050	0.00048	0.000021	4.41%
Chrysene	mg/kg			0.00063	0.00059	0.00066	0.00059	0.00066	0.00063	0.000037	5.92%
Dibenz(a,h)anthracene	mg/kg			0.00023	0.00023	0.00025	0.00023	0.00025	0.00024	0.000012	5.00%
Fluoranthene	mg/kg	2		0.00093	0.00080	0.00093	0.00080	0.00093	0.00089	0.000077	8.66%
Fluorene	mg/kg	0.2		0.00053	0.00046	0.00050	0.00046	0.00053	0.00050	0.000037	7.43%
Indeno(1,2,3-cd)pyrene	mg/kg			0.00093	0.00093	0.0010	0.00093	0.0010	0.00096	0.000039	4.08%
Naphthalene	mg/kg	0.01		0.0038	0.0028	0.0041	0.0028	0.0041	0.0036	0.00067	18.82%
Phenanthrene	mg/kg	0.04		0.0020	0.0017	0.0022	0.0017	0.0022	0.0020	0.00024	12.12%
Pyrene	mg/kg			0.00063	0.00059	0.00073	0.00059	0.00073	0.00065	0.000075	11.56%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 237
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Long Lake
Long Lake Deep - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code			LLM1	LLM2	LLM3					
	Permit No.			E292122	E292122	E292122					
	Depth (m)			19.5	19.5	19.5					
	Date			30-Aug-16	30-Aug-16	30-Aug-16					
	Sample Class			M	M	M					
	Units	ISQG	PEL				Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	**1.0**	**1.1**	**1.1**	1.0	1.1	**1.1**	0.10	9.09%
Acenaphthene	mg/kg	0.00671	0.0889	0.013	0.015	0.013	0.013	0.015	0.014	0.0010	7.14%
Acenaphthylene	mg/kg	0.00587	0.128	0.0070	0.0081	0.0055	0.0055	0.0081	0.0069	0.0013	18.84%
Anthracene	mg/kg	0.0469	0.245	0.097	0.13	0.11	0.097	0.13	0.11	0.017	15.18%
Benzo(a)anthracene	mg/kg	0.0317	0.385	0.056	0.068	0.054	0.054	0.068	0.059	0.0080	13.56%
Benzo(a)pyrene	mg/kg	0.0319	0.782	0.030	0.035	0.032	0.030	0.035	0.032	0.0030	9.38%
Benzo(b&j)fluoranthene	mg/kg			0.066	0.077	0.064	0.064	0.077	0.069	0.0070	10.14%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	0.041	0.050	0.042	0.041	0.050	0.044	0.0050	11.36%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	0.012	0.015	0.013	0.012	0.015	0.013	0.0020	15.38%
Chrysene	mg/kg	0.0571	0.862	0.062	0.074	0.062	0.062	0.074	0.066	0.0070	10.61%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	0.0063	0.0073	0.0071	0.0063	0.0073	0.0069	0.00050	7.25%
Fluoranthene	mg/kg	0.111	2.355	0.080	0.098	0.083	0.080	0.098	0.087	0.010	11.49%
Fluorene	mg/kg	0.0212	0.144	0.056	0.067	0.064	0.056	0.067	0.062	0.0060	9.68%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	0.030	0.036	0.032	0.030	0.036	0.033	0.0030	9.09%
Naphthalene	mg/kg	0.0346	0.391	**0.70**	**0.79**	**0.81**	0.70	0.81	**0.77**	0.060	7.79%
Phenanthrene	mg/kg	0.0419	0.515	0.24	0.30	0.27	0.24	0.30	0.27	0.030	11.11%
Pyrene	mg/kg	0.053	0.875	0.081	0.10	0.092	0.081	0.10	0.091	0.010	10.99%
Total PAH	mg/kg	4	35	2.5	2.8	2.7	2.5	2.8	2.67	0.153	5.72%
PAH Normalized to 1% TOC		**BCASQG**									
Total Organic Carbon	mg/kg			130000	130000	120000	120000	130000	126666	5773	4.56%
2-Methylnaphthalene	mg/kg			0.077	0.085	0.092	0.077	0.092	0.084	0.0074	8.77%
Acenaphthene	mg/kg	0.15		0.0010	0.0012	0.0011	0.0010	0.0012	0.0011	0.000080	7.41%
Acenaphthylene	mg/kg			0.00054	0.00062	0.00046	0.00046	0.00062	0.00054	0.000083	15.37%
Anthracene	mg/kg	0.60		0.0075	0.010	0.0092	0.0075	0.010	0.0089	0.0013	14.64%
Benzo(a)anthracene	mg/kg	0.2		0.0043	0.0052	0.0045	0.0043	0.0052	0.0047	0.00049	10.47%
Benzo(a)pyrene	mg/kg	0.06		0.0023	0.0027	0.0027	0.0023	0.0027	0.0026	0.00021	8.20%
Benzo(bj)fluoranthene	mg/kg			0.0051	0.0059	0.0053	0.0051	0.0059	0.0054	0.00043	7.90%
Benzo(ghi)perylene	mg/kg			0.0032	0.0039	0.0035	0.0032	0.0039	0.0035	0.00035	10.00%
Benzo(k)fluoranthene	mg/kg			0.00092	0.0012	0.0011	0.00092	0.0012	0.0011	0.00012	11.04%
Chrysene	mg/kg			0.0048	0.0057	0.0052	0.0048	0.0057	0.0052	0.00046	8.83%
Dibenz(a,h)anthracene	mg/kg			0.00049	0.00056	0.00059	0.00049	0.00059	0.00055	0.000055	10.07%
Fluoranthene	mg/kg	2		0.0062	0.0075	0.0069	0.0062	0.0075	0.0069	0.00070	10.19%
Fluorene	mg/kg	0.2		0.0043	0.0052	0.0053	0.0043	0.0053	0.0049	0.00054	10.95%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0023	0.0028	0.0027	0.0023	0.0028	0.0026	0.00024	9.30%
Naphthalene	mg/kg	0.01		0.054	0.061	0.068	0.054	0.068	0.061	0.0069	11.37%
Phenanthrene	mg/kg	0.04		0.019	0.023	0.023	0.019	0.023	0.021	0.0025	11.68%
Pyrene	mg/kg			0.0062	0.0077	0.0077	0.0062	0.0077	0.0072	0.00084	11.67%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 238
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Long Lake

Long Lake Near Seep - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code Permit No. Depth (m) Date Sample Class Units			LLNS1 E292123 15.7 31-Aug-16 M	LLNS2 E292123 15.7 31-Aug-16 M	LLNS3 E292123 15.7 31-Aug-16 M	LLNS4 E292123 15.7 31-Aug-16 M	LLNS5 E292123 15.7 31-Aug-16 M	LLNS6 E292123 15.7 31-Aug-16 M					
		ISQG	PEL							Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	**0.27**	**0.31**	**0.32**	**0.35**	**0.30**	**0.36**	0.27	0.36	**0.32**	0.030	9.38%
Acenaphthene	mg/kg	0.00671	0.0889	0.0052	0.0065	0.0070	0.0064	0.0074	0.0083	0.0052	0.0083	0.0068	0.0010	14.71%
Acenaphthylene	mg/kg	0.00587	0.128	<0.0036	<0.0029	<0.0036	<0.0036	<0.0034	<0.0040	<0.0029	<0.0040	0.0035	0.00040	11.43%
Anthracene	mg/kg	0.0469	0.245	0.033	0.038	0.046	0.044	0.036	0.053	0.033	0.053	0.042	0.0070	16.67%
Benzo(a)anthracene	mg/kg	0.0317	0.385	0.028	0.036	0.032	0.033	0.033	0.033	0.028	0.036	0.033	0.0030	9.09%
Benzo(a)pyrene	mg/kg	0.0319	0.782	0.016	0.014	0.017	0.016	0.017	0.019	0.014	0.019	0.017	0.0020	11.76%
Benzo(b&j)fluoranthene	mg/kg			0.050	0.038	0.052	0.047	0.050	0.052	0.038	0.052	0.048	0.0050	10.42%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	0.034	0.022	0.035	0.031	0.035	0.036	0.022	0.036	0.032	0.0050	15.63%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	0.0096	0.0077	0.0094	0.0087	0.0096	0.0099	0.0077	0.0099	0.0092	0.00080	8.70%
Chrysene	mg/kg	0.0571	0.862	0.035	0.036	0.038	0.037	0.038	0.039	0.035	0.039	0.037	0.0010	2.70%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	0.0044	0.0036	0.0047	0.0048	0.0044	0.0050	0.0036	0.0050	0.0045	0.0005	11.11%
Fluoranthene	mg/kg	0.111	2.355	0.047	0.044	0.060	0.053	0.052	0.056	0.044	0.060	0.052	0.0060	11.54%
Fluorene	mg/kg	0.0212	0.144	0.019	0.021	0.020	0.019	0.018	0.021	0.018	0.021	0.020	0.0010	5.00%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	0.024	0.015	0.026	0.022	0.025	0.026	0.015	0.026	0.023	0.0040	17.39%
Naphthalene	mg/kg	0.0346	0.391	0.19	0.22	0.22	0.21	0.21	0.25	0.19	0.25	0.22	0.020	9.09%
Phenanthrene	mg/kg	0.0419	0.515	0.089	0.11	0.12	0.12	0.11	0.13	0.089	0.13	0.11	0.014	12.39%
Pyrene	mg/kg	0.053	0.875	0.046	0.053	0.052	0.048	0.052	0.053	0.046	0.053	0.051	0.0030	5.88%
Total PAH	mg/kg	4	35	0.78	0.89	0.94	0.93	0.88	1.0	0.78	1.0	0.9	0.0739	8.22%
PAH Normalized to 1% TOC		**BCASQG**												
Total Organic Carbon	mg/kg			150000	120000	160000	150000	140000	160000	120000	160000	146666	15055	10.26%
2-Methylnaphthalene	mg/kg			0.018	0.026	0.020	0.023	0.021	0.023	0.018	0.026	0.022	0.0027	12.39%
Acenaphthene	mg/kg	0.15		0.00035	0.00054	0.00044	0.00043	0.00053	0.00052	0.00035	0.00054	0.00047	0.000076	16.27%
Acenaphthylene	mg/kg			0.00024	0.00024	0.00023	0.00024	0.00024	0.00025	0.00023	0.00025	0.00024	0.0000080	3.33%
Anthracene	mg/kg	0.60		0.0022	0.0032	0.0029	0.0029	0.0026	0.0033	0.0022	0.0033	0.0028	0.00041	14.44%
Benzo(a)anthracene	mg/kg	0.2		0.0019	0.0030	0.0020	0.0022	0.0024	0.0021	0.0019	0.0030	0.0023	0.00040	17.78%
Benzo(a)pyrene	mg/kg	0.06		0.0011	0.0012	0.0011	0.0011	0.0012	0.0012	0.0011	0.0012	0.0011	0.00007	6.19%
Benzo(bj)fluoranthene	mg/kg			0.0033	0.0032	0.0033	0.0031	0.0036	0.0033	0.0031	0.0036	0.0033	0.00016	4.88%
Benzo(ghi)perylene	mg/kg			0.0023	0.0018	0.0022	0.0021	0.0025	0.0023	0.0018	0.0025	0.0022	0.00022	10.09%
Benzo(k)fluoranthene	mg/kg			0.00064	0.00064	0.00059	0.00058	0.00069	0.00062	0.00058	0.00069	0.00063	0.000039	6.23%
Chrysene	mg/kg			0.0023	0.0030	0.0024	0.0025	0.0027	0.0024	0.0023	0.0030	0.0026	0.00026	10.20%
Dibenz(a,h)anthracene	mg/kg			0.00029	0.00030	0.00029	0.00032	0.00031	0.00031	0.00029	0.00032	0.00031	0.000011	3.59%
Fluoranthene	mg/kg	2		0.0031	0.0037	0.0038	0.0035	0.0037	0.0035	0.0031	0.0038	0.0036	0.00023	6.48%
Fluorene	mg/kg	0.2		0.0013	0.0018	0.0013	0.0013	0.0013	0.0013	0.0013	0.0018	0.0014	0.00019	13.97%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0016	0.0013	0.0016	0.0015	0.0018	0.0016	0.0013	0.0018	0.0016	0.00018	11.54%
Naphthalene	mg/kg	0.01		0.013	0.018	0.014	0.014	0.015	0.016	0.013	0.018	0.015	0.0019	12.75%
Phenanthrene	mg/kg	0.04		0.0059	0.0092	0.0075	0.0080	0.0079	0.0081	0.0059	0.0092	0.0078	0.0011	13.64%
Pyrene	mg/kg			0.0031	0.0044	0.0033	0.0032	0.0037	0.0033	0.0031	0.0044	0.0035	0.00050	14.33%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
***Red, bolded and underlined** font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 239
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Long Lake
Long Lake Outlet - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code			LLO1	LLO2	LLO3	LLO4	LLO5					
	Permit No.			E219412	E219412	E219412	E219412	E219412					
	Depth (m)			5.3	5.3	5.3	5.3	5.3					
	Date			30-Aug-16	30-Aug-16	30-Aug-16	30-Aug-16	30-Aug-16					
	Sample Class			M	M	M	M	M					
	Units	ISQG	PEL						Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	**1.5**	**0.99**	**0.91**	**0.55**	**0.53**	0.53	1.5	**0.90**	0.40	44.44%
Acenaphthene	mg/kg	0.00671	0.0889	0.014	0.011	0.012	0.0067	0.0078	0.0067	0.014	0.010	0.0030	29.13%
Acenaphthylene	mg/kg	0.00587	0.128	0.011	0.0079	0.0056	<0.0047	<0.0048	<0.0047	0.011	0.0068	0.0027	39.71%
Anthracene	mg/kg	0.0469	0.245	0.17	0.12	0.12	0.073	0.072	0.072	0.17	0.11	0.041	36.94%
Benzo(a)anthracene	mg/kg	0.0317	0.385	0.083	0.056	0.054	0.031	0.033	0.031	0.083	0.051	0.021	41.18%
Benzo(a)pyrene	mg/kg	0.0319	0.782	0.035	0.024	0.025	0.015	0.017	0.015	0.035	0.023	0.0080	34.78%
Benzo(b&j)fluoranthene	mg/kg			0.060	0.043	0.041	0.028	0.027	0.027	0.060	0.040	0.013	32.50%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	0.028	0.023	0.021	<0.019	<0.019	<0.019	0.028	0.022	0.0040	18.18%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	0.0090	0.0079	<0.0074	<0.0093	<0.0095	<0.0074	<0.0095	0.0086	0.00090	10.47%
Chrysene	mg/kg	0.0571	0.862	0.087	0.061	0.057	0.038	0.037	0.037	0.087	0.056	0.020	35.71%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	0.0068	0.0047	0.0048	<0.0047	<0.0048	0.0047	0.0068	0.0052	0.00090	17.31%
Fluoranthene	mg/kg	0.111	2.355	0.10	0.072	0.064	0.059	0.051	0.051	0.10	0.069	0.019	27.54%
Fluorene	mg/kg	0.0212	0.144	0.074	0.047	0.044	0.031	0.027	0.027	0.074	0.045	0.018	40.00%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	0.017	<0.015	<0.015	<0.019	<0.019	<0.015	<0.019	0.017	0.0020	11.76%
Naphthalene	mg/kg	0.0346	0.391	**1.1**	**0.71**	**0.65**	0.32	0.31	0.31	1.1	0.62	0.33	53.23%
Phenanthrene	mg/kg	0.0419	0.515	0.39	0.25	0.27	0.16	0.15	0.15	0.39	0.24	0.10	41.67%
Pyrene	mg/kg	0.053	0.875	0.096	0.066	0.060	0.039	0.042	0.039	0.096	0.061	0.023	37.70%
Total PAH	mg/kg	4	35	3.6	2.4	2.3	1.3	1.3	1.3	3.6	2.18	0.95	43.69%
PAH Normalized to 1% TOC		**BCASQG**											
Total Organic Carbon	mg/kg			120000	110000	110000			110000	120000	113333	5773	5.09%
2-Methylnaphthalene	mg/kg			0.13	0.090	0.083			0.083	0.13	0.099	0.023	22.78%
Acenaphthene	mg/kg	0.15		0.0012	0.0010	0.0011			0.0010	0.0012	0.0011	0.000090	8.26%
Acenaphthylene	mg/kg			0.00092	0.00072	0.00051			0.00051	0.00092	0.00072	0.00020	28.53%
Anthracene	mg/kg	0.60		0.014	0.011	0.011			0.011	0.014	0.0120	0.0019	15.83%
Benzo(a)anthracene	mg/kg	0.2		0.0069	0.0051	0.0049			0.0049	0.0069	0.0056	0.0011	19.68%
Benzo(a)pyrene	mg/kg	0.06		0.0029	0.0022	0.0023			0.0022	0.0029	0.0025	0.00040	16.26%
Benzo(bj)fluoranthene	mg/kg			0.0050	0.0039	0.0037			0.0037	0.0050	0.0042	0.00069	16.39%
Benzo(ghi)perylene	mg/kg			0.0023	0.0021	0.0019			0.0019	0.0023	0.0021	0.00021	9.95%
Benzo(k)fluoranthene	mg/kg			0.00075	0.00072	0.00067			0.00067	0.00075	0.00071	0.00004	5.46%
Chrysene	mg/kg			0.0073	0.0056	0.0052			0.0052	0.0073	0.0060	0.0011	18.36%
Dibenz(a,h)anthracene	mg/kg			0.00057	0.00043	0.00044			0.00043	0.00057	0.00048	0.0001	16.35%
Fluoranthene	mg/kg	2		0.0083	0.0066	0.0058			0.0058	0.0083	0.0069	0.0013	18.70%
Fluorene	mg/kg	0.2		0.0062	0.0043	0.0040			0.0040	0.0062	0.0048	0.0012	24.53%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0014	0.0014	0.0014			0.0014	0.0014	0.0014	0.000030	2.17%
Naphthalene	mg/kg	0.01		0.092	0.065	0.059			0.059	0.092	0.072	0.018	24.37%
Phenanthrene	mg/kg	0.04		0.033	0.023	0.025			0.023	0.033	0.027	0.0052	19.55%
Pyrene	mg/kg			0.0080	0.0060	0.0055			0.0055	0.0080	0.0065	0.0013	20.68%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 240
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Middle Quinsam Lake
Middle Quinsam Lake Inlet - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code Permit No. Depth (m) Date Sample Class Units	ISQG	PEL	MQLI1 E206901 1.5 1-Sep-16 M	MQLI2 E206901 1.5 1-Sep-16 M	MQLI3 E206901 1.5 1-Sep-16 M	Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	0.036	0.035	0.039	0.035	0.039	0.037	0.0020	5.41%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0042	<0.0044	<0.0045	<0.0042	<0.0045	0.0044	0.00020	4.55%
Acenaphthylene	mg/kg	0.00587	0.128	<0.0042	<0.0044	<0.0045	<0.0042	<0.0045	0.0044	0.00020	4.55%
Anthracene	mg/kg	0.0469	0.245	0.012	0.012	0.018	0.012	0.018	0.014	0.0030	21.43%
Benzo(a)anthracene	mg/kg	0.0317	0.385	<0.0083	<0.0088	<0.0089	<0.0083	<0.0089	0.0087	0.00030	3.45%
Benzo(a)pyrene	mg/kg	0.0319	0.782	<0.0083	<0.0088	<0.0089	<0.0083	<0.0089	0.0087	0.00030	3.45%
Benzo(b&j)fluoranthene	mg/kg			<0.0083	<0.0088	<0.0089	<0.0083	<0.0089	0.0087	0.00030	3.45%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	<0.017	<0.018	<0.018	<0.017	<0.018	0.018	0.0010	5.56%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.0083	<0.0088	<0.0089	<0.0083	<0.0089	0.0087	0.00030	3.45%
Chrysene	mg/kg	0.0571	0.862	<0.0083	<0.0088	<0.0089	<0.0083	<0.0089	0.0087	0.00030	3.45%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.0042	<0.0044	<0.0045	<0.0042	<0.0045	0.0044	0.00020	4.55%
Fluoranthene	mg/kg	0.111	2.355	0.014	0.013	0.014	0.013	0.014	0.014	0.0010	7.14%
Fluorene	mg/kg	0.0212	0.144	<0.0083	<0.0088	<0.0089	<0.0083	<0.0089	0.0087	0.00030	3.45%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.017	<0.018	<0.018	<0.017	<0.018	0.018	0.0010	5.56%
Naphthalene	mg/kg	0.0346	0.391	0.020	0.021	0.025	0.020	0.025	0.022	0.0030	13.64%
Phenanthrene	mg/kg	0.0419	0.515	0.014	0.015	0.020	0.014	0.020	0.016	0.0030	18.75%
Pyrene	mg/kg	0.053	0.875	0.0089	0.0097	0.010	0.0089	0.010	0.0095	0.00060	6.32%
Total PAH	mg/kg	4	35	0.10	0.10	0.13	0.10	0.13	0.11	0.0173	
PAH Normalized to 1% TOC		**BCASQG**									
Total Organic Carbon	mg/kg			120000	120000	120000	120000	120000	120000	0	0.00%
2-Methylnaphthalene	mg/kg			0.0030	0.0029	0.0033	0.0029	0.0033	0.0031	0.00017	5.56%
Acenaphthene	mg/kg	0.15		0.00035	0.00037	0.00038	0.00035	0.00038	0.00036	0.000013	3.57%
Acenaphthylene	mg/kg			0.00035	0.00037	0.00038	0.00035	0.00038	0.00036	0.000013	3.57%
Anthracene	mg/kg	0.60		0.0010	0.0010	0.0015	0.0010	0.0015	0.0012	0.00029	24.79%
Benzo(a)anthracene	mg/kg	0.2		0.00069	0.00073	0.00074	0.00069	0.00074	0.00072	0.000027	3.74%
Benzo(a)pyrene	mg/kg	0.06		0.00069	0.00073	0.00074	0.00069	0.00074	0.00072	0.000027	3.74%
Benzo(bj)fluoranthene	mg/kg			0.00069	0.00073	0.00074	0.00069	0.00074	0.00072	0.000027	3.74%
Benzo(ghi)perylene	mg/kg			0.0014	0.0015	0.0015	0.0014	0.0015	0.0015	0.000050	3.40%
Benzo(k)fluoranthene	mg/kg			0.00069	0.00073	0.00074	0.00069	0.00074	0.00072	0.000027	3.74%
Chrysene	mg/kg			0.00069	0.00073	0.00074	0.00069	0.00074	0.00072	0.000027	3.74%
Dibenz(a,h)anthracene	mg/kg			0.00035	0.00037	0.00038	0.00035	0.00038	0.00036	0.000013	3.57%
Fluoranthene	mg/kg	2		0.0012	0.0011	0.0012	0.0011	0.0012	0.0011	0.000050	4.39%
Fluorene	mg/kg	0.2		0.00069	0.00073	0.00074	0.00069	0.00074	0.00072	0.000027	3.74%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0014	0.0015	0.0015	0.0014	0.0015	0.0015	0.000050	3.40%
Naphthalene	mg/kg	0.01		0.0017	0.0018	0.0021	0.0017	0.0021	0.0018	0.00022	12.02%
Phenanthrene	mg/kg	0.04		0.0012	0.0013	0.0017	0.0012	0.0017	0.0014	0.00027	19.85%
Pyrene	mg/kg			0.00074	0.00081	0.00083	0.00074	0.00083	0.00079	0.000047	5.92%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 241
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Middle Quinsam Lake
Middle Quinsam Lake Deep - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code Permit No. Depth (m) Date Sample Class			MQL1 E292115 13.5 4-Oct-16 X	MQL2 E292115 13.5 1-Sep-16 M	MQL3 E292115 13.5 1-Sep-16 M					
	Units	ISQG	PEL				Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	<0.020	0.038	0.042	<0.020	0.042	0.033	0.0117	35.16%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0050	<0.0054	<0.0057	<0.0050	0.0057	0.0054	0.0004	6.54%
Acenaphthylene	mg/kg	0.00587	0.128	<0.0050	<0.0054	<0.0057	<0.0050	0.0057	0.0054	0.0004	6.54%
Anthracene	mg/kg	0.0469	0.245	<0.020	0.015	0.019	0.015	0.02	0.018	0.0026	14.70%
Benzo(a)anthracene	mg/kg	0.0317	0.385	<0.020	<0.011	<0.011	<0.011	0.02	0.014	0.0052	37.12%
Benzo(a)pyrene	mg/kg	0.0319	0.782	<0.020	<0.011	<0.011	<0.011	0.02	0.014	0.0052	37.12%
Benzo(b&j)fluoranthene	mg/kg			<0.020	0.019	0.020	0.019	0.02	0.020	0.0006	2.94%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	0.020	0.036	0.038	0.020	0.038	0.031	0.0099	31.49%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.020	<0.011	<0.011	<0.011	0.02	0.014	0.0052	37.12%
Chrysene	mg/kg	0.0571	0.862	<0.020	<0.011	<0.011	<0.011	0.02	0.014	0.0052	37.12%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.0050	<0.0054	<0.0057	<0.0050	0.0057	0.0054	0.0004	6.54%
Fluoranthene	mg/kg	0.111	2.355	<0.020	0.022	0.026	<0.020	0.026	0.0227	0.0031	13.48%
Fluorene	mg/kg	0.0212	0.144	<0.020	<0.011	<0.011	<0.011	0.02	0.014	0.0052	37.12%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.020	0.023	0.026	<0.020	0.026	0.023	0.0030	13.04%
Naphthalene	mg/kg	0.0346	0.391	<0.020	0.027	0.033	<0.020	0.033	0.027	0.0065	24.40%
Phenanthrene	mg/kg	0.0419	0.515	<0.020	0.017	0.026	0.017	0.026	0.021	0.0046	21.82%
Pyrene	mg/kg	0.053	0.875	<0.020	0.015	0.019	0.015	0.02	0.018	0.0026	14.70%
Total PAH	mg/kg	4	35	0.02	0.13	0.16			0.10		
PAH Normalized to 1% TOC		**BCASQG**									
Total Organic Carbon	mg/kg			130000	130000	130000	130000	130000	130000	0	0.00%
2-Methylnaphthalene	mg/kg			0.0015	0.0029	0.0032	0.0015	0.0032	0.0026	0.00090	35.14%
Acenaphthene	mg/kg	0.15		0.00038	0.00042	0.00044	0.00038	0.00044	0.00041	0.000027	6.49%
Acenaphthylene	mg/kg			0.00038	0.00042	0.00044	0.00038	0.00044	0.00041	0.000027	6.49%
Anthracene	mg/kg	0.60		0.0015	0.0012	0.0015	0.0012	0.0015	0.0014	0.00021	14.85%
Benzo(a)anthracene	mg/kg	0.2		0.0015	0.00085	0.00085	0.00085	0.0015	0.0011	0.00040	37.13%
Benzo(a)pyrene	mg/kg	0.06		0.0015	0.00085	0.00085	0.00085	0.0015	0.0011	0.00040	37.13%
Benzo(bj)fluoranthene	mg/kg			0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.000046	3.02%
Benzo(ghi)perylene	mg/kg			0.0015	0.0028	0.0029	0.0015	0.0029	0.0024	0.00076	31.46%
Benzo(k)fluoranthene	mg/kg			0.0015	0.00085	0.00085	0.00085	0.0015	0.0011	0.00040	37.13%
Chrysene	mg/kg			0.0015	0.00085	0.00085	0.00085	0.0015	0.0011	0.00040	37.13%
Dibenz(a,h)anthracene	mg/kg			0.00038	0.00042	0.00044	0.00038	0.00044	0.00041	0.000027	6.49%
Fluoranthene	mg/kg	2		0.0015	0.0017	0.0020	0.0015	0.0020	0.0017	0.00024	13.50%
Fluorene	mg/kg	0.2		0.0015	0.00085	0.00085	0.00085	0.0015	0.0011	0.00040	37.13%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0015	0.0018	0.0020	0.0015	0.0020	0.0018	0.00023	13.04%
Naphthalene	mg/kg	0.01		0.0015	0.0021	0.0025	0.0015	0.0025	0.0021	0.00050	24.42%
Phenanthrene	mg/kg	0.04		0.0015	0.0013	0.0020	0.0013	0.0020	0.0016	0.00035	21.75%
Pyrene	mg/kg			0.0015	0.0012	0.0015	0.0012	0.0015	0.0014	0.00021	14.85%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 242
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Middle Quinsam Lake

Middle Quinsam Lake Near Seep - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code			MQLNS1	MQLNS2	MQLNS3	MQLNS4	MQLNS5					
	Permit No.			E292116	E292116	E292116	E292116	E292116					
	Depth (m)			1	1	1	1	1					
	Date			4-Oct-16	4-Oct-16	4-Oct-16	4-Oct-16	4-Oct-16					
	Sample Class			X	X	X	X	X					
	Units	ISQG	PEL						Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.00	0.00%
Acenaphthylene	mg/kg	0.00587	0.128	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.00	0.00%
Anthracene	mg/kg	0.0469	0.245	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Benzo(a)anthracene	mg/kg	0.0317	0.385	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Benzo(a)pyrene	mg/kg	0.0319	0.782	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Benzo(b&j)fluoranthene	mg/kg			<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Chrysene	mg/kg	0.0571	0.862	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.00	0.00%
Fluoranthene	mg/kg	0.111	2.355	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Fluorene	mg/kg	0.0212	0.144	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Naphthalene	mg/kg	0.0346	0.391	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Phenanthrene	mg/kg	0.0419	0.515	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Pyrene	mg/kg	0.053	0.875	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Total PAH	mg/kg	4	35	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
PAH Normalized to 1% TOC		**BCASQG**											
Total Organic Carbon	mg/kg			150000	160000	170000	170000	180000	150000	180000	166000	11402	6.87%
2-Methylnaphthalene	mg/kg			0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0013	0.0012	0.000085	7.02%
Acenaphthene	mg/kg	0.15		0.00033	0.00031	0.00029	0.00029	0.00028	0.00028	0.00033	0.00030	0.000021	7.02%
Acenaphthylene	mg/kg			0.00033	0.00031	0.00029	0.00029	0.00028	0.00028	0.00033	0.00030	0.000021	7.02%
Anthracene	mg/kg	0.60		0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0013	0.0012	0.000085	7.02%
Benzo(a)anthracene	mg/kg	0.2		0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0013	0.0012	0.000085	7.02%
Benzo(a)pyrene	mg/kg	0.06		0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0013	0.0012	0.000085	7.02%
Benzo(bj)fluoranthene	mg/kg			0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0013	0.0012	0.000085	7.02%
Benzo(ghi)perylene	mg/kg			0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0013	0.0012	0.000085	7.02%
Benzo(k)fluoranthene	mg/kg			0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0013	0.0012	0.000085	7.02%
Chrysene	mg/kg			0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0013	0.0012	0.000085	7.02%
Dibenz(a,h)anthracene	mg/kg			0.00033	0.00031	0.00029	0.00029	0.00028	0.00028	0.00033	0.00030	0.000021	7.02%
Fluoranthene	mg/kg	2		0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0013	0.0012	0.000085	7.02%
Fluorene	mg/kg	0.2		0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0013	0.0012	0.000085	7.02%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0013	0.0012	0.000085	7.02%
Naphthalene	mg/kg	0.01		0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0013	0.0012	0.000085	7.02%
Phenanthrene	mg/kg	0.04		0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0013	0.0012	0.000085	7.02%
Pyrene	mg/kg			0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0013	0.0012	0.000085	7.02%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 243
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Middle Quinsam Lake
Middle Quinsam Lake Outlet - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code			MQLO1	MQLO2	MQLO3					
	Permit No.			0900504	0900504	0900504					
	Depth (m)			2	2	2					
	Date			4-Oct-16	4-Oct-16	4-Oct-16					
	Sample Class			X	X	X					
	Units	ISQG	PEL				Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.00	0.00%
Acenaphthylene	mg/kg	0.00587	0.128	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.00	0.00%
Anthracene	mg/kg	0.0469	0.245	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Benzo(a)anthracene	mg/kg	0.0317	0.385	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Benzo(a)pyrene	mg/kg	0.0319	0.782	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Benzo(b&j)fluoranthene	mg/kg			<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Chrysene	mg/kg	0.0571	0.862	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	0.00	0.00%
Fluoranthene	mg/kg	0.111	2.355	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Fluorene	mg/kg	0.0212	0.144	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Naphthalene	mg/kg	0.0346	0.391	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Phenanthrene	mg/kg	0.0419	0.515	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Pyrene	mg/kg	0.053	0.875	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
Total PAH	mg/kg	4	35	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	0.00	0.00%
PAH Normalized to 1% TOC		**BCASQG**									
Total Organic Carbon	mg/kg			140000	140000	130000	130000	140000	136666.667	5774	4.22%
2-Methylnaphthalene	mg/kg			0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.000063	4.33%
Acenaphthene	mg/kg	0.15		0.00036	0.00036	0.00038	0.00036	0.00038	0.00037	0.000016	4.33%
Acenaphthylene	mg/kg			0.00036	0.00036	0.00038	0.00036	0.00038	0.00037	0.000016	4.33%
Anthracene	mg/kg	0.60		0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.000063	4.33%
Benzo(a)anthracene	mg/kg	0.2		0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.000063	4.33%
Benzo(a)pyrene	mg/kg	0.06		0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.000063	4.33%
Benzo(bj)fluoranthene	mg/kg			0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.000063	4.33%
Benzo(ghi)perylene	mg/kg			0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.000063	4.33%
Benzo(k)fluoranthene	mg/kg			0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.000063	4.33%
Chrysene	mg/kg			0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.000063	4.33%
Dibenz(a,h)anthracene	mg/kg			0.00036	0.00036	0.00038	0.00036	0.00038	0.00037	0.000016	4.33%
Fluoranthene	mg/kg	2		0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.000063	4.33%
Fluorene	mg/kg	0.2		0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.000063	4.33%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.000063	4.33%
Naphthalene	mg/kg	0.01		0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.000063	4.33%
Phenanthrene	mg/kg	0.04		0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.000063	4.33%
Pyrene	mg/kg			0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.000063	4.33%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 244
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Lower Quinsam Lake
Lower Quinsam Lake Inlet - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code Permit No. Depth (m) Date Sample Class Units	ISQG	PEL	LQLI1 E292117 15.5 12-Sep-16 M	LQLI2 E292117 15.5 12-Sep-16 M	LQLI3 E292117 15.5 12-Sep-16 M	Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	0.16	0.11	0.14	0.11	0.16	0.14	0.030	21.43%
Acenaphthene	mg/kg	0.00671	0.0889	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	0.00	0.00%
Acenaphthylene	mg/kg	0.00587	0.128	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	0.00	0.00%
Anthracene	mg/kg	0.0469	0.245	0.0060	0.0045	0.0053	0.0045	0.0060	0.0053	0.00080	15.09%
Benzo(a)anthracene	mg/kg	0.0317	0.385	0.0082	0.0067	0.0094	0.0067	0.0094	0.0081	0.0014	17.28%
Benzo(a)pyrene	mg/kg	0.0319	0.782	0.0032	0.0027	0.0035	0.0027	0.0035	0.0031	0.00040	12.90%
Benzo(b&j)fluoranthene	mg/kg			0.0067	0.0060	0.0072	0.0060	0.0072	0.0066	0.00060	9.09%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	0.0025	0.0021	0.0025	0.0021	0.0025	0.0024	0.00020	8.33%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.0010	<0.0010	0.0010	<0.0010	0.0010	0.0010	0.00	0.00%
Chrysene	mg/kg	0.0571	0.862	0.015	0.010	0.013	0.010	0.015	0.013	0.0030	23.08%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	0.00	0.00%
Fluoranthene	mg/kg	0.111	2.355	0.013	0.010	0.012	0.010	0.013	0.012	0.0020	16.67%
Fluorene	mg/kg	0.0212	0.144	0.0026	0.0019	0.0020	0.0019	0.0026	0.0022	0.00040	18.18%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	0.00	0.00%
Naphthalene	mg/kg	0.0346	0.391	0.11	0.079	0.10	0.079	0.11	0.096	0.016	16.67%
Phenanthrene	mg/kg	0.0419	0.515	0.077	0.055	0.075	0.055	0.077	0.069	0.012	17.39%
Pyrene	mg/kg	0.053	0.875	0.012	0.0094	0.013	0.0094	0.013	0.012	0.0019	16.52%
Total PAH	mg/kg	4	35	0.40	0.29	0.37	0.29	0.40	0.35	0.06	16.11%
PAH Normalized to 1% TOC		**BCASQG**									
Total Organic Carbon	mg/kg			38000	39000	32000	32000	44000	37000	5099	13.78%
2-Methylnaphthalene	mg/kg			0.042	0.028	0.044	0.028	0.044	0.038	0.0086	22.63%
Acenaphthene	mg/kg	0.15		0.00013	0.00013	0.00016	0.00013	0.00016	0.00014	0.000015	10.79%
Acenaphthylene	mg/kg			0.00013	0.00013	0.00016	0.00013	0.00016	0.00014	0.000015	10.79%
Anthracene	mg/kg	0.60		0.0016	0.0012	0.0017	0.0012	0.0017	0.0015	0.00027	18.49%
Benzo(a)anthracene	mg/kg	0.2		0.0022	0.0017	0.0029	0.0017	0.0029	0.0023	0.00062	27.31%
Benzo(a)pyrene	mg/kg	0.06		0.00084	0.00069	0.0011	0.00069	0.0011	0.00088	0.00020	22.97%
Benzo(bj)fluoranthene	mg/kg			0.0018	0.0015	0.0023	0.0015	0.0023	0.0019	0.00036	19.46%
Benzo(ghi)perylene	mg/kg			0.00066	0.00054	0.00078	0.00054	0.00078	0.00066	0.00012	18.51%
Benzo(k)fluoranthene	mg/kg			0.00026	0.00026	0.00031	0.00026	0.00031	0.00028	0.000031	11.19%
Chrysene	mg/kg			0.0040	0.0026	0.0041	0.0026	0.0041	0.0035	0.00084	23.86%
Dibenz(a,h)anthracene	mg/kg			0.00013	0.00013	0.00016	0.00013	0.00016	0.00014	0.000015	10.79%
Fluoranthene	mg/kg	2		0.0034	0.0026	0.0038	0.0026	0.0038	0.0032	0.00061	18.83%
Fluorene	mg/kg	0.2		0.00068	0.00049	0.00063	0.00049	0.00068	0.00060	0.00010	16.86%
Indeno(1,2,3-cd)pyrene	mg/kg			0.00053	0.00051	0.00063	0.00051	0.00063	0.00056	0.000061	10.99%
Naphthalene	mg/kg	0.01		0.029	0.020	0.031	0.020	0.031	0.027	0.0057	21.27%
Phenanthrene	mg/kg	0.04		0.020	0.014	0.023	0.014	0.023	0.019	0.0047	24.35%
Pyrene	mg/kg			0.0032	0.0024	0.0041	0.0024	0.0041	0.0032	0.00083	25.86%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 245
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Lower Quinsam Lake

Lower Quinsam Lake Deep 1 - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code			LQL1	LQL2	LQL3	LQL4	LQL5					
	Permit No.			E292118	E292118	E292118	E292118	E292118					
	Depth (m)			16.5	16.5	16.5	16.5	16.5					
	Date			12-Sep-16	12-Sep-16	12-Sep-16	12-Sep-16	12-Sep-16					
	Sample Class			M	M	M	M	M					
	Units	ISQG	PEL						Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	0.15	0.15	0.13	0.13	0.20	0.13	0.20	0.15	0.03	20.00%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0014	<0.0014	<0.0013	<0.0014	<0.0014	<0.0013	<0.0014	0.0014	0.000040	2.86%
Acenaphthylene	mg/kg	0.00587	0.128	<0.0014	<0.0014	<0.0013	<0.0014	<0.0014	<0.0013	<0.0014	0.0014	0.000040	2.86%
Anthracene	mg/kg	0.0469	0.245	0.0081	0.0088	0.0075	0.0070	0.013	0.0070	0.013	0.0089	0.0024	26.97%
Benzo(a)anthracene	mg/kg	0.0317	0.385	0.010	0.010	0.0087	0.0084	0.018	0.0084	0.018	0.011	0.0040	36.36%
Benzo(a)pyrene	mg/kg	0.0319	0.782	0.0055	0.0052	0.0045	0.0041	0.0088	0.0041	0.0088	0.0056	0.0019	33.93%
Benzo(b&j)fluoranthene	mg/kg			0.013	0.012	0.011	0.010	0.019	0.010	0.019	0.013	0.0040	30.77%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	<0.0054	<0.0056	<0.0052	<0.0056	0.0085	<0.0052	0.0085	0.0061	0.0014	22.95%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.0027	<0.0028	<0.0026	<0.0028	0.0032	<0.0026	0.0032	0.0028	0.0002	7.14%
Chrysene	mg/kg	0.0571	0.862	0.016	0.016	0.014	0.014	0.027	0.014	0.027	0.017	0.0050	29.41%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.0014	<0.0014	<0.0013	<0.0014	0.0016	<0.0013	0.0016	0.0014	0.00010	7.14%
Fluoranthene	mg/kg	0.111	2.355	0.017	0.017	0.015	0.015	0.025	0.015	0.025	0.018	0.0040	22.22%
Fluorene	mg/kg	0.0212	0.144	0.0055	0.0055	0.0048	0.0047	0.0085	0.0047	0.0085	0.0058	0.0016	27.59%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.0054	<0.0056	<0.0052	<0.0056	<0.0056	<0.0052	<0.0056	0.0055	0.00020	3.64%
Naphthalene	mg/kg	0.0346	0.391	0.10	0.11	0.094	0.095	0.16	0.094	0.16	0.11	0.028	25.00%
Phenanthrene	mg/kg	0.0419	0.515	0.074	0.073	0.064	0.066	0.12	0.064	0.12	0.079	0.023	29.11%
Pyrene	mg/kg	0.053	0.875	0.016	0.016	0.014	0.014	0.020	0.014	0.020	0.016	0.0020	12.50%
Total PAH	mg/kg	4	35	0.40	0.40	0.36	0.36	0.60	0.36	0.60	0.42	0.10	23.90%
PAH Normalized to 1% TOC		**BCASQG**											
Total Organic Carbon	mg/kg			44000	44000	41000	43000	43000	41000	44000	43000	1224	2.85%
2-Methylnaphthalene	mg/kg			0.034	0.034	0.032	0.030	0.047	0.030	0.047	0.035	0.0065	18.41%
Acenaphthene	mg/kg	0.15		0.00032	0.00032	0.00032	0.00033	0.00033	0.00032	0.00033	0.00032	0.0000050	1.56%
Acenaphthylene	mg/kg			0.00032	0.00032	0.00032	0.00033	0.00033	0.00032	0.00033	0.00032	0.0000050	1.56%
Anthracene	mg/kg	0.60		0.0018	0.0020	0.0018	0.0016	0.0030	0.0016	0.0030	0.0021	0.00055	26.70%
Benzo(a)anthracene	mg/kg	0.2		0.0023	0.0023	0.0021	0.0020	0.0042	0.0020	0.0042	0.0026	0.00092	35.94%
Benzo(a)pyrene	mg/kg	0.06		0.0013	0.0012	0.0011	0.0010	0.0021	0.0010	0.0021	0.0013	0.00043	32.90%
Benzo(bj)fluoranthene	mg/kg			0.0030	0.0027	0.0027	0.0023	0.0044	0.0023	0.0044	0.0030	0.00081	26.82%
Benzo(ghi)perylene	mg/kg			0.0012	0.0013	0.0013	0.0013	0.0020	0.0012	0.0020	0.0014	0.00032	22.70%
Benzo(k)fluoranthene	mg/kg			0.00061	0.00064	0.00063	0.00065	0.00074	0.00061	0.00074	0.00066	0.000051	7.77%
Chrysene	mg/kg			0.0036	0.0036	0.0034	0.0033	0.0063	0.0033	0.0063	0.0041	0.0013	31.11%
Dibenz(a,h)anthracene	mg/kg			0.00032	0.00032	0.00032	0.00033	0.00037	0.00032	0.00037	0.00033	0.000024	7.27%
Fluoranthene	mg/kg	2		0.0039	0.0039	0.0037	0.0035	0.0058	0.0035	0.0058	0.0041	0.00095	22.95%
Fluorene	mg/kg	0.2		0.0013	0.0013	0.0012	0.0011	0.0020	0.0011	0.0020	0.0014	0.00036	26.67%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0012	0.0013	0.0013	0.0013	0.0013	0.0012	0.0013	0.0013	0.000030	2.36%
Naphthalene	mg/kg	0.01		0.023	0.025	0.023	0.022	0.037	0.022	0.037	0.026	0.0064	24.62%
Phenanthrene	mg/kg	0.04		0.017	0.017	0.016	0.015	0.028	0.015	0.028	0.018	0.0053	28.80%
Pyrene	mg/kg			0.0036	0.0036	0.0034	0.0033	0.0047	0.0033	0.0047	0.0037	0.00054	14.52%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 246
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Lower Quinsam Lake
Lower Quinsam Lake Deep 2- Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code Permit No. Depth (m) Date Sample Class Units	ISQG	PEL	LQLM1 E292119 15 12-Sep-16 M	LQLM2 E292119 15 12-Sep-16 M	LQLM3 E292119 15 12-Sep-16 M	Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	0.15	0.15	0.15	0.15	0.15	0.15	0.00	0.00%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0018	<0.0020	<0.0020	<0.0018	<0.0020	0.0019	0.00010	5.26%
Acenaphthylene	mg/kg	0.00587	0.128	0.0020	<0.0020	<0.0020	0.0020	0.0020	0.0020	0.00	0.00%
Anthracene	mg/kg	0.0469	0.245	0.012	0.011	0.011	0.011	0.012	0.011	0.0010	9.09%
Benzo(a)anthracene	mg/kg	0.0317	0.385	0.016	0.017	0.017	0.016	0.017	0.017	0.0010	5.88%
Benzo(a)pyrene	mg/kg	0.0319	0.782	0.011	0.011	0.012	0.011	0.012	0.011	0.0010	9.09%
Benzo(b&j)fluoranthene	mg/kg			0.044	0.039	0.047	0.039	0.047	0.043	0.0040	9.30%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	0.026	0.020	0.026	0.020	0.026	0.024	0.0030	12.50%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	0.0065	0.0071	0.0088	0.0065	0.0088	0.0075	0.0012	16.00%
Chrysene	mg/kg	0.0571	0.862	0.034	0.034	0.037	0.034	0.037	0.035	0.0020	5.71%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	0.0045	0.0040	0.0036	0.0036	0.0045	0.0040	0.00050	12.50%
Fluoranthene	mg/kg	0.111	2.355	0.036	0.033	0.037	0.033	0.037	0.035	0.0020	5.71%
Fluorene	mg/kg	0.0212	0.144	0.0069	0.0071	0.0072	0.0069	0.0072	0.0071	0.00020	2.82%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	0.017	0.014	0.018	0.014	0.018	0.016	0.0020	12.50%
Naphthalene	mg/kg	0.0346	0.391	0.11	0.11	0.11	0.11	0.11	0.11	0.00	0.00%
Phenanthrene	mg/kg	0.0419	0.515	0.084	0.082	0.088	0.082	0.088	0.085	0.0030	3.53%
Pyrene	mg/kg	0.053	0.875	0.033	0.030	0.034	0.030	0.034	0.032	0.0020	6.25%
Total PAH	mg/kg	4	35	0.50	0.48	0.51	0.48	0.51	0.50	0.02	3.06%
PAH Normalized to 1% TOC		**BCASQG**									
Total Organic Carbon	mg/kg			43000	42000	38000	38000	45000	42400	2701	6.37%
2-Methylnaphthalene	mg/kg			0.035	0.036	0.040	0.035	0.040	0.037	0.0025	6.81%
Acenaphthene	mg/kg	0.15		0.00042	0.00048	0.00053	0.00042	0.00053	0.00047	0.000054	11.39%
Acenaphthylene	mg/kg			0.00047	0.00048	0.00053	0.00047	0.00053	0.00049	0.000033	6.75%
Anthracene	mg/kg	0.60		0.0028	0.0026	0.0029	0.0026	0.0029	0.0028	0.00014	5.05%
Benzo(a)anthracene	mg/kg	0.2		0.0037	0.0041	0.0045	0.0037	0.0045	0.0041	0.00038	9.31%
Benzo(a)pyrene	mg/kg	0.06		0.0026	0.0026	0.0032	0.0026	0.0032	0.0028	0.00033	11.87%
Benzo(bj)fluoranthene	mg/kg			0.010	0.0093	0.012	0.0093	0.012	0.011	0.0016	15.05%
Benzo(ghi)perylene	mg/kg			0.0061	0.0048	0.0068	0.0048	0.0068	0.0059	0.0011	17.86%
Benzo(k)fluoranthene	mg/kg			0.0015	0.0017	0.0023	0.0015	0.0023	0.0018	0.00043	23.37%
Chrysene	mg/kg			0.0079	0.0081	0.0097	0.0079	0.0097	0.0086	0.0010	11.77%
Dibenz(a,h)anthracene	mg/kg			0.0011	0.0010	0.0009	0.0009	0.0011	0.0010	0.000058	5.90%
Fluoranthene	mg/kg	2		0.0084	0.0079	0.0097	0.0079	0.0097	0.0087	0.00097	11.20%
Fluorene	mg/kg	0.2		0.0016	0.0017	0.0019	0.0016	0.0019	0.0017	0.00015	8.67%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0040	0.0033	0.0047	0.0033	0.0047	0.0040	0.00071	17.71%
Naphthalene	mg/kg	0.01		0.026	0.026	0.029	0.026	0.029	0.027	0.0018	6.69%
Phenanthrene	mg/kg	0.04		0.020	0.020	0.023	0.020	0.023	0.021	0.0021	10.14%
Pyrene	mg/kg			0.0077	0.0071	0.0090	0.0071	0.0090	0.0079	0.00093	11.74%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 247
2016-17 Annual Report

Results of Sediment Chemistry Analysis on Lower Quinsam Lake
Lower Quinsam Lake Outlet - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code Permit No. Depth (m) Date Sample Class Units	ISQG	PEL	LQLO1 E292120 2.3 8-Sep-16 M	LQLO2 E292120 2.3 8-Sep-16 M	LQLO3 E292120 2.3 8-Sep-16 M	Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	0.085	0.084	0.081	0.081	0.085	0.083	0.0020	2.41%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0038	<0.0037	<0.0034	<0.0034	<0.0038	0.0036	0.00020	5.56%
Acenaphthylene	mg/kg	0.00587	0.128	<0.0038	<0.0037	<0.0034	<0.0034	<0.0038	0.0036	0.00020	5.56%
Anthracene	mg/kg	0.0469	0.245	<0.0075	<0.0074	<0.0067	<0.0067	<0.0075	0.0072	0.00040	5.56%
Benzo(a)anthracene	mg/kg	0.0317	0.385	0.0077	<0.0074	0.0077	<0.0074	0.0077	0.0076	0.00020	2.63%
Benzo(a)pyrene	mg/kg	0.0319	0.782	<0.0075	<0.0074	<0.0067	<0.0067	<0.0075	0.0072	0.00040	5.56%
Benzo(b&j)fluoranthene	mg/kg			0.0092	0.0091	0.010	0.0091	0.010	0.0094	0.00050	5.32%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	<0.015	<0.015	<0.013	<0.013	<0.015	0.014	0.0010	7.14%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.0075	<0.0074	<0.0067	<0.0067	<0.0075	0.0072	0.00040	5.56%
Chrysene	mg/kg	0.0571	0.862	0.012	0.012	0.013	0.012	0.013	0.012	0.0010	8.33%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.0038	<0.0037	<0.0034	<0.0034	<0.0038	0.0036	0.00020	5.56%
Fluoranthene	mg/kg	0.111	2.355	0.012	0.011	0.012	0.011	0.012	0.012	0.0010	8.33%
Fluorene	mg/kg	0.0212	0.144	0.0092	<0.0074	<0.0067	<0.0067	0.0092	0.0078	0.0013	16.67%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.015	<0.015	<0.013	<0.013	<0.015	0.014	0.0010	7.14%
Naphthalene	mg/kg	0.0346	0.391	0.062	0.062	0.060	0.060	0.062	0.061	0.0010	1.64%
Phenanthrene	mg/kg	0.0419	0.515	0.039	0.037	0.041	0.037	0.041	0.039	0.0020	5.13%
Pyrene	mg/kg	0.053	0.875	0.010	0.0099	0.010	0.0099	0.010	0.010	0.00010	1.00%
Total PAH	mg/kg	4	35	0.24	0.22	0.22	0.22	0.24	0.23	0.0115	5.09%
PAH Normalized to 1% TOC		**BCASQG**									
Total Organic Carbon	mg/kg			87000	76000	73000	62000	87000	74200	8927	12.03%
2-Methylnaphthalene	mg/kg			0.0098	0.011	0.011	0.0098	0.011	0.011	0.00077	7.22%
Acenaphthene	mg/kg	0.15		0.00044	0.00049	0.00047	0.00044	0.00049	0.00046	0.000025	5.40%
Acenaphthylene	mg/kg			0.00044	0.00049	0.00047	0.00044	0.00049	0.00046	0.000025	5.40%
Anthracene	mg/kg	0.60		0.00086	0.00097	0.00092	0.00086	0.00097	0.00092	0.000056	6.10%
Benzo(a)anthracene	mg/kg	0.2		0.00089	0.00097	0.00105	0.00089	0.00105	0.00097	0.000083	8.56%
Benzo(a)pyrene	mg/kg	0.06		0.00086	0.00097	0.00092	0.00086	0.00097	0.00092	0.000056	6.10%
Benzo(bj)fluoranthene	mg/kg			0.0011	0.0012	0.0014	0.0011	0.0014	0.0012	0.00016	13.22%
Benzo(ghi)perylene	mg/kg			0.0017	0.0020	0.0018	0.0017	0.0020	0.0018	0.00013	7.14%
Benzo(k)fluoranthene	mg/kg			0.00086	0.00097	0.00092	0.00086	0.00097	0.00092	0.000056	6.10%
Chrysene	mg/kg			0.0014	0.0016	0.0018	0.0014	0.0018	0.0016	0.00020	12.66%
Dibenz(a,h)anthracene	mg/kg			0.00044	0.00049	0.00047	0.00044	0.00049	0.00046	0.000025	5.40%
Fluoranthene	mg/kg	2		0.0014	0.0015	0.0016	0.0014	0.0016	0.0015	0.00013	8.72%
Fluorene	mg/kg	0.2		0.0011	0.0010	0.00092	0.00092	0.0011	0.0010	0.000072	7.32%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0017	0.0020	0.0018	0.0017	0.0020	0.0018	0.00013	7.14%
Naphthalene	mg/kg	0.01		0.0071	0.0082	0.0082	0.0071	0.0082	0.0078	0.00061	7.78%
Phenanthrene	mg/kg	0.04		0.0045	0.0049	0.0056	0.0045	0.0056	0.0050	0.00058	11.62%
Pyrene	mg/kg			0.0012	0.0013	0.0014	0.0012	0.0014	0.0013	0.00011	8.66%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 248
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Lower Wetland
Lower Wetland Inlet - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code			LWI1	LWI2	LWI3					
	Permit No.			E292124	E292124	E292124					
	Depth (m)			0.4	0.4	0.4					
	Date			5-Oct-16	5-Oct-16	5-Oct-16					
	Sample Class			M	M	M					
	Units	ISQG	PEL				Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	<0.0090	0.0093	<0.0079	<0.0079	0.0093	0.0087	0.00070	8.05%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0045	<0.0044	<0.0040	<0.0040	<0.0045	0.0043	0.00030	6.98%
Acenaphthylene	mg/kg	0.00587	0.128	<0.0045	<0.0044	<0.0040	<0.0040	<0.0045	0.0043	0.00030	6.98%
Anthracene	mg/kg	0.0469	0.245	<0.0090	<0.0088	<0.0079	<0.0079	<0.0090	0.0086	0.00060	6.98%
Benzo(a)anthracene	mg/kg	0.0317	0.385	<0.0090	<0.0088	<0.0079	<0.0079	<0.0090	0.0086	0.00060	6.98%
Benzo(a)pyrene	mg/kg	0.0319	0.782	<0.0090	<0.0088	<0.0079	<0.0079	<0.0090	0.0086	0.00060	6.98%
Benzo(b&j)fluoranthene	mg/kg			<0.0090	0.010	0.014	<0.0090	0.014	0.0110	0.0026	23.64%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	<0.018	<0.018	<0.016	<0.016	<0.018	0.017	0.0010	5.88%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.0090	<0.0088	<0.0079	<0.0079	<0.0090	0.0086	0.00060	6.98%
Chrysene	mg/kg	0.0571	0.862	<0.0090	<0.0088	<0.0079	<0.0079	<0.0090	0.0086	0.00060	6.98%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.0045	<0.0044	<0.0040	<0.0040	<0.0045	0.0043	0.00030	6.98%
Fluoranthene	mg/kg	0.111	2.355	<0.0090	<0.0088	<0.0079	<0.0079	<0.0090	0.0086	0.00060	6.98%
Fluorene	mg/kg	0.0212	0.144	<0.0090	<0.0088	<0.0079	<0.0079	<0.0090	0.0086	0.00060	6.98%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.018	<0.018	<0.016	<0.016	<0.018	0.017	0.0010	5.88%
Naphthalene	mg/kg	0.0346	0.391	<0.0090	0.010	<0.0079	<0.0079	0.010	0.0090	0.0011	12.22%
Phenanthrene	mg/kg	0.0419	0.515	0.0096	0.0093	<0.0079	<0.0079	0.0096	0.0089	0.00090	10.11%
Pyrene	mg/kg	0.053	0.875	<0.0090	<0.0088	<0.0079	<0.0079	<0.0090	0.0086	0.00060	6.98%
Total PAH	mg/kg	4	35	0.0096	0.029	<0.0079	<0.0079	0.029	0.0155	0.01172	75.63%
PAH Normalized to 1% TOC		**BCASQG**									
Total Organic Carbon	mg/kg			310000	300000	330000	300000	330000	313333	15275	4.88%
2-Methylnaphthalene	mg/kg			0.00029	0.00031	0.00024	0.00024	0.00031	0.00028	0.000037	13.21%
Acenaphthene	mg/kg	0.15		0.00015	0.00015	0.00012	0.00012	0.00015	0.00014	0.000014	10.14%
Acenaphthylene	mg/kg			0.00015	0.00015	0.00012	0.00012	0.00015	0.00014	0.000014	10.14%
Anthracene	mg/kg	0.60		0.00029	0.00029	0.00024	0.00024	0.00029	0.00027	0.000030	10.95%
Benzo(a)anthracene	mg/kg	0.2		0.00029	0.00029	0.00024	0.00024	0.00029	0.00027	0.000030	10.95%
Benzo(a)pyrene	mg/kg	0.06		0.00029	0.00029	0.00024	0.00024	0.00029	0.00027	0.000030	10.95%
Benzo(bj)fluoranthene	mg/kg			0.00029	0.00033	0.00042	0.00029	0.00042	0.00035	0.000068	19.48%
Benzo(ghi)perylene	mg/kg			0.00058	0.00060	0.00049	0.00049	0.00060	0.00056	0.000062	11.17%
Benzo(k)fluoranthene	mg/kg			0.00029	0.00029	0.00024	0.00024	0.00029	0.00027	0.000030	10.95%
Chrysene	mg/kg			0.00029	0.00029	0.00024	0.00024	0.00029	0.00027	0.000030	10.95%
Dibenz(a,h)anthracene	mg/kg			0.00015	0.00015	0.00012	0.00012	0.00015	0.00014	0.000014	10.14%
Fluoranthene	mg/kg	2		0.00029	0.00029	0.00024	0.00024	0.00029	0.00027	0.000030	10.95%
Fluorene	mg/kg	0.2		0.00029	0.00029	0.00024	0.00024	0.00029	0.00027	0.000030	10.95%
Indeno(1,2,3-cd)pyrene	mg/kg			0.00058	0.00060	0.00049	0.00049	0.00060	0.00056	0.000062	11.17%
Naphthalene	mg/kg	0.01		0.00029	0.00033	0.00024	0.00024	0.00033	0.00029	0.000047	16.38%
Phenanthrene	mg/kg	0.04		0.00031	0.00031	0.00024	0.00024	0.00031	0.00029	0.000041	14.34%
Pyrene	mg/kg			0.00029	0.00029	0.00024	0.00024	0.00029	0.00027	0.000030	10.95%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 249
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Lower Wetland

Lower Wetland Inlet - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code			LWM1	LWM2	LWM3					
	Permit No.			E292125	E292125	E292125					
	Depth (m)			0.4	0.4	0.4					
	Date			5-Oct-16	5-Oct-16	5-Oct-16					
	Sample Class			M	M	M					
	Units	ISQG	PEL				Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	0.013	0.028	0.016	0.013	0.028	0.019	0.0080	42.11%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0032	<0.0030	<0.0035	<0.0030	<0.0035	0.0032	0.00030	9.38%
Acenaphthylene	mg/kg	0.00587	0.128	<0.0032	<0.0030	<0.0035	<0.0030	<0.0035	0.0032	0.00030	9.38%
Anthracene	mg/kg	0.0469	0.245	<0.0064	<0.0059	<0.0070	<0.0059	<0.0070	0.0064	0.00060	9.38%
Benzo(a)anthracene	mg/kg	0.0317	0.385	<0.0064	<0.0059	<0.0070	<0.0059	<0.0070	0.0064	0.00060	9.38%
Benzo(a)pyrene	mg/kg	0.0319	0.782	<0.0064	<0.0059	<0.0070	<0.0059	<0.0070	0.0064	0.00060	9.38%
Benzo(b&j)fluoranthene	mg/kg			<0.0064	0.0061	0.0074	0.0061	0.0074	0.0066	0.00070	10.61%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	<0.013	<0.012	<0.014	<0.012	<0.014	0.013	0.0010	7.69%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.0064	<0.0059	<0.0070	<0.0059	<0.0070	0.0064	0.00060	9.38%
Chrysene	mg/kg	0.0571	0.862	<0.0064	<0.0059	<0.0070	<0.0059	<0.0070	0.0064	0.00060	9.38%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.0032	<0.0030	<0.0035	<0.0030	<0.0035	0.0032	0.00030	9.38%
Fluoranthene	mg/kg	0.111	2.355	<0.0064	<0.0059	<0.0070	<0.0059	<0.0070	0.0064	0.00060	9.38%
Fluorene	mg/kg	0.0212	0.144	<0.0064	<0.0059	<0.0070	<0.0059	<0.0070	0.0064	0.00060	9.38%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.013	<0.012	<0.014	<0.012	<0.014	0.013	0.0010	7.69%
Naphthalene	mg/kg	0.0346	0.391	0.012	0.019	0.011	0.011	0.019	0.014	0.0040	28.57%
Phenanthrene	mg/kg	0.0419	0.515	0.015	0.018	0.012	0.012	0.018	0.015	0.0030	20.00%
Pyrene	mg/kg	0.053	0.875	<0.0064	<0.0059	<0.0070	<0.0059	<0.0070	0.0064	0.00060	9.38%
Total PAH	mg/kg	4	35	0.039	0.065	0.039	0.039	0.065	0.04767	0.01501	31.49%
PAH Normalized to 1% TOC		**BCASQG**									
Total Organic Carbon	mg/kg			180000	160000	200000	160000	200000	180000	20000	11.11%
2-Methylnaphthalene	mg/kg			0.000722	0.0018	0.00080	0.00072	0.0018	0.0011	0.00057	52.43%
Acenaphthene	mg/kg	0.15		0.000178	0.00019	0.00018	0.00018	0.00019	0.00018	0.0000070	3.89%
Acenaphthylene	mg/kg			0.000178	0.00019	0.00018	0.00018	0.00019	0.00018	0.0000070	3.89%
Anthracene	mg/kg	0.60		0.000356	0.00037	0.00035	0.00035	0.00037	0.00036	0.000010	2.79%
Benzo(a)anthracene	mg/kg	0.2		0.000356	0.00037	0.00035	0.00035	0.00037	0.00036	0.000010	2.79%
Benzo(a)pyrene	mg/kg	0.06		0.000356	0.00037	0.00035	0.00035	0.00037	0.00036	0.000010	2.79%
Benzo(bj)fluoranthene	mg/kg			0.000356	0.00038	0.00037	0.00036	0.00038	0.00037	0.000013	3.52%
Benzo(ghi)perylene	mg/kg			0.000722	0.00075	0.00070	0.00070	0.00075	0.00072	0.000025	3.45%
Benzo(k)fluoranthene	mg/kg			0.000356	0.00037	0.00035	0.00035	0.00037	0.00036	0.000010	2.79%
Chrysene	mg/kg			0.000356	0.00037	0.00035	0.00035	0.00037	0.00036	0.000010	2.79%
Dibenz(a,h)anthracene	mg/kg			0.000178	0.00019	0.00018	0.00018	0.00019	0.00018	0.000007	3.89%
Fluoranthene	mg/kg	2		0.000356	0.00037	0.00035	0.00035	0.00037	0.00036	0.000010	2.79%
Fluorene	mg/kg	0.2		0.000356	0.00037	0.00035	0.00035	0.00037	0.00036	0.000010	2.79%
Indeno(1,2,3-cd)pyrene	mg/kg			0.000722	0.00075	0.00070	0.00070	0.00075	0.00072	0.000025	3.45%
Naphthalene	mg/kg	0.01		0.000667	0.0012	0.00055	0.00055	0.0012	0.00080	0.00034	42.52%
Phenanthrene	mg/kg	0.04		0.000833	0.0011	0.00060	0.00060	0.0011	0.00085	0.00026	30.55%
Pyrene	mg/kg			0.000356	0.00037	0.00035	0.00035	0.00037	0.00036	0.000010	2.79%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 250
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Lower Wetland

Lower Wetland Outlet - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code Permit No. Depth (m) Date Sample Class			LWO1 E292112 1 13-Sep-16 M	LWO2 E292112 1 13-Sep-16 M	LWO3 E292112 1 13-Sep-16 M	LWO4 E292112 1 13-Sep-16 M	LWO5 E292112 1 13-Sep-16 M					
	Units	ISQG	PEL						Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	0.0054	0.0061	0.0056	0.0070	0.0056	0.0054	0.0070	0.0059	0.00060	10.17%
Acenaphthene	mg/kg	0.00671	0.0889	<0.0020	<0.0021	<0.0019	<0.0021	<0.0022	<0.0019	<0.0022	0.0021	0.00010	4.76%
Acenaphthylene	mg/kg	0.00587	0.128	<0.0020	<0.0021	<0.0019	<0.0021	<0.0022	<0.0019	<0.0022	0.0021	0.00010	4.76%
Anthracene	mg/kg	0.0469	0.245	<0.0039	<0.0042	<0.0038	<0.0041	<0.0043	<0.0038	<0.0043	0.0041	0.00020	4.88%
Benzo(a)anthracene	mg/kg	0.0317	0.385	<0.0039	<0.0042	<0.0038	<0.0041	<0.0043	<0.0038	<0.0043	0.0041	0.00020	4.88%
Benzo(a)pyrene	mg/kg	0.0319	0.782	<0.0039	<0.0042	<0.0038	<0.0041	<0.0043	<0.0038	<0.0043	0.0041	0.00020	4.88%
Benzo(b&j)fluoranthene	mg/kg			0.0042	0.0048	<0.0038	0.0044	<0.0043	<0.0038	0.0048	0.0043	0.00040	9.30%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	<0.0078	<0.0084	<0.0076	<0.0082	<0.0086	<0.0076	<0.0086	0.0081	0.00040	4.94%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.0039	<0.0042	<0.0038	<0.0041	<0.0043	<0.0038	<0.0043	0.0041	0.00020	4.88%
Chrysene	mg/kg	0.0571	0.862	<0.0039	0.0044	<0.0038	0.0044	<0.0043	<0.0038	0.0044	0.0042	0.00030	7.14%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.0020	<0.0021	<0.0019	<0.0021	<0.0022	<0.0019	<0.0022	0.0021	0.00010	4.76%
Fluoranthene	mg/kg	0.111	2.355	0.0042	0.0048	0.0041	0.0048	0.0046	0.0041	0.0048	0.0045	0.00030	6.67%
Fluorene	mg/kg	0.0212	0.144	<0.0039	<0.0042	<0.0038	<0.0041	<0.0043	<0.0038	<0.0043	0.0041	0.00020	4.88%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.0078	<0.0084	<0.0076	<0.0082	<0.0086	<0.0076	<0.0086	0.0081	0.00040	4.94%
Naphthalene	mg/kg	0.0346	0.391	0.0042	0.0048	0.0041	0.0057	<0.0043	0.0041	0.0057	0.0046	0.00070	15.22%
Phenanthrene	mg/kg	0.0419	0.515	0.0092	0.0083	0.0079	0.0096	0.0093	0.0079	0.0096	0.0089	0.00070	7.87%
Pyrene	mg/kg	0.053	0.875	<0.0039	<0.0042	<0.0038	<0.0041	<0.0043	<0.0038	<0.0043	0.0041	0.00020	4.88%
Total PAH	mg/kg	4	35	0.023	0.029	0.022	0.031	0.019	0.019	0.031	0.0248	0.00502	20.24%
PAH Normalized to 1% TOC		**BCASQG**											
Total Organic Carbon	mg/kg			84000	66000	70000	65000	69000	65000	84000	70800	7661	10.82%
2-Methylnaphthalene	mg/kg			0.00064	0.00092	0.00080	0.0011	0.00081	0.00064	0.0011	0.00085	0.00016	19.01%
Acenaphthene	mg/kg	0.15		0.00024	0.00032	0.00027	0.00032	0.00032	0.00024	0.00032	0.00029	0.000038	12.93%
Acenaphthylene	mg/kg			0.00024	0.00032	0.00027	0.00032	0.00032	0.00024	0.00032	0.00029	0.000038	12.93%
Anthracene	mg/kg	0.60		0.00046	0.00064	0.00054	0.00063	0.00062	0.00046	0.00064	0.00058	0.000075	12.95%
Benzo(a)anthracene	mg/kg	0.2		0.00046	0.00064	0.00054	0.00063	0.00062	0.00046	0.00064	0.00058	0.000075	12.95%
Benzo(a)pyrene	mg/kg	0.06		0.00046	0.00064	0.00054	0.00063	0.00062	0.00046	0.00064	0.00058	0.000075	12.95%
Benzo(bj)fluoranthene	mg/kg			0.00050	0.00073	0.00054	0.00068	0.00062	0.00050	0.00073	0.00061	0.000093	15.15%
Benzo(ghi)perylene	mg/kg			0.00093	0.0013	0.0011	0.0013	0.0013	0.00093	0.0013	0.0012	0.00015	12.84%
Benzo(k)fluoranthene	mg/kg			0.00046	0.00064	0.00054	0.00063	0.00062	0.00046	0.00064	0.00058	0.000075	12.95%
Chrysene	mg/kg			0.00046	0.00067	0.00054	0.00068	0.00062	0.00046	0.00068	0.00060	0.000090	15.13%
Dibenz(a,h)anthracene	mg/kg			0.00024	0.00032	0.00027	0.00032	0.00032	0.00024	0.00032	0.00029	0.000038	12.93%
Fluoranthene	mg/kg	2		0.00050	0.00073	0.00059	0.00074	0.00067	0.00050	0.00074	0.00064	0.00010	15.53%
Fluorene	mg/kg	0.2		0.00046	0.00064	0.00054	0.00063	0.00062	0.00046	0.00064	0.00058	0.000075	12.95%
Indeno(1,2,3-cd)pyrene	mg/kg			0.00093	0.0013	0.0011	0.0013	0.0013	0.00093	0.0013	0.0012	0.00015	12.84%
Naphthalene	mg/kg	0.01		0.00050	0.00073	0.00059	0.00088	0.00062	0.00050	0.00088	0.00066	0.00015	21.87%
Phenanthrene	mg/kg	0.04		0.0011	0.0013	0.0011	0.0015	0.0014	0.0011	0.0015	0.0013	0.00016	12.70%
Pyrene	mg/kg			0.00046	0.00064	0.00054	0.00063	0.00062	0.00046	0.00064	0.00058	0.000075	12.95%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 251
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Quinsam River

Quinsam River at Argonaut Bridge - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code Permit No. Depth (m) Date Sample Class Units	ISQG	PEL	WA1 0126402 0.7 14-Sep-16 M	WA2 0126402 0.7 14-Sep-16 M	WA3 0126402 0.7 14-Sep-16 M	WA4 0126402 0.7 14-Sep-16 M	WA5 0126402 0.7 14-Sep-16 M	Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Acenaphthene	mg/kg	0.00671	0.0889	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	0.00	0.00%
Acenaphthylene	mg/kg	0.00587	0.128	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	0.00	0.00%
Anthracene	mg/kg	0.0469	0.245	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Benzo(a)anthracene	mg/kg	0.0317	0.385	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Benzo(a)pyrene	mg/kg	0.0319	0.782	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Benzo(b&j)fluoranthene	mg/kg			<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	0.00	0.00%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Chrysene	mg/kg	0.0571	0.862	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	0.00	0.00%
Fluoranthene	mg/kg	0.111	2.355	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Fluorene	mg/kg	0.0212	0.144	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	0.00	0.00%
Naphthalene	mg/kg	0.0346	0.391	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Phenanthrene	mg/kg	0.0419	0.515	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Pyrene	mg/kg	0.053	0.875	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Total PAH	mg/kg	4	35	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
PAH Normalized to 1% TOC		**BCASQG**											
Total Organic Carbon	mg/kg			45000	18000	39000	37000	16000	16000	45000	31000	13133	42.36%
2-Methylnaphthalene	mg/kg			0.00022	0.00056	0.00026	0.00027	0.00063	0.00022	0.00063	0.00039	0.00019	48.96%
Acenaphthene	mg/kg	0.15		0.00011	0.00028	0.00013	0.00014	0.00031	0.00011	0.00031	0.00019	0.00010	49.22%
Acenaphthylene	mg/kg			0.00011	0.00028	0.00013	0.00014	0.00031	0.00011	0.00031	0.00019	0.00010	49.22%
Anthracene	mg/kg	0.60		0.00022	0.00056	0.00026	0.00027	0.00063	0.00022	0.00063	0.00039	0.00019	48.96%
Benzo(a)anthracene	mg/kg	0.2		0.00022	0.00056	0.00026	0.00027	0.00063	0.00022	0.00063	0.00039	0.00019	48.96%
Benzo(a)pyrene	mg/kg	0.06		0.00022	0.00056	0.00026	0.00027	0.00063	0.00022	0.00063	0.00039	0.00019	48.96%
Benzo(bj)fluoranthene	mg/kg			0.00022	0.00056	0.00026	0.00027	0.00063	0.00022	0.00063	0.00039	0.00019	48.96%
Benzo(ghi)perylene	mg/kg			0.00044	0.0011	0.00051	0.00054	0.0013	0.00044	0.0013	0.00077	0.00038	48.96%
Benzo(k)fluoranthene	mg/kg			0.00022	0.00056	0.00026	0.00027	0.00063	0.00022	0.00063	0.00039	0.00019	48.96%
Chrysene	mg/kg			0.00022	0.00056	0.00026	0.00027	0.00063	0.00022	0.00063	0.00039	0.00019	48.96%
Dibenz(a,h)anthracene	mg/kg			0.00011	0.00028	0.00013	0.00014	0.00031	0.00011	0.00031	0.00019	0.00010	49.22%
Fluoranthene	mg/kg	2		0.00022	0.00056	0.00026	0.00027	0.00063	0.00022	0.00063	0.00039	0.00019	48.96%
Fluorene	mg/kg	0.2		0.00022	0.00056	0.00026	0.00027	0.00063	0.00022	0.00063	0.00039	0.00019	48.96%
Indeno(1,2,3-cd)pyrene	mg/kg			0.00044	0.0011	0.00051	0.00054	0.0013	0.00044	0.0013	0.00077	0.00038	48.96%
Naphthalene	mg/kg	0.01		0.00022	0.00056	0.00026	0.00027	0.00063	0.00022	0.00063	0.00039	0.00019	48.96%
Phenanthrene	mg/kg	0.04		0.00022	0.00056	0.00026	0.00027	0.00063	0.00022	0.00063	0.00039	0.00019	48.96%
Pyrene	mg/kg			0.00022	0.00056	0.00026	0.00027	0.00063	0.00022	0.00063	0.00039	0.00019	48.96%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 252
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Quinsam River

Quinsam River Downstream of North Mining Operation - Metals (ICPMS)

	Stn.Code			QRDS11	QRDS12	QRDS13	QRDS14	QRDS15					
	Permit No.			E286930	E286930	E286930	E286930	E286930					
	Depth (m)			0.7	0.7	0.7	0.7	0.7					
	Date			15-Sep-16	15-Sep-16	15-Sep-16	15-Sep-16	15-Sep-16					
	Sample Class			M	M	M	M	M					
	Units	ISQG	PEL						Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	0.0057	0.017	0.018	0.015	0.013	0.0057	0.018	0.0137	0.0049	35.77%
Acenaphthene	mg/kg	0.00671	0.0889	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	0.00	0.00%
Acenaphthylene	mg/kg	0.00587	0.128	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	0.00	0.00%
Anthracene	mg/kg	0.0469	0.245	<0.0010	0.0012	0.0016	0.0014	0.0010	<0.0010	0.0016	0.0012	0.00030	25.00%
Benzo(a)anthracene	mg/kg	0.0317	0.385	<0.0010	0.0012	0.0012	<0.0010	0.0010	<0.0010	0.0012	0.0011	0.00010	9.09%
Benzo(a)pyrene	mg/kg	0.0319	0.782	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Benzo(b&j)fluoranthene	mg/kg			<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	0.00	0.00%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Chrysene	mg/kg	0.0571	0.862	<0.0010	0.0015	0.0020	0.0014	0.0016	<0.0010	0.0020	0.0015	0.00040	26.67%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	0.00	0.00%
Fluoranthene	mg/kg	0.111	2.355	<0.0010	0.0014	0.0020	0.0010	0.0015	<0.0010	0.0020	0.0014	0.00040	28.57%
Fluorene	mg/kg	0.0212	0.144	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	0.00	0.00%
Naphthalene	mg/kg	0.0346	0.391	0.0048	0.016	0.022	0.013	0.014	0.0048	0.022	0.0140	0.0062	44.29%
Phenanthrene	mg/kg	0.0419	0.515	0.0041	0.0093	0.011	0.0068	0.0096	0.0041	0.011	0.0082	0.0027	32.93%
Pyrene	mg/kg	0.053	0.875	<0.0010	0.0014	0.0014	<0.0010	0.0012	<0.0010	0.0014	0.0012	0.00020	16.67%
Total PAH	mg/kg	4	35	0.015	0.049	0.060	0.039	0.043	0.015	0.060	0.0412	0.01665	40.41%
PAH Normalized to 1% TOC		**BCASQG**											
Total Organic Carbon	mg/kg			26000	49000	28000	32000	26000	26000	49000	32200	9706	30.14%
2-Methylnaphthalene	mg/kg			0.0022	0.0035	0.0064	0.0047	0.0050	0.0022	0.0064	0.0044	0.0016	36.82%
Acenaphthene	mg/kg	0.15		0.00019	0.00010	0.00018	0.00016	0.00019	0.00010	0.00019	0.00016	0.000038	23.00%
Acenaphthylene	mg/kg			0.00019	0.00010	0.00018	0.00016	0.00019	0.00010	0.00019	0.00016	0.000038	23.00%
Anthracene	mg/kg	0.60		0.00038	0.00024	0.00057	0.00044	0.00038	0.00024	0.00057	0.00040	0.00012	29.04%
Benzo(a)anthracene	mg/kg	0.2		0.00038	0.00024	0.00043	0.00031	0.00038	0.00024	0.00043	0.00035	0.000072	20.65%
Benzo(a)pyrene	mg/kg	0.06		0.00038	0.00020	0.00036	0.00031	0.00038	0.00020	0.00038	0.00033	0.000076	23.00%
Benzo(bj)fluoranthene	mg/kg			0.00038	0.00020	0.00036	0.00031	0.00038	0.00020	0.00038	0.00033	0.000076	23.00%
Benzo(ghi)perylene	mg/kg			0.00077	0.00041	0.00071	0.00063	0.00077	0.00041	0.00077	0.00066	0.00015	23.00%
Benzo(k)fluoranthene	mg/kg			0.00038	0.00020	0.00036	0.00031	0.00038	0.00020	0.00038	0.00033	0.000076	23.00%
Chrysene	mg/kg			0.00038	0.00031	0.00071	0.00044	0.00062	0.00031	0.00071	0.00049	0.00017	34.29%
Dibenz(a,h)anthracene	mg/kg			0.00019	0.00010	0.00018	0.00016	0.00019	0.00010	0.00019	0.00016	0.000038	23.00%
Fluoranthene	mg/kg	2		0.00038	0.00029	0.00071	0.00031	0.00058	0.00029	0.00071	0.00045	0.00018	40.54%
Fluorene	mg/kg	0.2		0.00038	0.00020	0.00036	0.00031	0.00038	0.00020	0.00038	0.00033	0.000076	23.00%
Indeno(1,2,3-cd)pyrene	mg/kg			0.00077	0.00041	0.00071	0.00063	0.00077	0.00041	0.00077	0.00066	0.00015	23.00%
Naphthalene	mg/kg	0.01		0.0018	0.0033	0.0079	0.0041	0.0054	0.0018	0.0079	0.0045	0.0023	50.88%
Phenanthrene	mg/kg	0.04		0.0016	0.0019	0.0039	0.0021	0.0037	0.0016	0.0039	0.0026	0.0011	41.05%
Pyrene	mg/kg			0.00038	0.00029	0.00050	0.00031	0.00046	0.00029	0.00050	0.00039	0.000092	23.75%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
***Red, bolded and underlined** font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 253
2016-17 Annual Report

Results of Sediment Chemistry Analysis in Quinsam River

Quinsam River Downstream of 7-South Mining Operations - Polycyclic Aromatic Hydrocarbons (GCMS)

	Stn.Code			7SQR1	7SQR2	7SQR3	7SQR4	7SQR5					
	Permit No.			E292113	E292113	E292113	E292113	E292113					
	Depth (m)			0.9	0.9	0.9	0.9	0.9					
	Date			19-Sep-16	19-Sep-16	19-Sep-16	19-Sep-16	19-Sep-16					
	Sample Class			M	M	M	M	M					
	Units	ISQG	PEL						Minimum	Maximum	Average	SD	RSD%
2-Methylnaphthalene	mg/kg	0.0202	0.201	0.051	0.082	0.013	0.021	0.0043	0.0043	0.082	0.034	0.032	93.29%
Acenaphthene	mg/kg	0.00671	0.0889	0.00092	0.0036	<0.00050	<0.00050	<0.00050	<0.00050	0.0036	0.0012	0.0014	112.50%
Acenaphthylene	mg/kg	0.00587	0.128	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	0.00	0.00%
Anthracene	mg/kg	0.0469	0.245	<0.0010	0.0078	<0.0010	0.0017	<0.0010	<0.0010	0.0078	0.0025	0.0030	120.00%
Benzo(a)anthracene	mg/kg	0.0317	0.385	0.0061	0.0080	<0.0010	0.0027	<0.0010	<0.0010	0.0080	0.0038	0.0032	84.21%
Benzo(a)pyrene	mg/kg	0.0319	0.782	0.0022	0.0026	<0.0010	<0.0010	<0.0010	<0.0010	0.0026	0.0016	0.00080	50.00%
Benzo(b&j)fluoranthene	mg/kg			0.0055	0.0039	<0.0010	<0.0010	<0.0010	<0.0010	0.0055	0.0025	0.0021	84.00%
Benzo(g,h,i)perylene	mg/kg	0.17	0.17	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	0.00	0.00%
Benzo(k)fluoranthene	mg/kg	0.24	0.24	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.00	0.00%
Chrysene	mg/kg	0.0571	0.862	0.0090	0.0099	0.0013	0.0040	0.0012	0.0012	0.0099	0.0051	0.0042	82.35%
Dibenz(a,h)anthracene	mg/kg	0.0062	0.135	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	0.00	0.00%
Fluoranthene	mg/kg	0.111	2.355	0.0081	0.011	0.0017	0.0034	0.0014	0.0014	0.011	0.0051	0.0042	82.35%
Fluorene	mg/kg	0.0212	0.144	<0.0010	0.0056	<0.0010	<0.0010	<0.0010	<0.0010	0.0056	0.0019	0.0021	110.53%
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	0.00	0.00%
Naphthalene	mg/kg	0.0346	0.391	0.037	0.030	0.010	0.015	0.0032	0.0032	0.037	0.019	0.014	74.21%
Phenanthrene	mg/kg	0.0419	0.515	0.044	0.079	0.0065	0.022	0.0044	0.0044	0.079	0.031	0.031	99.68%
Pyrene	mg/kg	0.053	0.875	0.0064	0.0071	<0.0010	0.0026	<0.0010	<0.0010	0.0071	0.0036	0.0029	80.56%
Total PAH	mg/kg	4	35	0.16	0.25	0.033	0.072	0.015	0.015	0.25	0.106	0.09800	92.46%
PAH Normalized to 1% TOC		**BCASQG**											
Total Organic Carbon	mg/kg			19000	39000	37000	19000	32000	19000	39000	29200	9654	33.06%
2-Methylnaphthalene	mg/kg			0.027	0.021	0.0035	0.011	0.0013	0.0013	0.027	0.013	0.011	86.27%
Acenaphthene	mg/kg	0.15		0.00048	0.00092	0.00014	0.00026	0.00016	0.00014	0.00092	0.00039	0.00033	83.42%
Acenaphthylene	mg/kg			0.00026	0.00013	0.00014	0.00026	0.00016	0.00013	0.00026	0.00019	0.000068	35.98%
Anthracene	mg/kg	0.60		0.00053	0.0020	0.00027	0.00090	0.00031	0.00027	0.0020	0.00080	0.00072	89.26%
Benzo(a)anthracene	mg/kg	0.2		0.0032	0.0021	0.00027	0.0014	0.00031	0.00027	0.0032	0.0015	0.0012	85.27%
Benzo(a)pyrene	mg/kg	0.06		0.0012	0.00067	0.00027	0.00053	0.00031	0.00027	0.0012	0.00059	0.00036	60.99%
Benzo(bj)fluoranthene	mg/kg			0.0029	0.0010	0.00027	0.00053	0.00031	0.00027	0.0029	0.0010	0.0011	109.60%
Benzo(ghi)perylene	mg/kg			0.0011	0.00051	0.00054	0.0011	0.00063	0.00051	0.0011	0.00076	0.00027	35.98%
Benzo(k)fluoranthene	mg/kg			0.00053	0.00026	0.00027	0.00053	0.00031	0.00026	0.00053	0.00038	0.00014	36.24%
Chrysene	mg/kg			0.0047	0.0025	0.00035	0.0021	0.00038	0.00035	0.0047	0.0020	0.0018	89.67%
Dibenz(a,h)anthracene	mg/kg			0.00026	0.00013	0.00014	0.00026	0.00016	0.00013	0.00026	0.00019	0.000068	35.98%
Fluoranthene	mg/kg	2		0.0043	0.0028	0.00046	0.0018	0.00044	0.00044	0.0043	0.0020	0.0016	83.46%
Fluorene	mg/kg	0.2		0.00053	0.00144	0.00027	0.00053	0.00031	0.00027	0.0014	0.00062	0.00048	77.40%
Indeno(1,2,3-cd)pyrene	mg/kg			0.0011	0.00051	0.00054	0.0011	0.00063	0.00051	0.0011	0.00076	0.00027	35.98%
Naphthalene	mg/kg	0.01		0.020	0.0077	0.0027	0.0079	0.0010	0.0010	0.020	0.0078	0.0072	93.17%
Phenanthrene	mg/kg	0.04		0.023	0.0203	0.0018	0.012	0.0014	0.0014	0.023	0.012	0.010	87.04%
Pyrene	mg/kg			0.0034	0.0018	0.00027	0.0014	0.00031	0.00027	0.0034	0.0014	0.0013	89.29%

Notes:

Factor applied to less-than results when calculating statistics: 1.0
ISQG = Interim Sediment Quality Guidelines (BC)
PEL = Probable Effects Level
BCASQG = BC Approved Sediment Quality Guidelines (Based on 1% TOC)
SD = Standard Deviation

Factor applied to greater-than results when calculating statistics: 1.0
Red font indicates ISQG exceedance
Red, bolded and underlined *font indicates PEL exceedace*
Red font indicates BCASQG exceedance
RSD% = Relative Standard Devation

Table 254
2016-17 Annual Report

Relative Percent Difference (RPD) Sediment Values Greater Than 20%

Site Code	EMS ID	Date	Parameter	Units	Result 1	Result 2	RPD Greater than 20%	LMDL	5XDL
7SQR1	E292113	19-Sep-16	Fluoranthene	mg/kg	0.0081	0.011	30	0.0010	0.005
7SQR1	E292113	19-Sep-16	Benzo(a)anthracene	mg/kg	0.0061	0.0085	33	0.0010	0.005
7SQR1	E292113	19-Sep-16	HighMolecularWeightPAH	mg/kg	0.032	0.045	34	0.0010	0.005
7SQR1	E292113	19-Sep-16	Chrysene	mg/kg	0.0090	0.013	36	0.0010	0.005
7SQR1	E292113	19-Sep-16	Pyrene	mg/kg	0.0064	0.010	44	0.0010	0.005
7SQR1	E292113	19-Sep-16	Phenanthrene	mg/kg	0.044	0.075	52	0.0010	0.005
7SQR1	E292113	19-Sep-16	LowMolecularWeightPAH	mg/kg	0.13	0.25	63	0.0010	0.005
7SQR1	E292113	19-Sep-16	Naphthalene	mg/kg	0.037	0.072	64	0.0010	0.005
7SQR1	E292113	19-Sep-16	(2)Methylnaphthalene	mg/kg	0.051	0.10	65	0.00050	0.0025
7SQR1	E292113	19-Sep-16	Total Sulphur	%	0.17	0.084	68	0.030	0.15
LLNS1	E292123	31-Aug-16	Anthracene	mg/kg	0.033	0.026	24	0.0010	0.005
LLNS1	E292123	31-Aug-16	Total Tin	mg/kg	6.24	0.52	169	0.10	0.5
LQL1	E29118	12-Sep-16	Fluoranthene	mg/kg	0.017	0.021	21	0.0010	0.005
LQL1	E29118	12-Sep-16	D10-Anthracene	%	80	99	21	%	
LQL1	E29118	12-Sep-16	pH-L	mg/kg	5.85	7.31	22		0
LQL1	E29118	12-Sep-16	LowMolecularWeightPAH	mg/kg	0.34	0.43	23	0.0010	0.005
LQL1	E29118	12-Sep-16	Sand	%	22	17	26	%	
LQL1	E29118	12-Sep-16	Phenanthrene	mg/kg	0.074	0.098	28	0.0010	0.005
LQL1	E29118	12-Sep-16	Anthracene	mg/kg	0.0081	0.011	30	0.0010	0.005
LQL1	E29118	12-Sep-16	HighMolecularWeightPAH	mg/kg	0.065	0.089	31	0.0010	0.005
LQL1	E29118	12-Sep-16	D14-Terphenyl	%	69	95	32	2.0	10
LQL1	E29118	12-Sep-16	Benzo(b&j)fluoranthene	mg/kg	0.013	0.018	32	0.0010	0.005
LQL1	E29118	12-Sep-16	Benzo(a)anthracene	mg/kg	0.010	0.014	33	0.0010	0.005
LQL1	E29118	12-Sep-16	Naphthalene	mg/kg	0.10	0.14	33	0.0010	0.005
LQL1	E29118	12-Sep-16	D8-Naphthalene	%	67	97	37	0.0010	0.005
LQL1	E29118	12-Sep-16	D8-Acenaphthylene	%	63	92	37	0.00050	0.0025
LQL1	E29118	12-Sep-16	Chrysene	mg/kg	0.016	0.024	40	0.0010	0.005
LWO1	E292112	13-Sep-16	LowMolecularWeightPAH	mg/kg	0.019	0.015	24	0.0010	0.005
LWO1	E292112	13-Sep-16	D10-Anthracene	%	97	124	24	%	
LWO1	E292112	13-Sep-16	Clay	%	12	8.8	31	2.0	10
LWO1	E292112	13-Sep-16	Fluoranthene	mg/kg	0.0042	0.0060	35	0.0010	0.005
LWO1	E292112	13-Sep-16	HighMolecularWeightPAH	mg/kg	0.0042	0.0060	35	0.0010	0.005
MQLNS1	E292116	1-Sep-16	Naphthalene	mg/kg	0.041	0.032	25	0.0010	0.005
NNLS1	E292114	24-Aug-16	Clay	%	8.8	12	31	2.0	10
WA1	O126402	14-Sep-16	Total Organic Carbon	mg/kg	45000	34000	28	%	
WA1	O126402	14-Sep-16	Total Bismuth	mg/kg	0.55	0.41	29	0.10	0.5
WA1	O126402	14-Sep-16	Total Sulphur	%	0.25	0.15	50	0.030	0.15
WA1	O126402	14-Sep-16	Silt	%	4.9	2.5	65	%	

Appendix II

Appendix II
List of Graphs

Graph 1	Hardness Settling Pond 4
Graph 2	Average Monthly Dissolved Sulphate Settling Pond 4
Graph 3	Weekly pH Settling Pond 4
Graph 4	Total Suspended Solids Settling Pond 4 & WC
Graph 5	Dissolved Iron Settling Pond 4
Graph 6	Dissolved Aluminum Settling Pond 4
Graph 7	Total Managanese Settling Pond 4
Graph 8	Total Iron Settling Pond 4 vs QU10-13 D
Graph 9	Hardness Settling Pond 1
Graph 10	Average Monthly Dissolved Sulphate Settling Pond 1
Graph 11	Weekly Field pH Settling Pond 1
Graph 12	Total Suspended Solids Settling Pond 1
Graph 13	Dissolved Iron Settling Pond 1
Graph 14	Total Manganese Settling Pond 1
Graph 15	Dissolved Sulphate 7SSD vs 7S
Graph 16	Discharge vs Total Suspended Solids 7SSD
Graph 17	Dissolved Aluminum 7SSD vs 7S
Graph 18	Total Arsenic 7SSD vs. 7S
Graph 19	Dissolved and Total Copper 7SSD vs. 7S
Graph 20	Dissolved Iron 7SSD vs 7S
Graph 21	Total Manganese 7SSD vs. 7S
Graph 22	Dissolved Sulphate vs Discharge LLE
Graph 23	Dissolved Iron vs Discharge LLE
Graph 24	Dissolved Sulphate Seeps Into Long Lake
Graph 25	Dissolved Arsenic Seeps Into Long Lake
Graph 26	Total Manganese Seeps Into Long Lake
Graph 27	5 in 30 Hardness No Name Lake
Graph 28	5 in 30 pH No Name Lake
Graph 29	5 in 30 Average Dissolved Sulphate No Name Lake
Graph 30	5 in 30 Dissolved Iron No Name Lake
Graph 31	5 in 30 Total Iron No Name Lake
Graph 32	5 in 30 Hardness Long Lake
Graph 33	5 in 30 pH Long Lake
Graph 34	Historic Dissolved Oxygen vs Total Manganese Long Lake 1 Metre from bottom 2005-2016
Graph 35	Historic Dissolved Sulphate Long Lake

Appendix II
List of Graphs

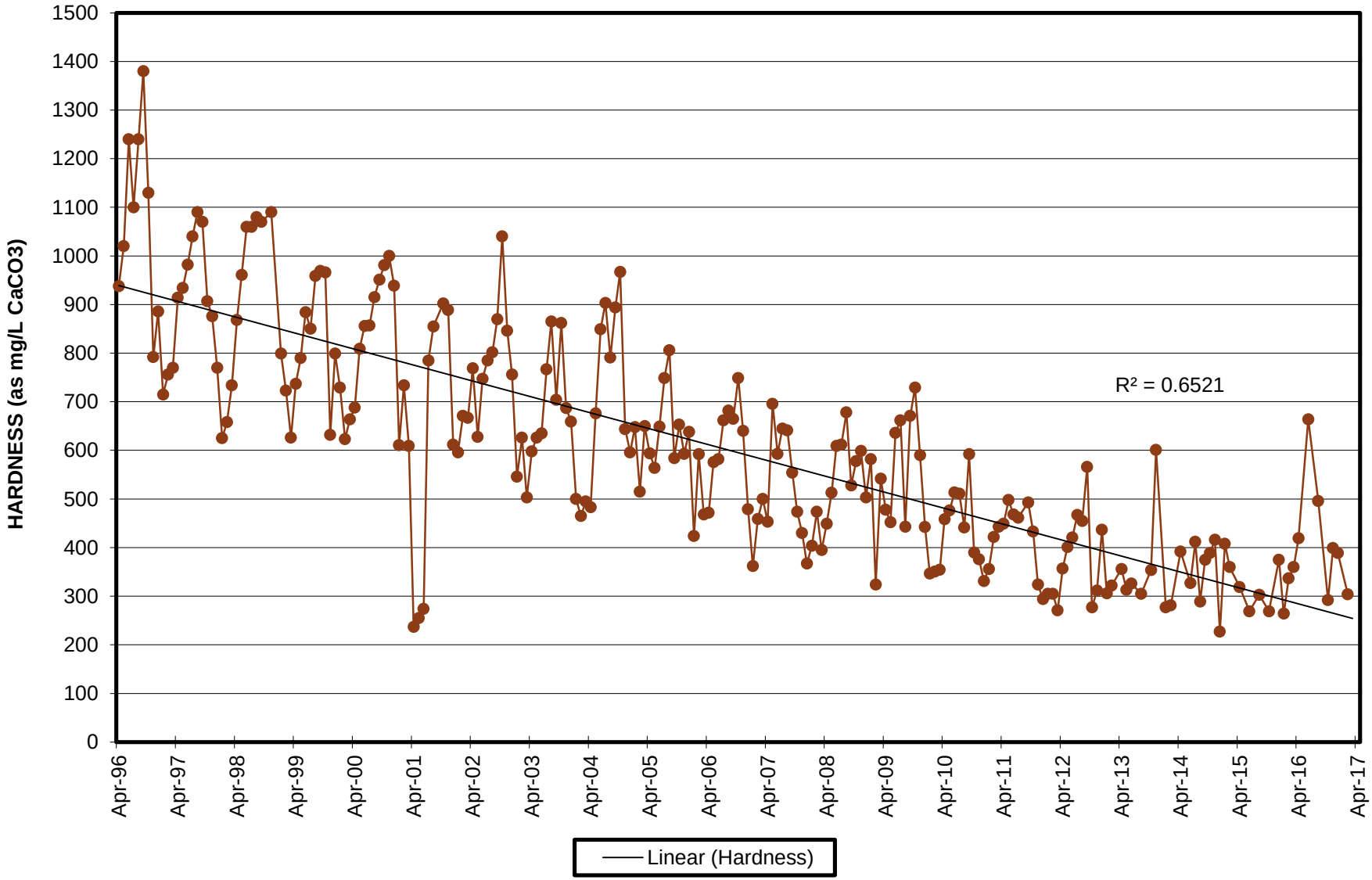
Graph 36	5 in 30 Average Dissolved Sulphate Long Lake
Graph 37	5 in 30 Total Manganese Long Lake
Graph 38	5 in 30 Average Total Manganese Long Lake
Graph 39	5 in 30 Hardness Middle Quinsam Lake
Graph 40	5 in 30 pH Middle Quinsam Lake
Graph 41	5 in 30 Average Dissolved Sulphate Middle Quinsam Lake
Graph 42	5 in 30 Total Manganese Middle Quinsam Lake
Graph 43	5 in 30 Average Total Manganese Middle Quinsam Lake
Graph 44	5 in 30 Total Arsenic Middle Quinsam Lake
Graph 45	5 in 30 Total Iron Middle Quinsam Lake
Graph 46	5 in 30 Hardness Lower Quinsam Lake
Graph 47	5 in 30 pH Lower Quinsam Lake
Graph 48	5 in 30 Average Dissolved Sulphate Lower Quinsam Lake
Graph 49	5 in 30 Total Manganese Lower Quinsam Lake
Graph 50	5 in 30 Average Total Manganese Lower Quinsam Lake
Graph 51	5 in 30 Dissolved Iron vs Dissolved Oxgen Lower Quinsam Lake 1mb
Graph 52	5 in 30 Total Iron vs Dissolved Oxgen Lower Quinsam Lake 1mb
Graph 53	5 in 30 Average Dissolved Sulphate Quinsam Sub Basin: Rivers and Streams
Graph 54	Dissolved Sulphate Quinsam Sub Basin: Rivers and Streams (NNO to LLO)
Graph 55	Dissolved Sulphate Quinsam Sub Basin: Rivers (WA, WB to 7SQR)
Graph 56	5 in 30 Average Dissolved Aluminum Quinsam Sub Basin: Rivers and Streams
Graph 57	5 in 30 Dissolved Aluminum Quinsam Sub Basin: Rivers and Streams
Graph 58	Total Arsenic Quinsam Sub Basin: Rivers and Streams
Graph 59	Total Zinc Quinsam Sub Basin: Rivers and Streams
Graph 60	Dissolved Aluminum vs. Flow Iron River
Graph 61	5 in 30 Average Dissolved Aluminum vs. Flow Iron River
Graph 62	Total Arsenic vs. Flow Iron River
Graph 63	Flow vs. Precipitation WA
Graph 64	Flow vs. Precipitation WB
Graph 65	Discharge LLSM
Graph 66	Discharge vs. Precipitation LLE
Graph 67	Flow vs. Precipitation LLO
Graph 68	Discharge vs. Precipitation 7SSD
Graph 69	Flow vs. Precipitation 7S Stream 1
Graph 70	Flow vs. Precipitation IR8

GRAPH 1

HARDNESS

SETTLING POND 4

QUINSAM COAL

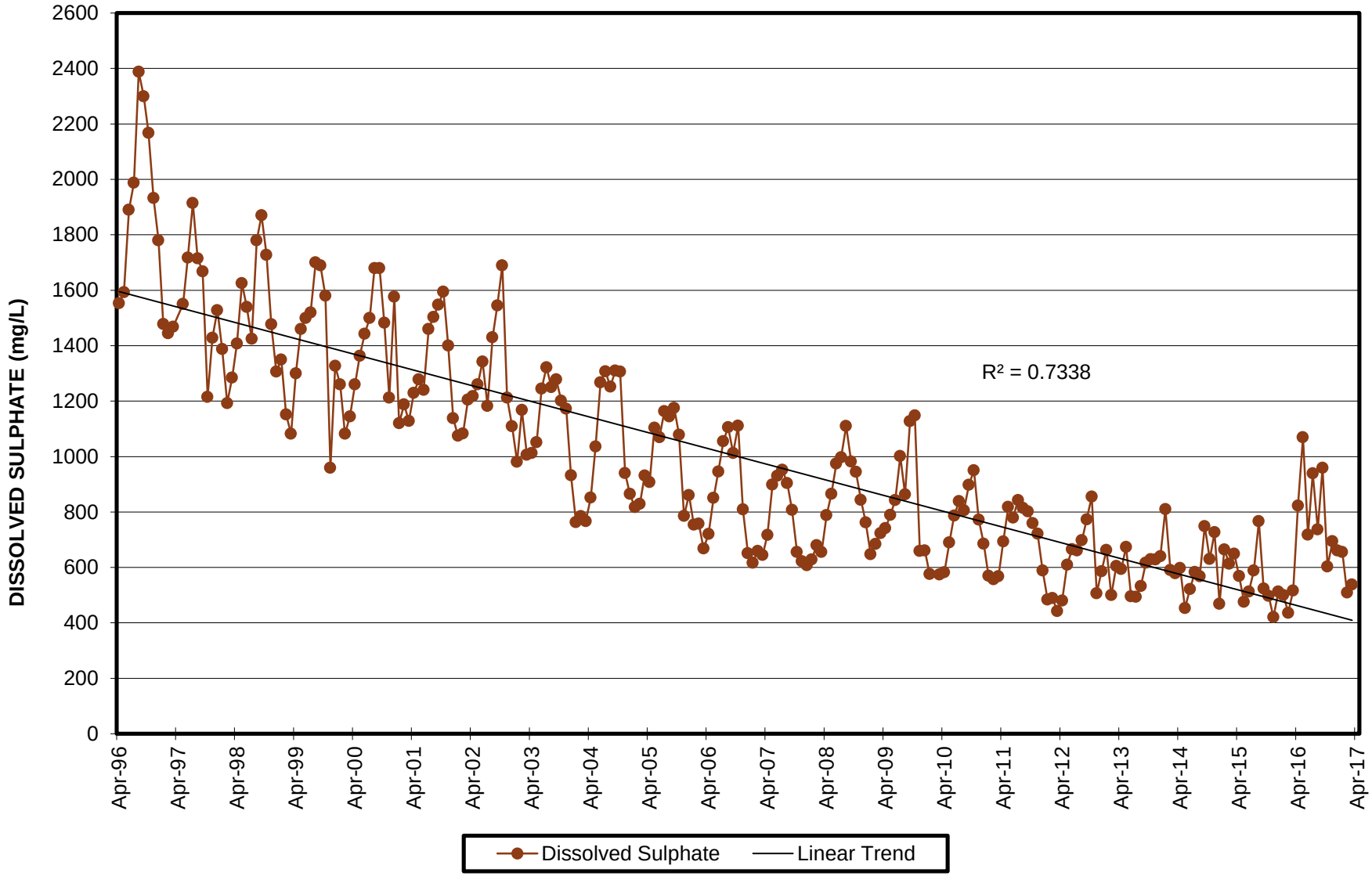


GRAPH 2

AVERAGE MONTHLY DISSOLVED SULPHATE

SETTLING POND 4

QUINSAM COAL

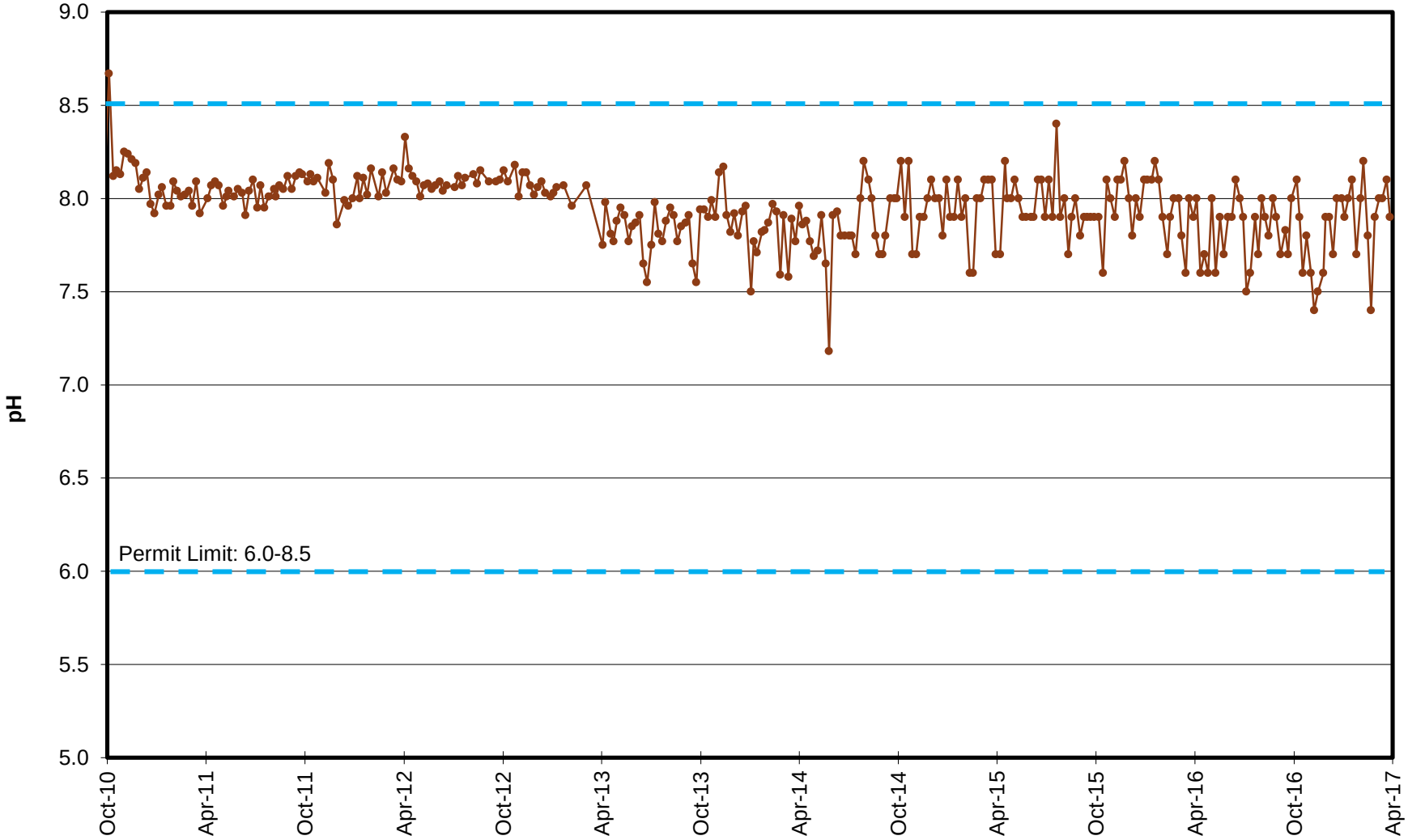


GRAPH 3

WEEKLY pH

SETTLING POND 4

QUINSAM COAL

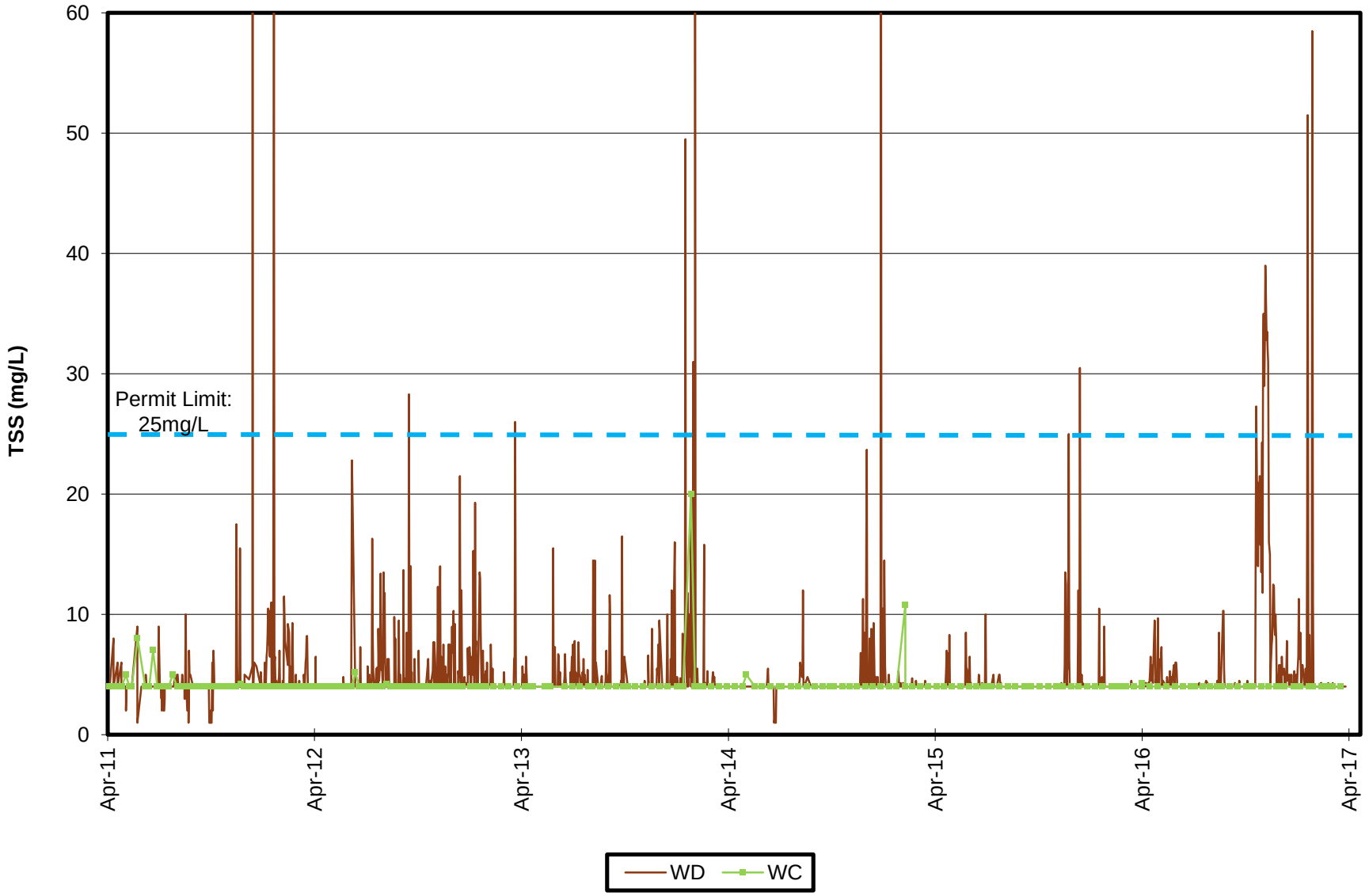


GRAPH 4

TOTAL SUSPENDED SOLIDS

SETTLING POND 4 & WC

QUINSAM COAL

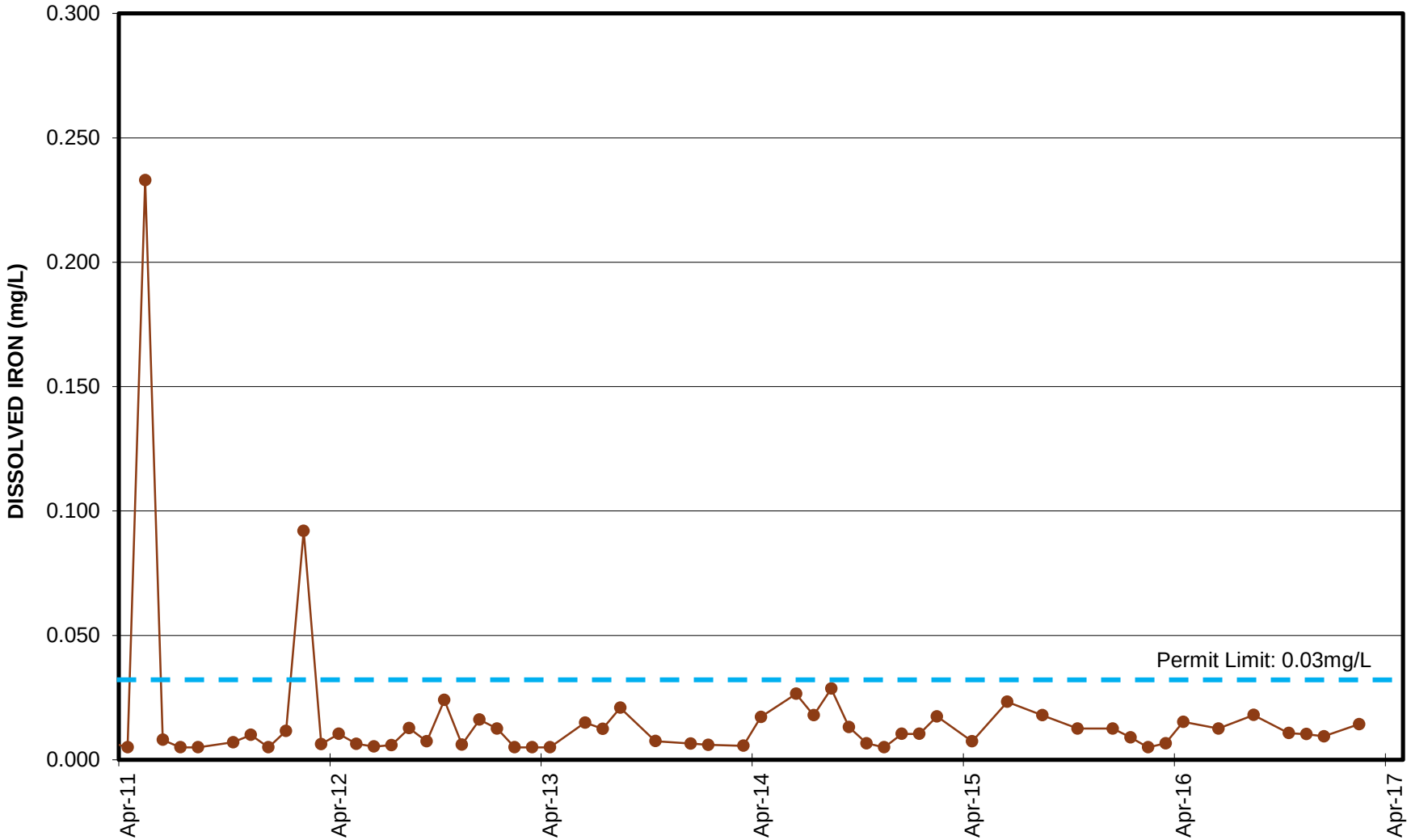


GRAPH 5

DISSOLVED IRON

SETTLING POND 4

QUINSAM COAL

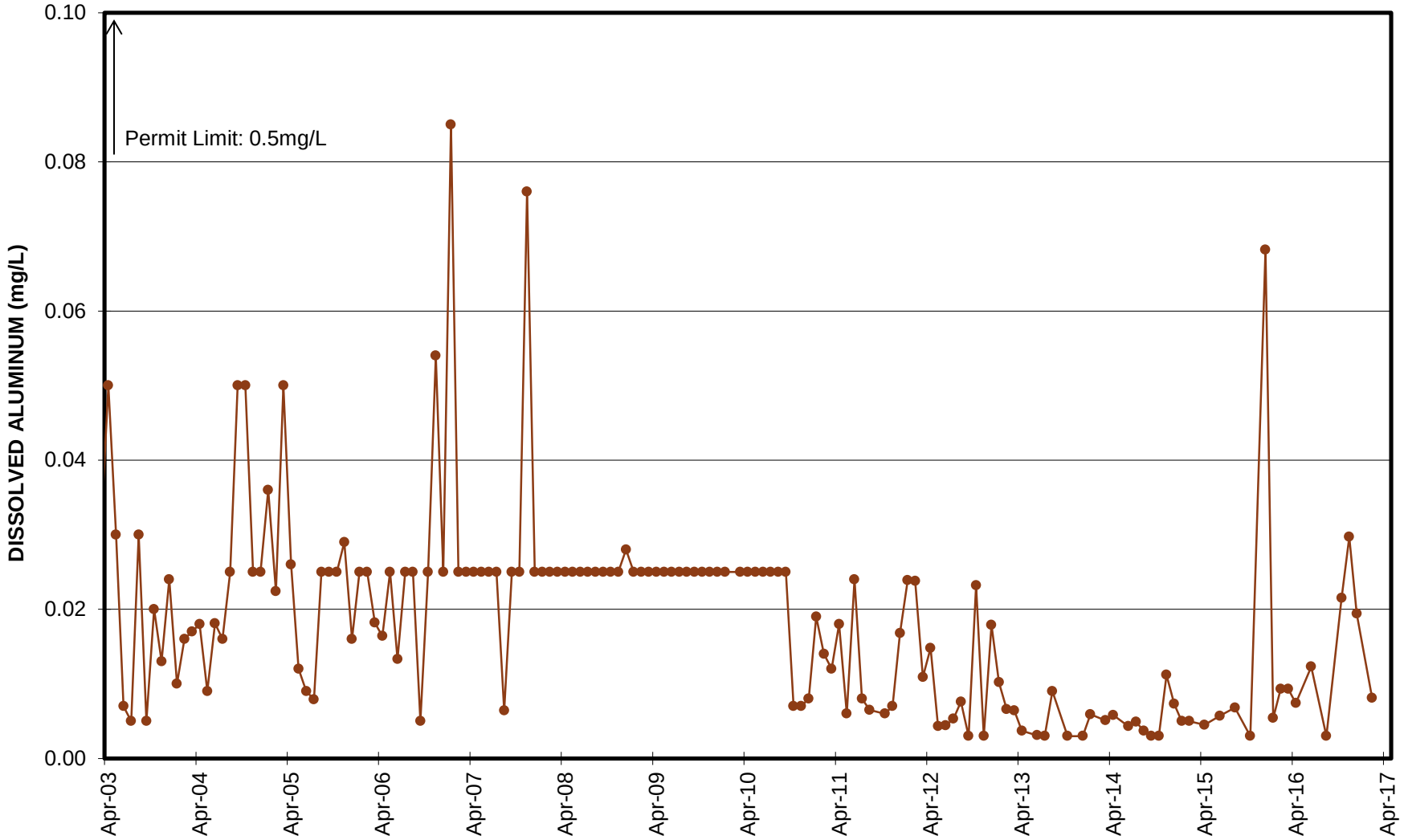


GRAPH 6

DISSOLVED ALUMINUM

SETTLING POND 4

QUINSAM COAL

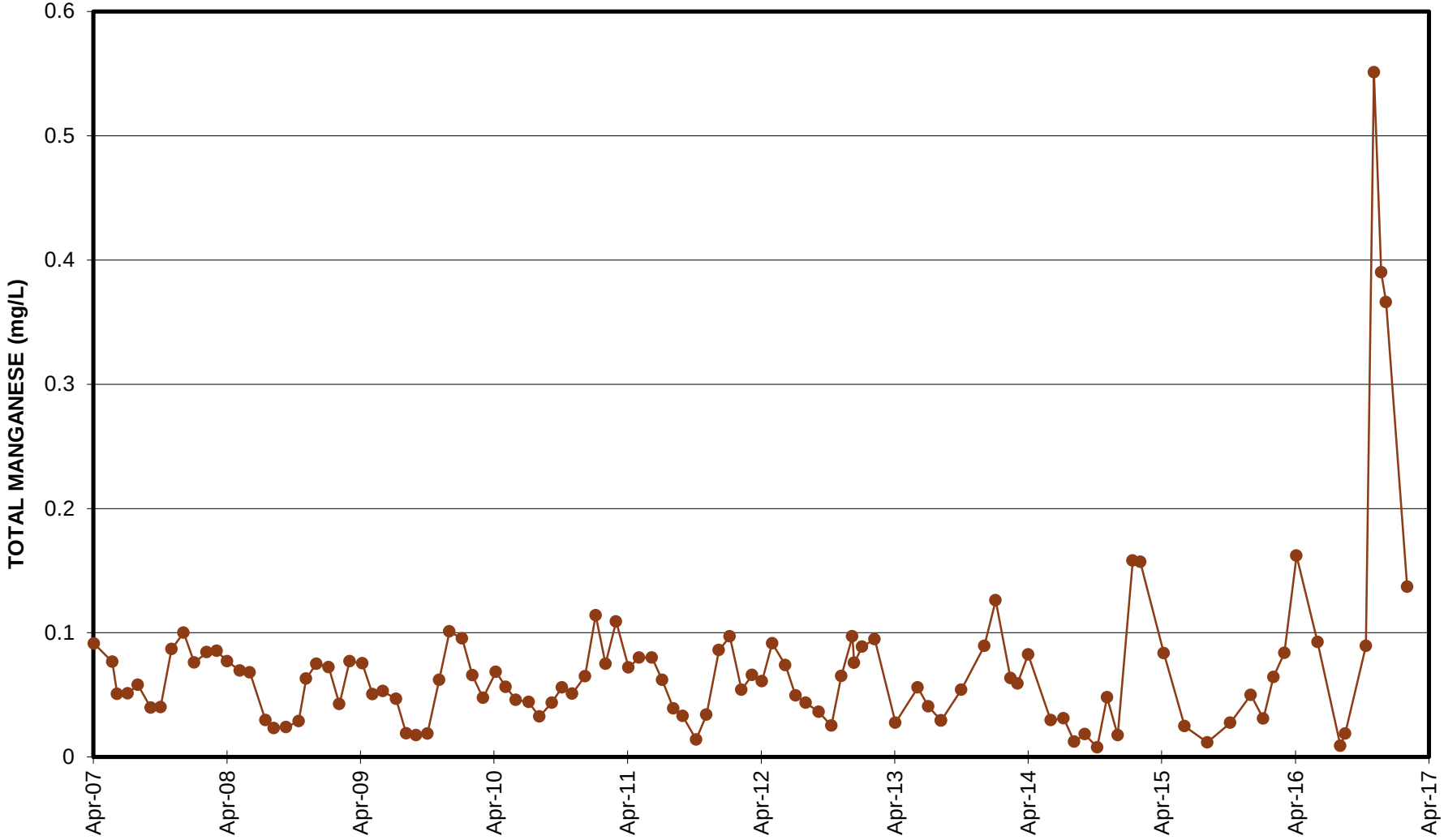


GRAPH 7

TOTAL MANGANESE

SETTLING POND 4

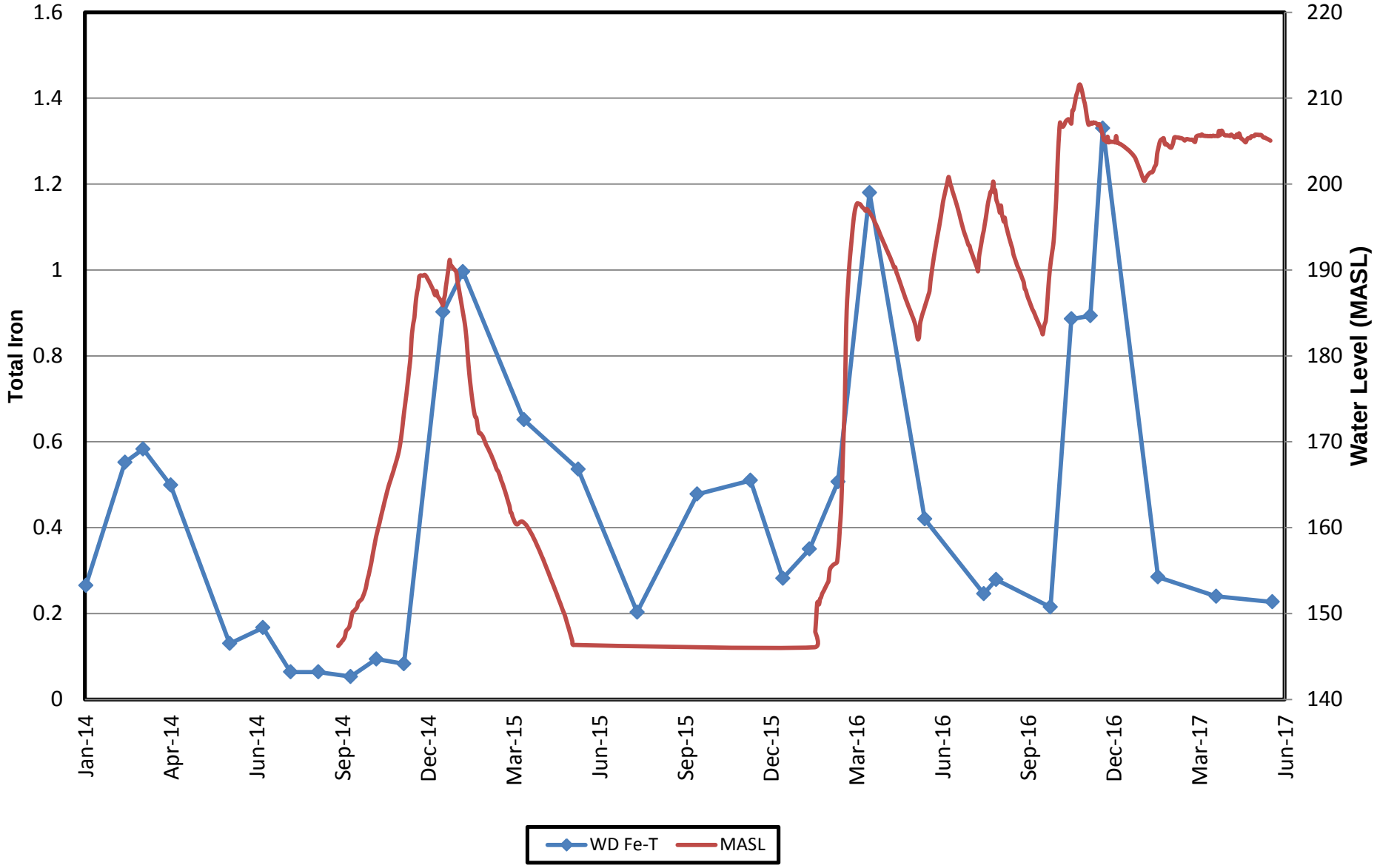
QUINSAM COAL



GRAPH 8

TOTAL IRON

SETTLING POND 4 vs Water Level in QU10-13 D

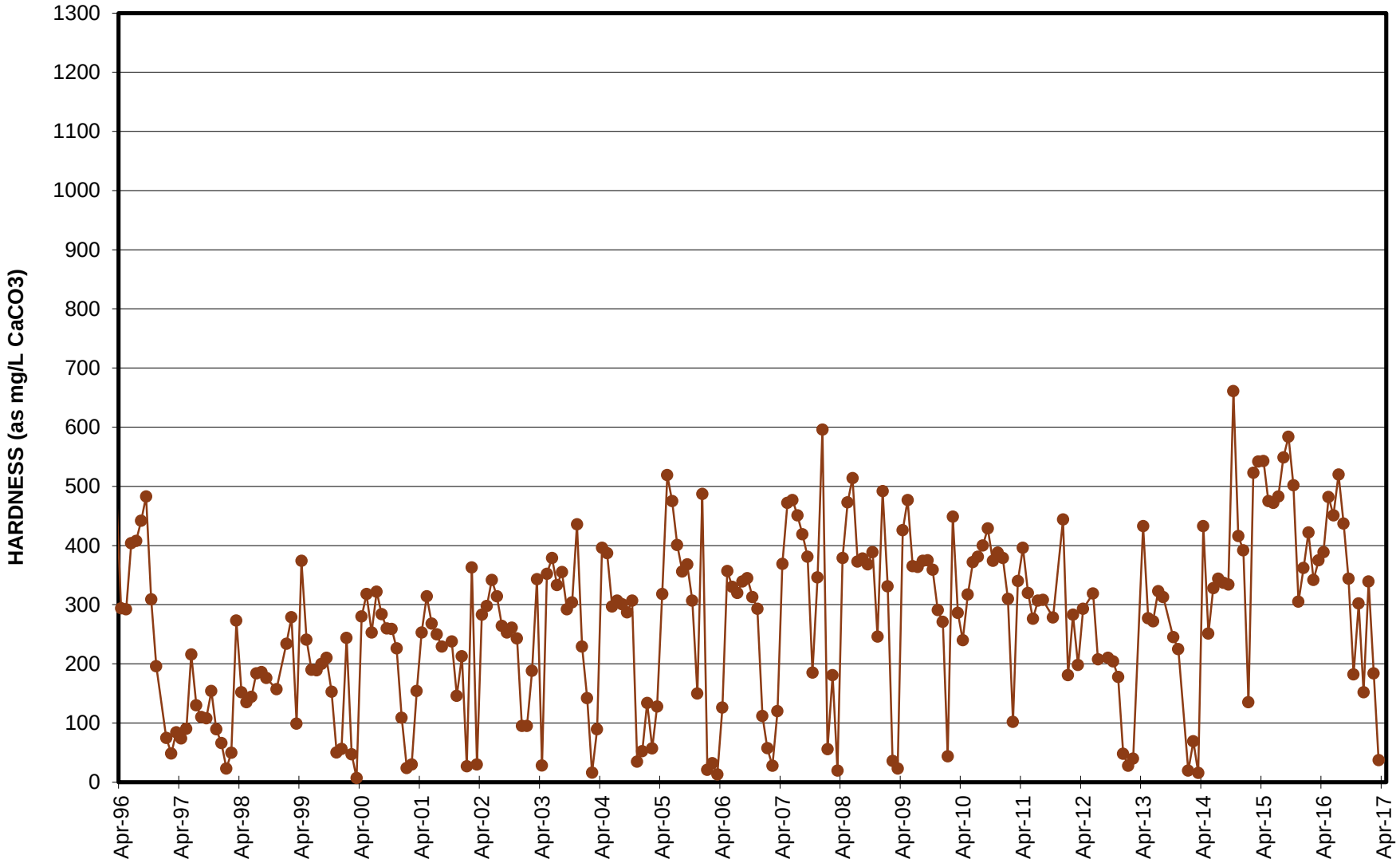


GRAPH 9

HARDNESS

SETTLING POND 1

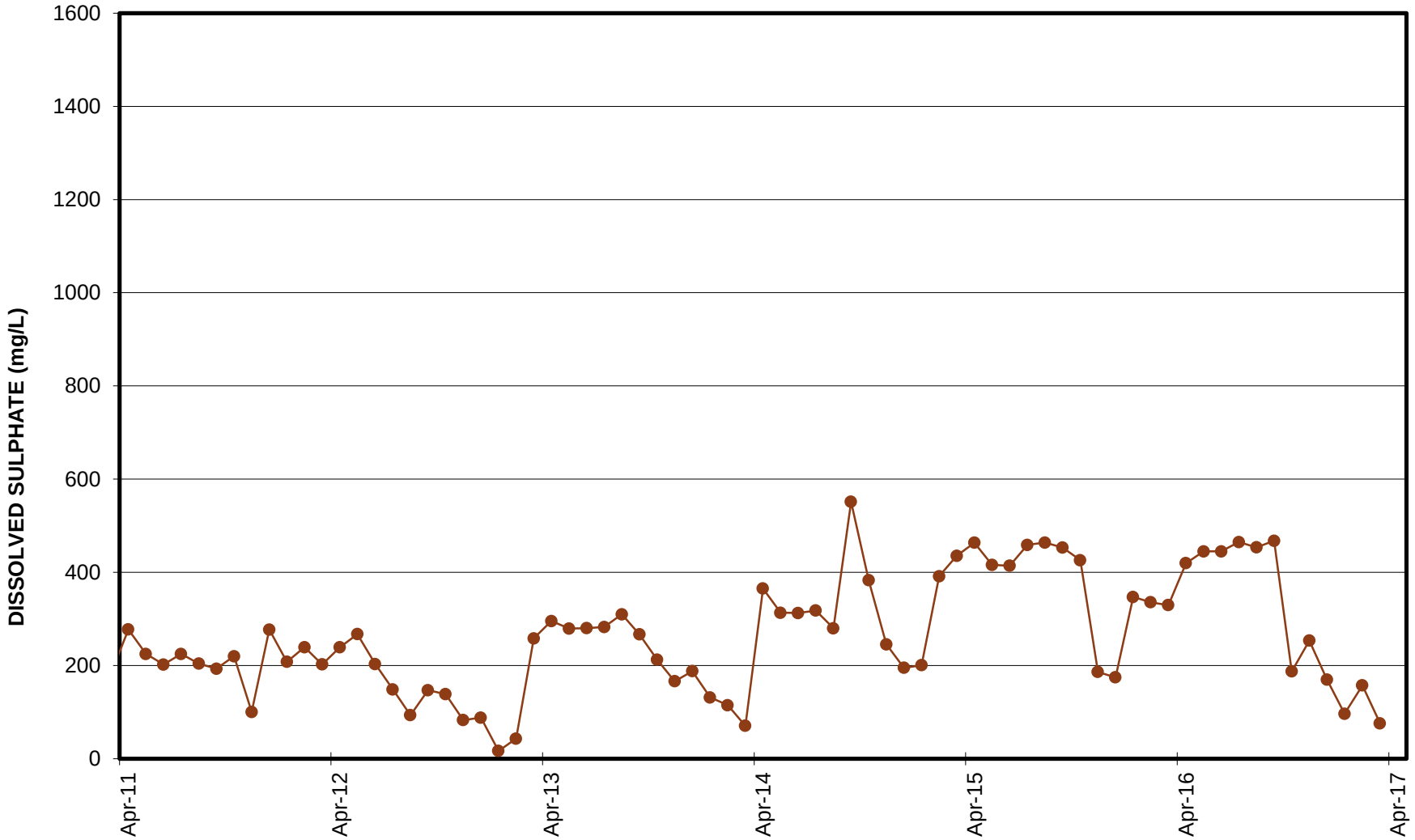
QUINSAM COAL



GRAPH 10

AVERAGE MONTHLY DISSOLVED SULPHATE

SETTLING POND 1

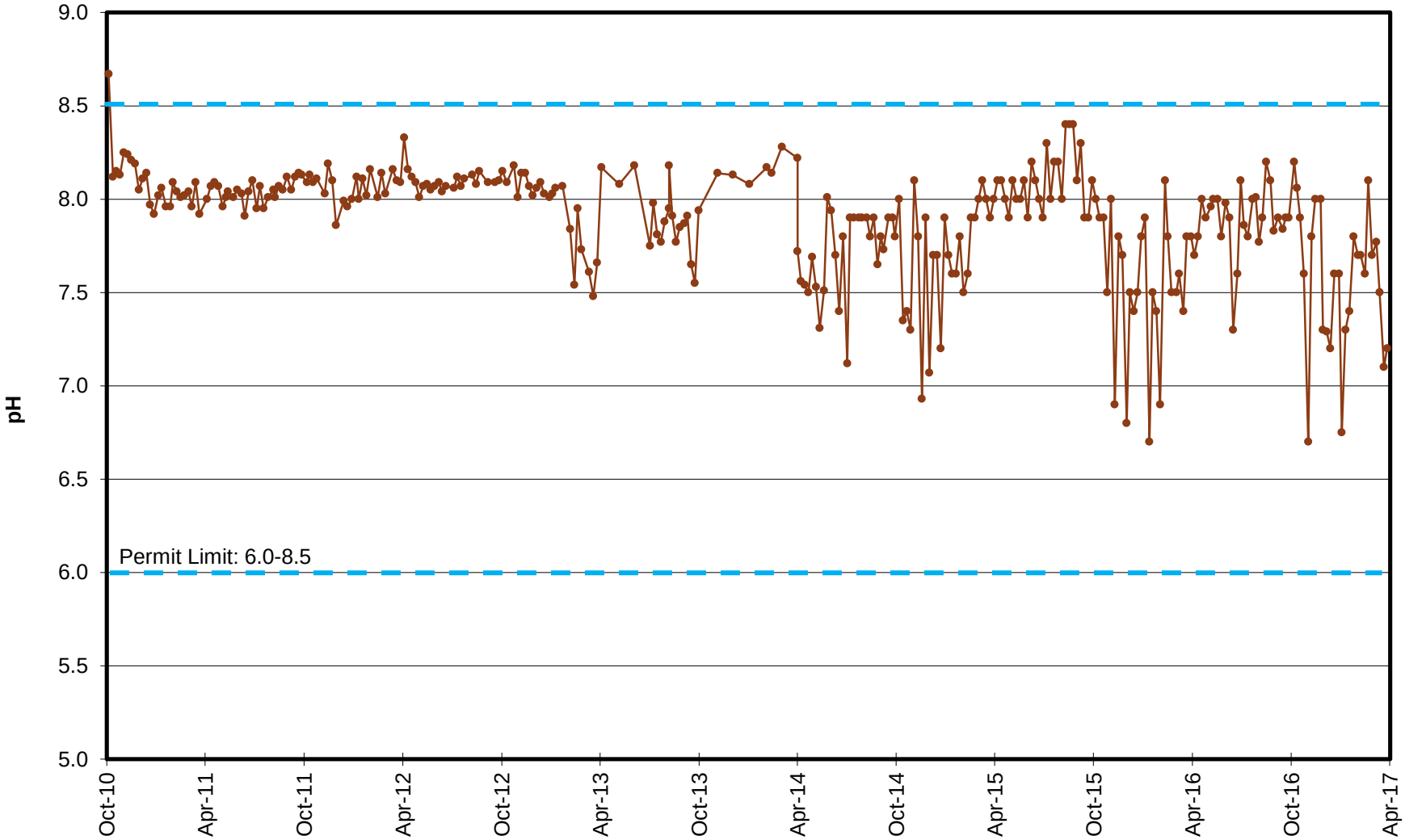


GRAPH 11

WEEKLY FIELD pH

SETTLING POND 1

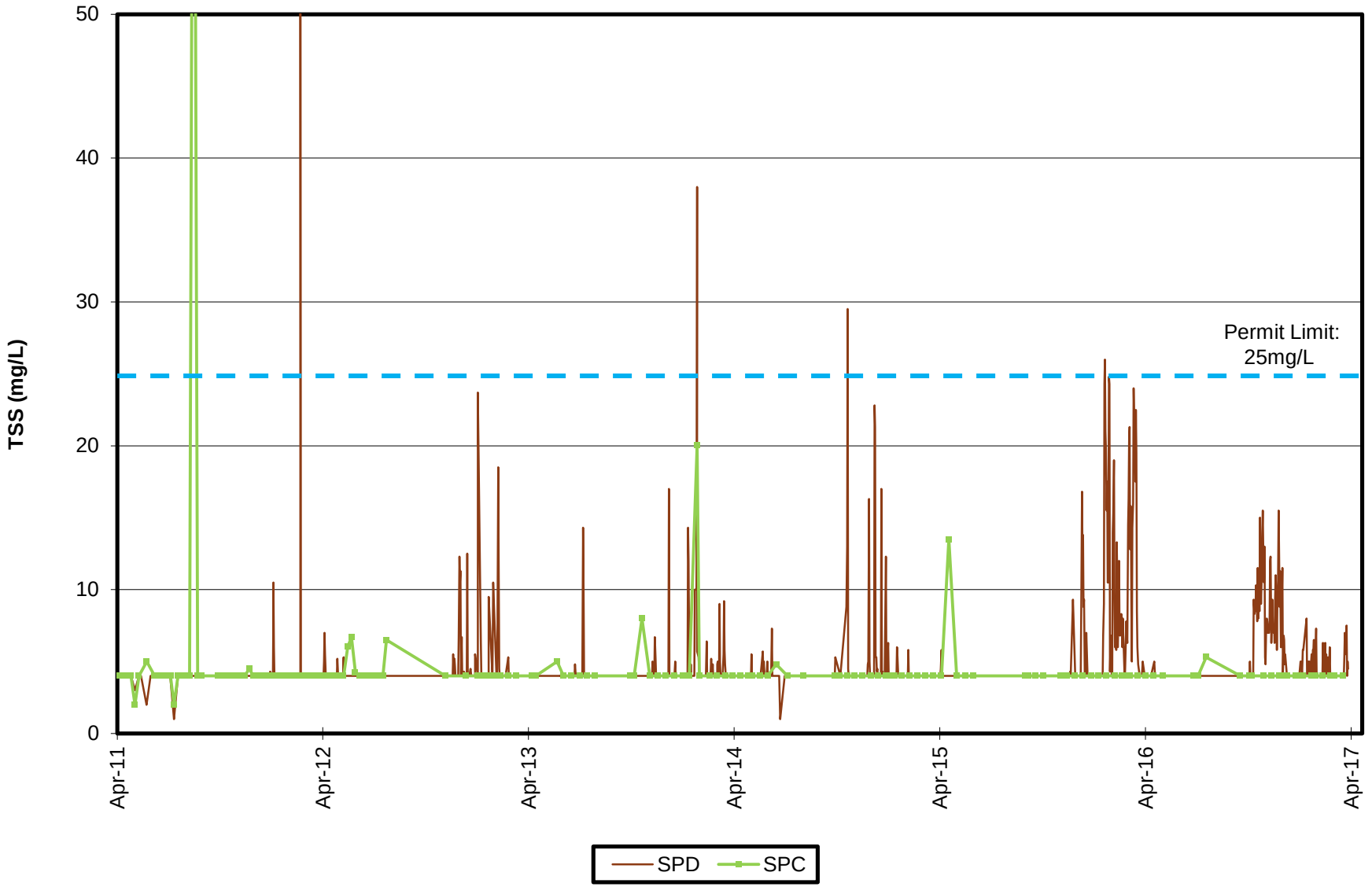
QUINSAM COAL



GRAPH 12

TOTAL SUSPENDED SOLIDS

SETTLING POND 1

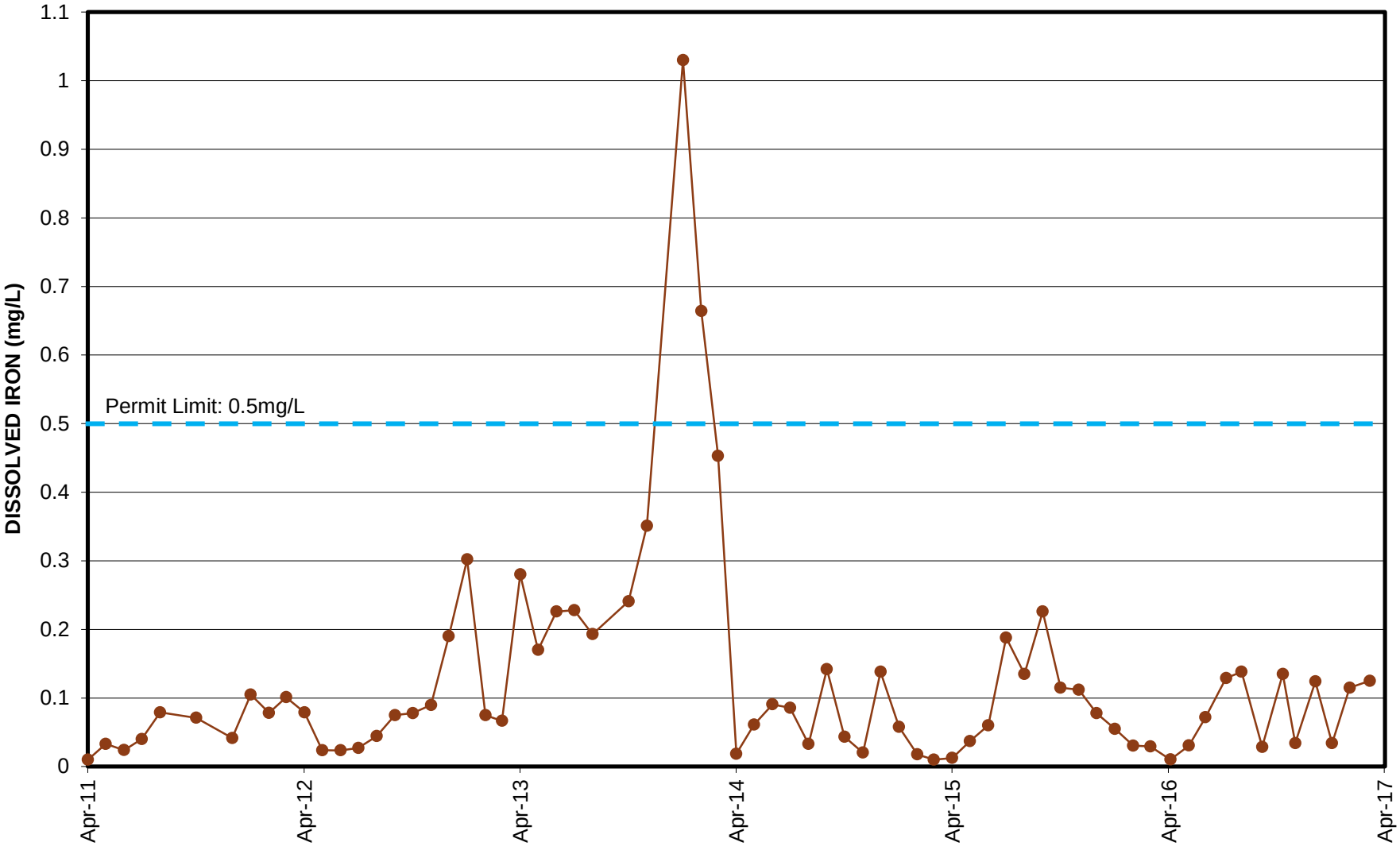


GRAPH 13

DISSOLVED IRON

SETTLING POND 1

QUINSAM COAL

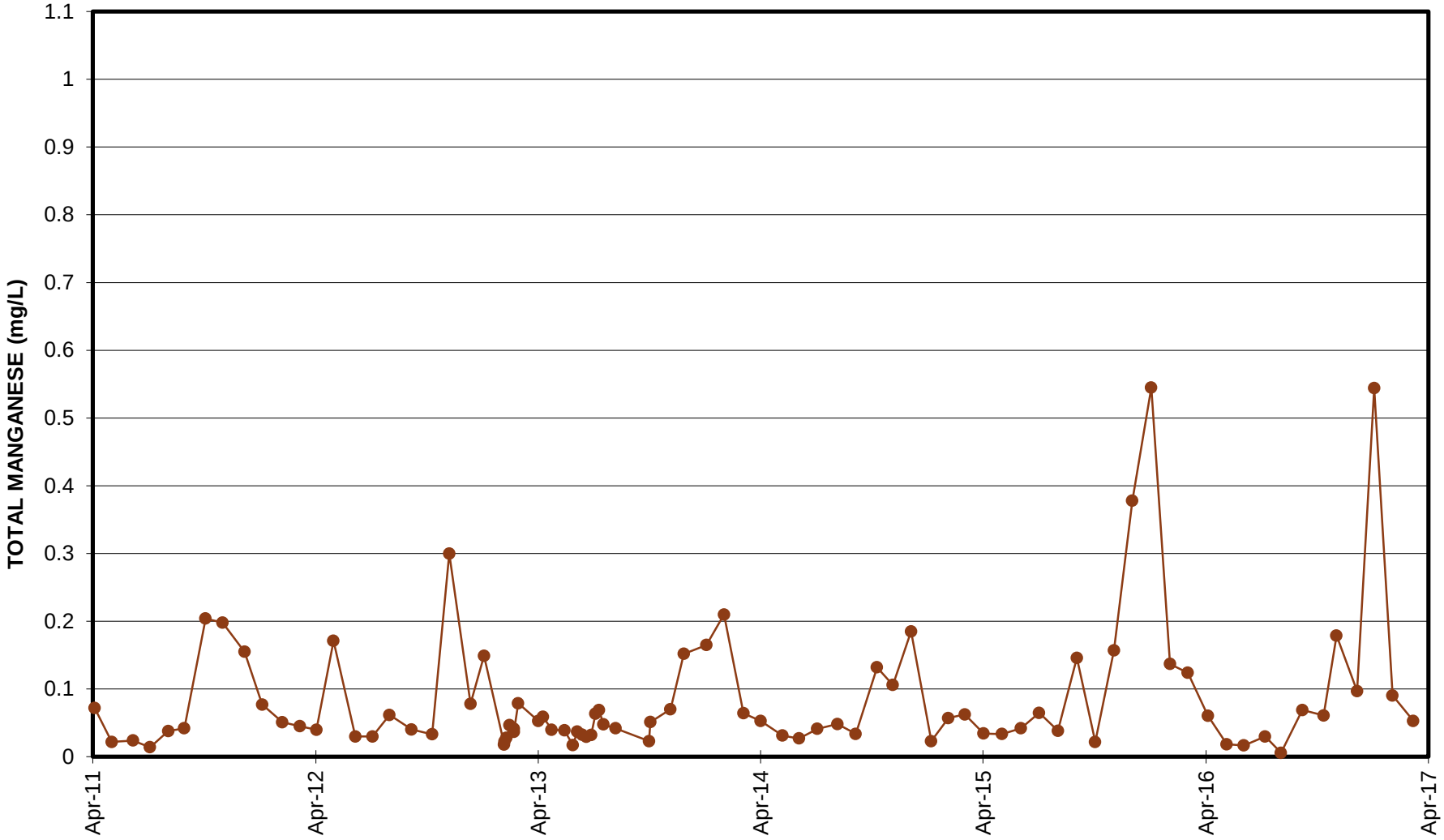


GRAPH 14

TOTAL MANGANESE

SETTLING POND 1

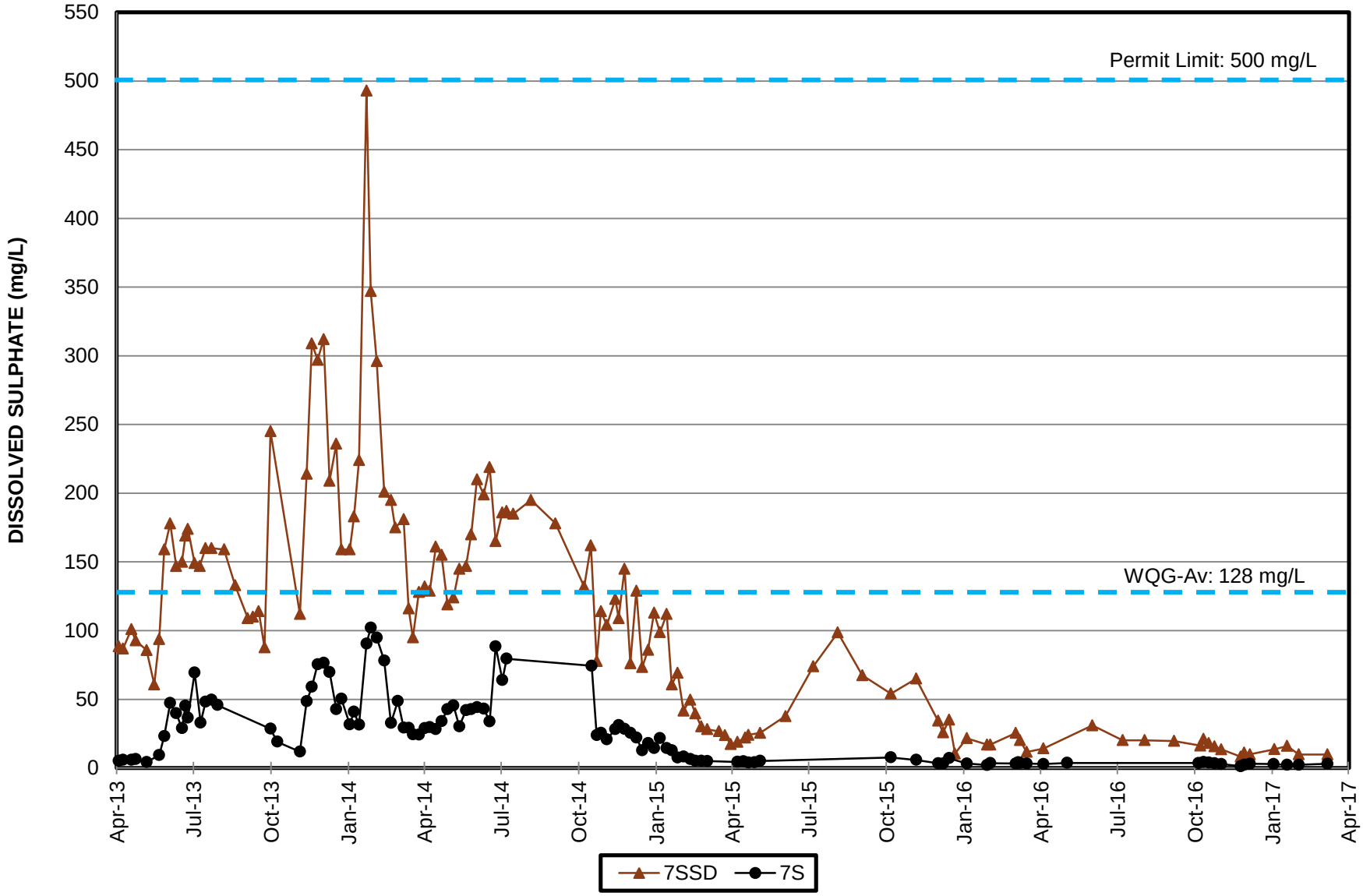
QUINSAM COAL



GRAPH 15

DISSOLVED SULPHATE

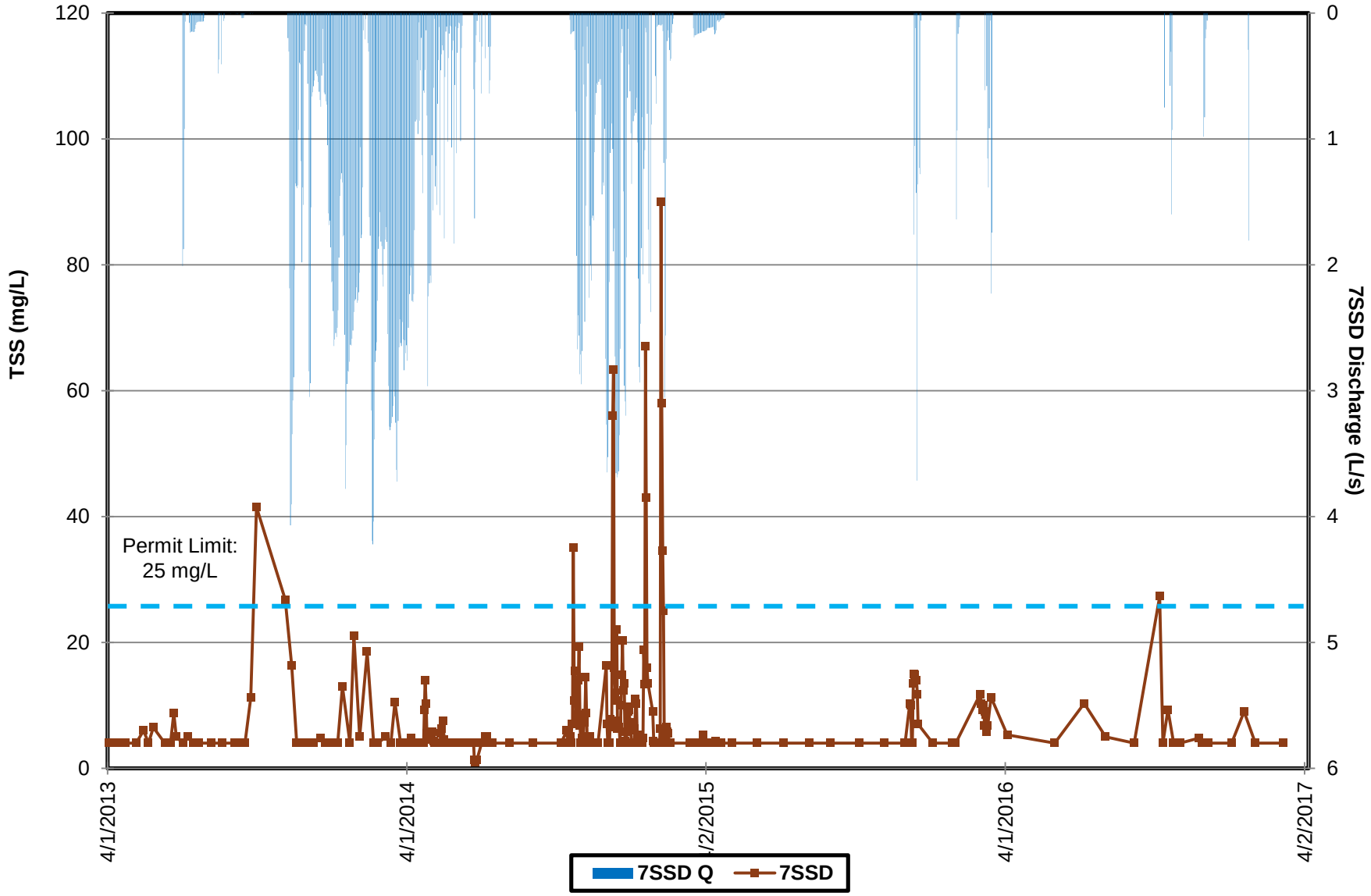
7SSD vs 7S



GRAPH 16

DISCHARGE vs TOTAL SUSPENDED SOLIDS

7SSD

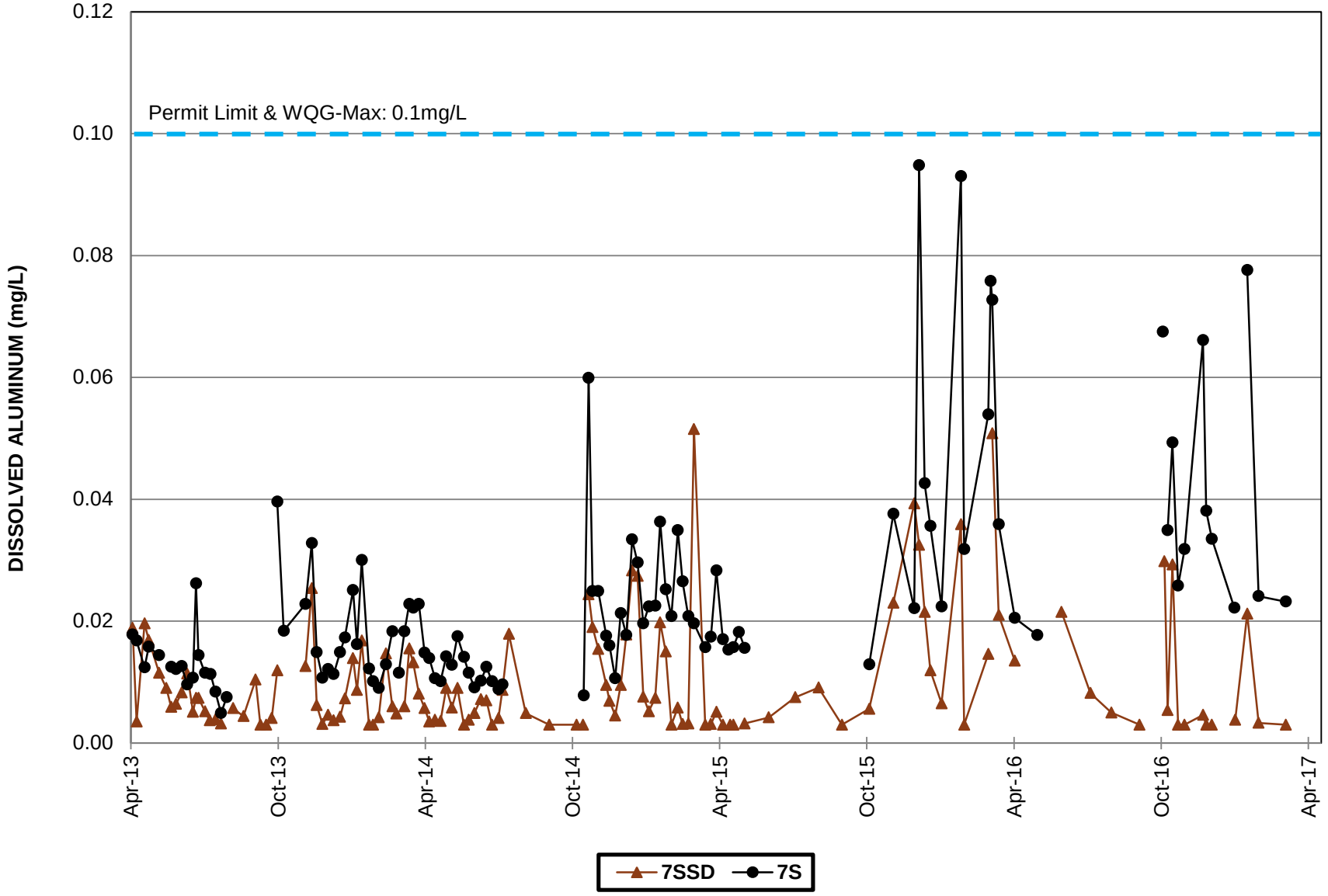


GRAPH 17

DISSOLVED ALUMINUM

7SSD vs 7S

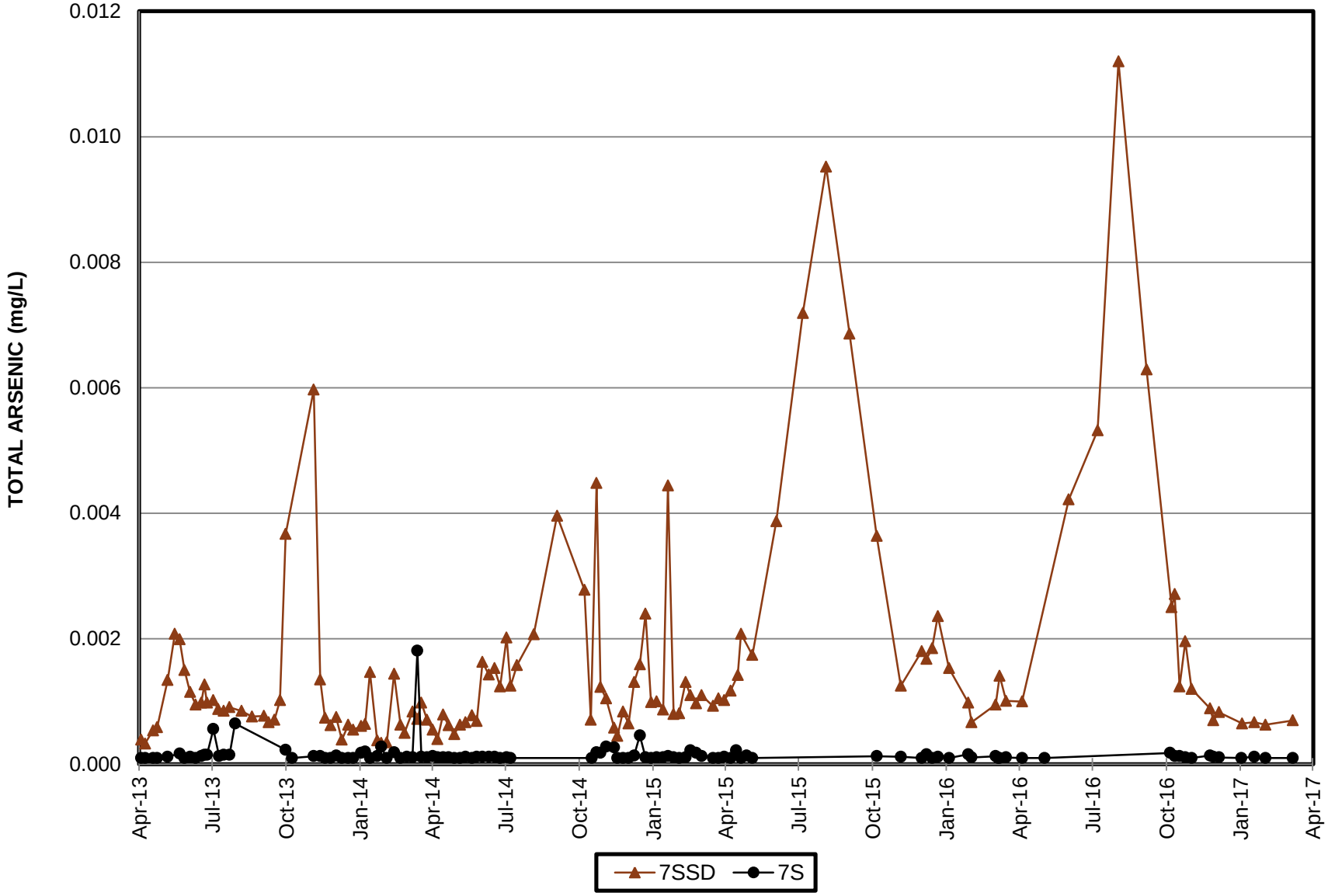
QUINSAM COAL



GRAPH 18

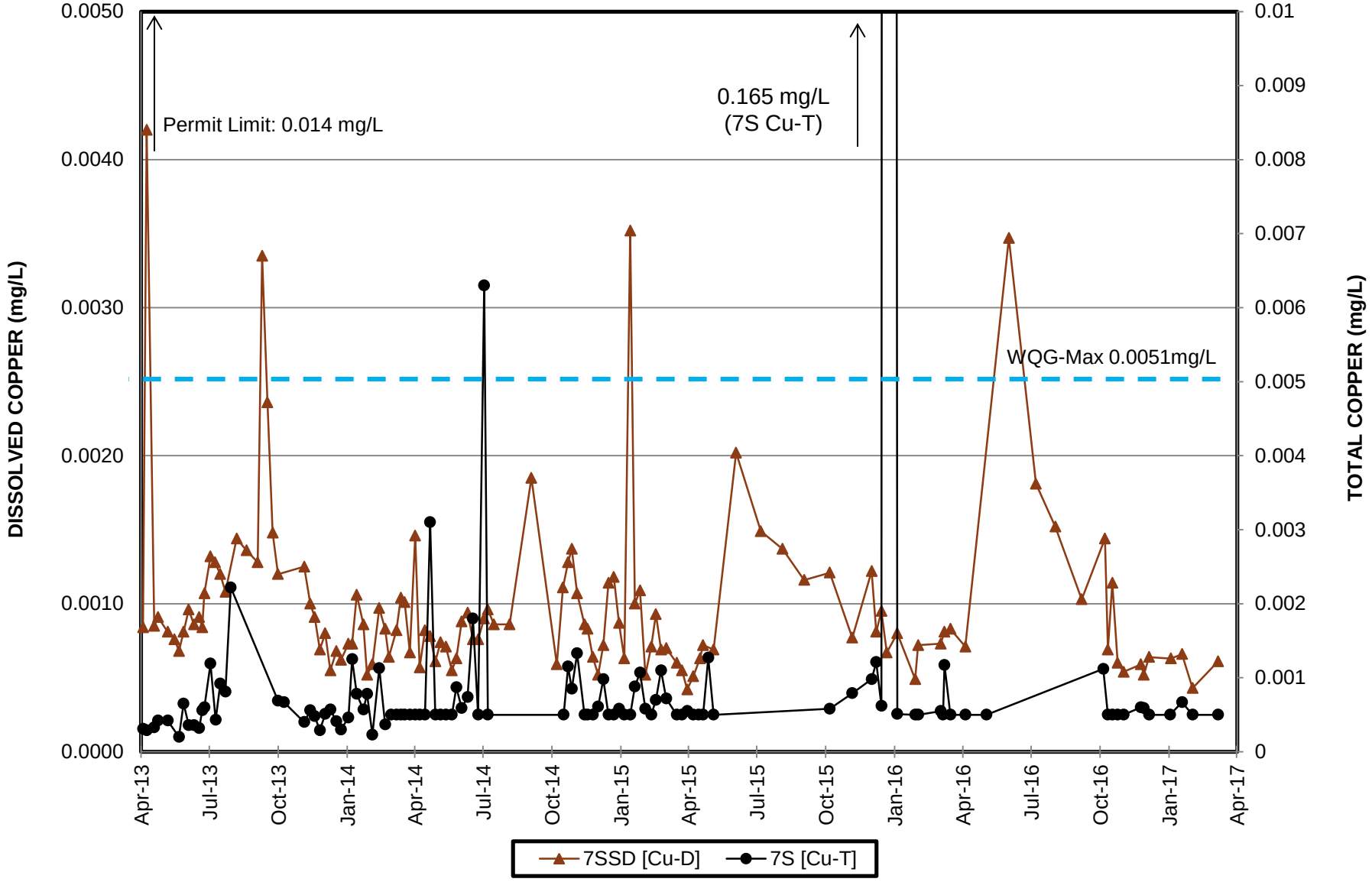
TOTAL ARSENIC

7S vs 7SSD



QUINSAM COAL

GRAPH 19
DISSOLVED AND TOTAL COPPER
7SSD vs 7S

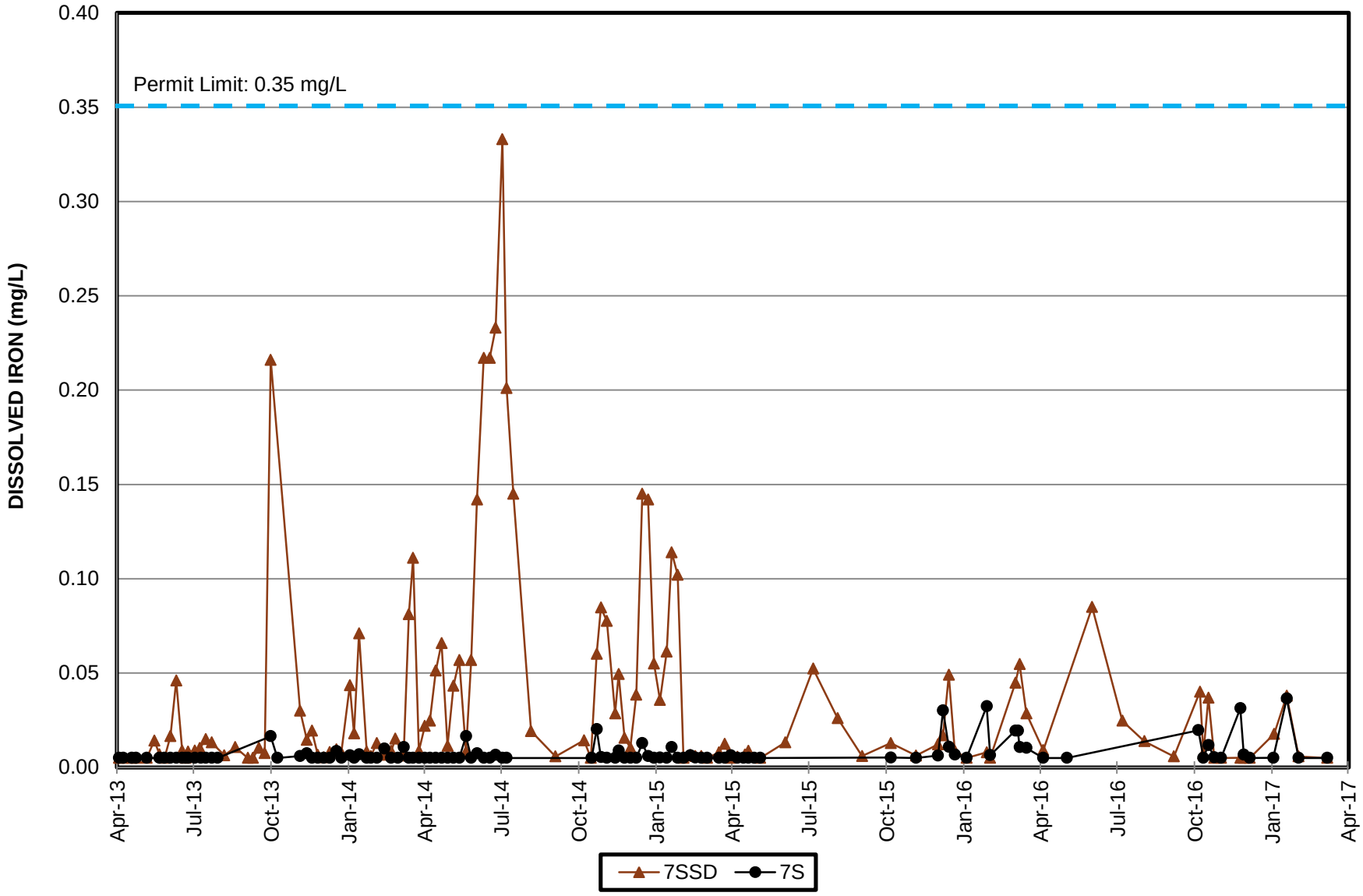


GRAPH 20

DISSOLVED IRON

7SSD vs 7S

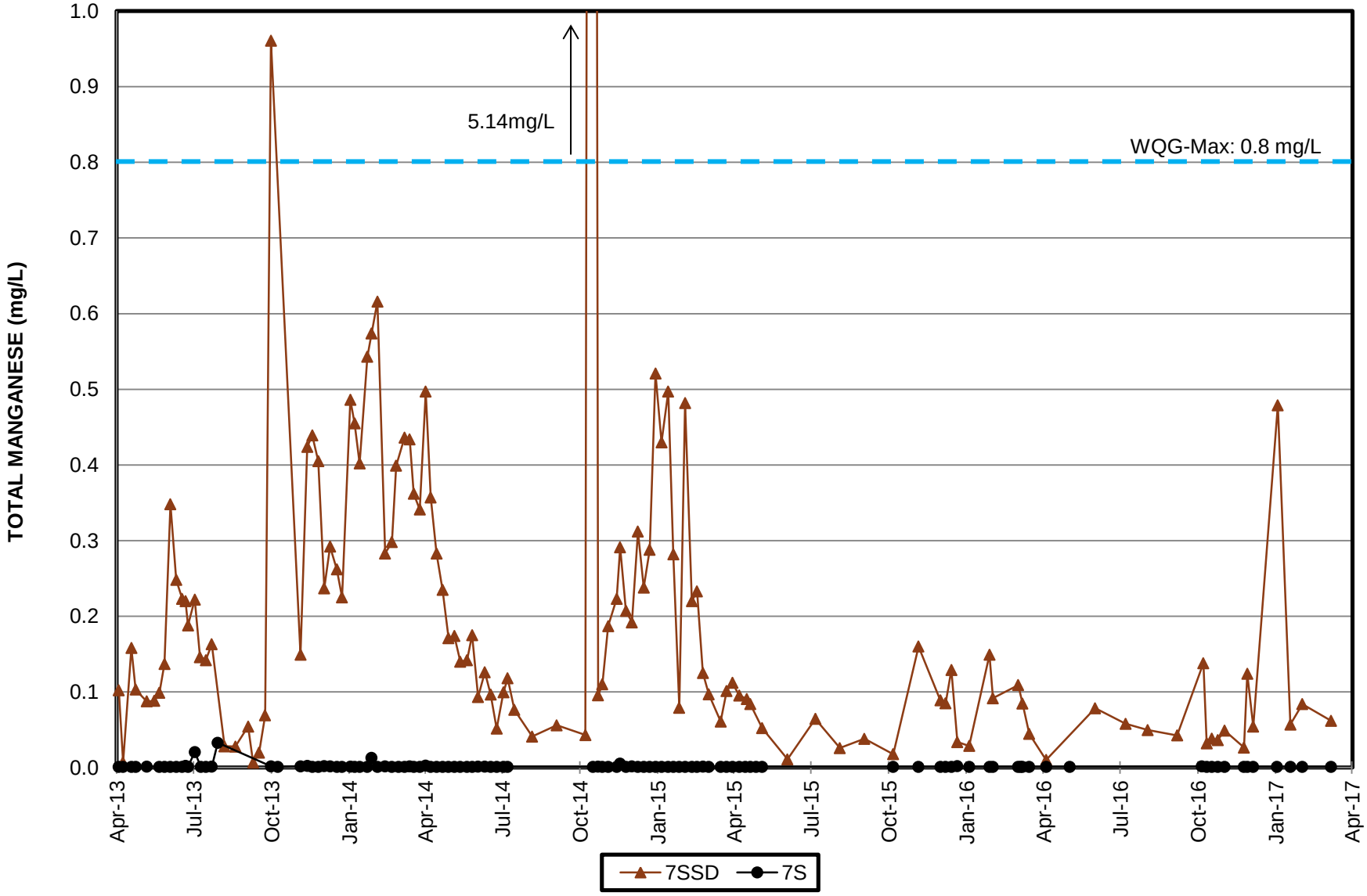
QUINSAM COAL



GRAPH 21

TOTAL MANGANESE

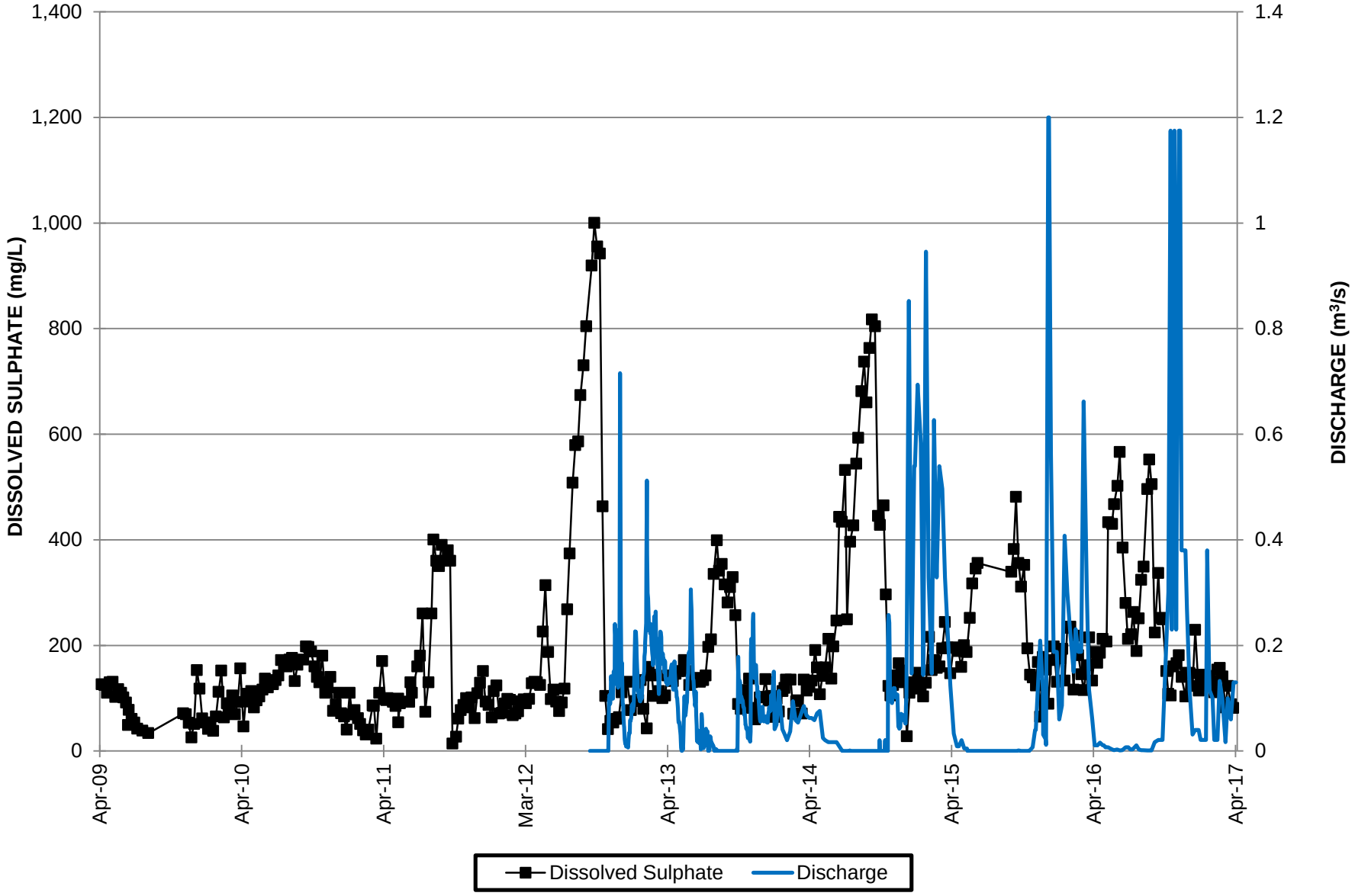
7SSD vs 7S



GRAPH 22

DISSOLVED SULPHATE VS DISCHARGE

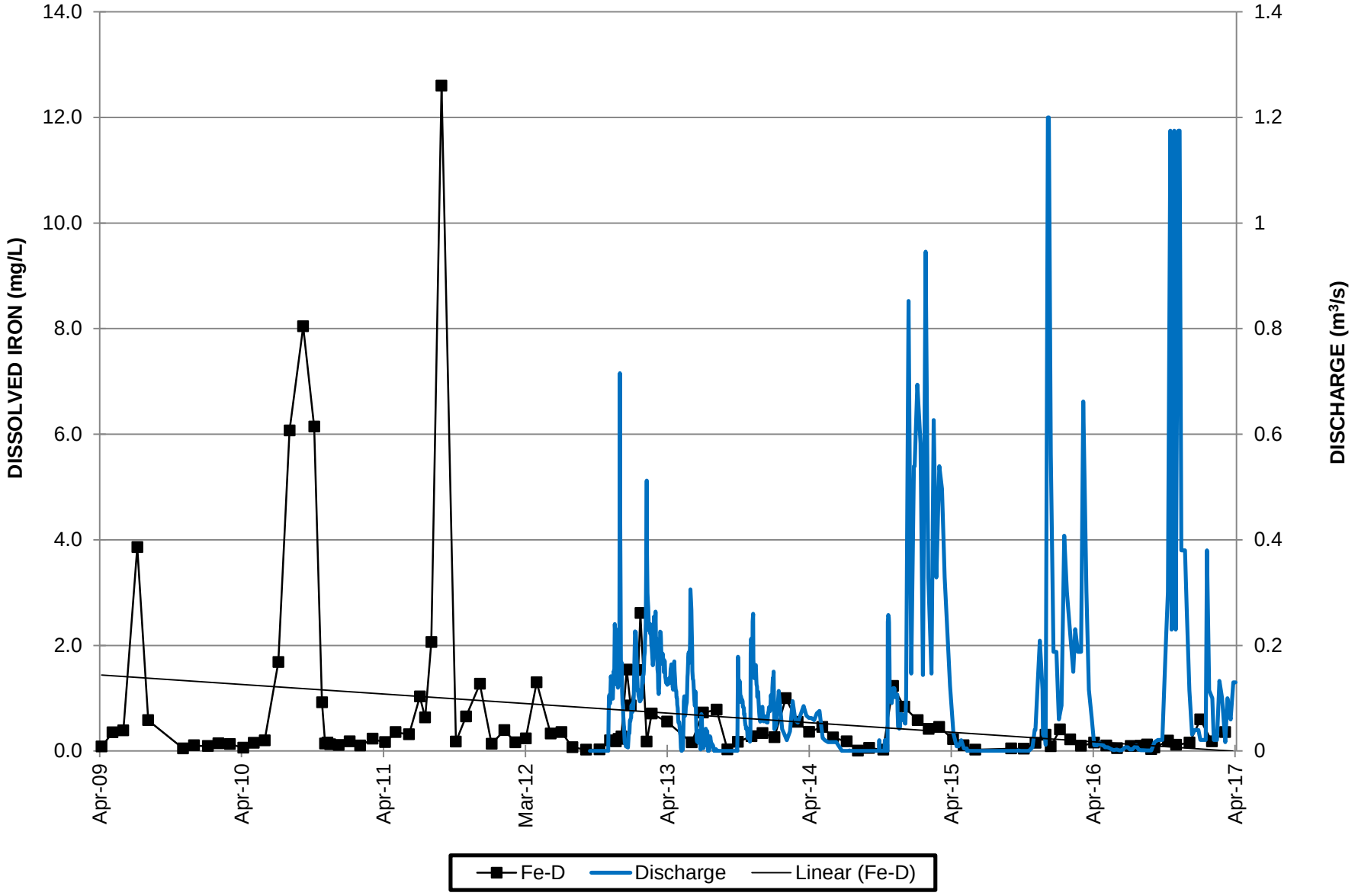
LLE



GRAPH 23

DISSOLVED IRON VS DISCHARGE

LLE

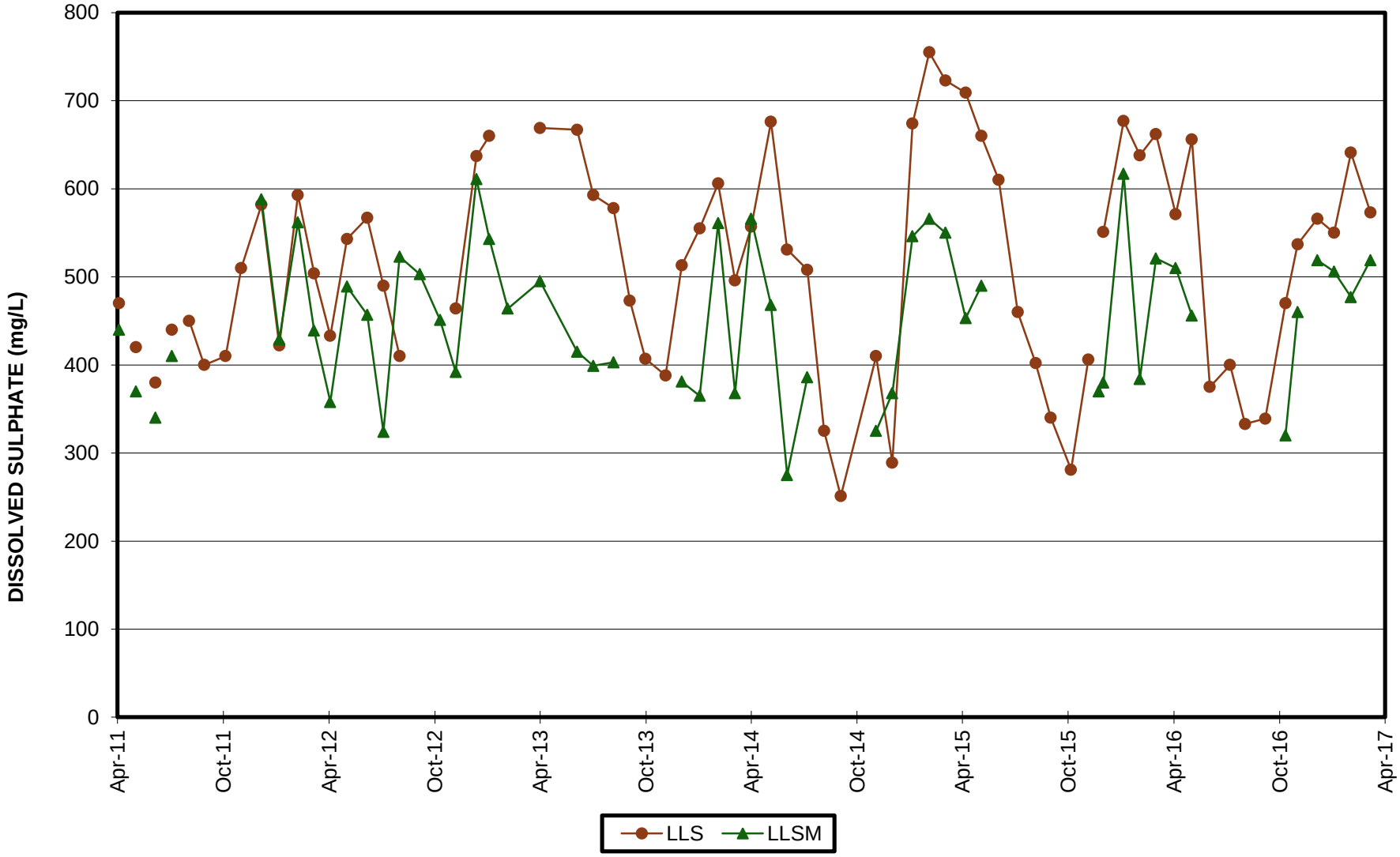


GRAPH 24

DISSOLVED SULPHATE

SEEPS INTO LONG LAKE

QUINSAM COAL

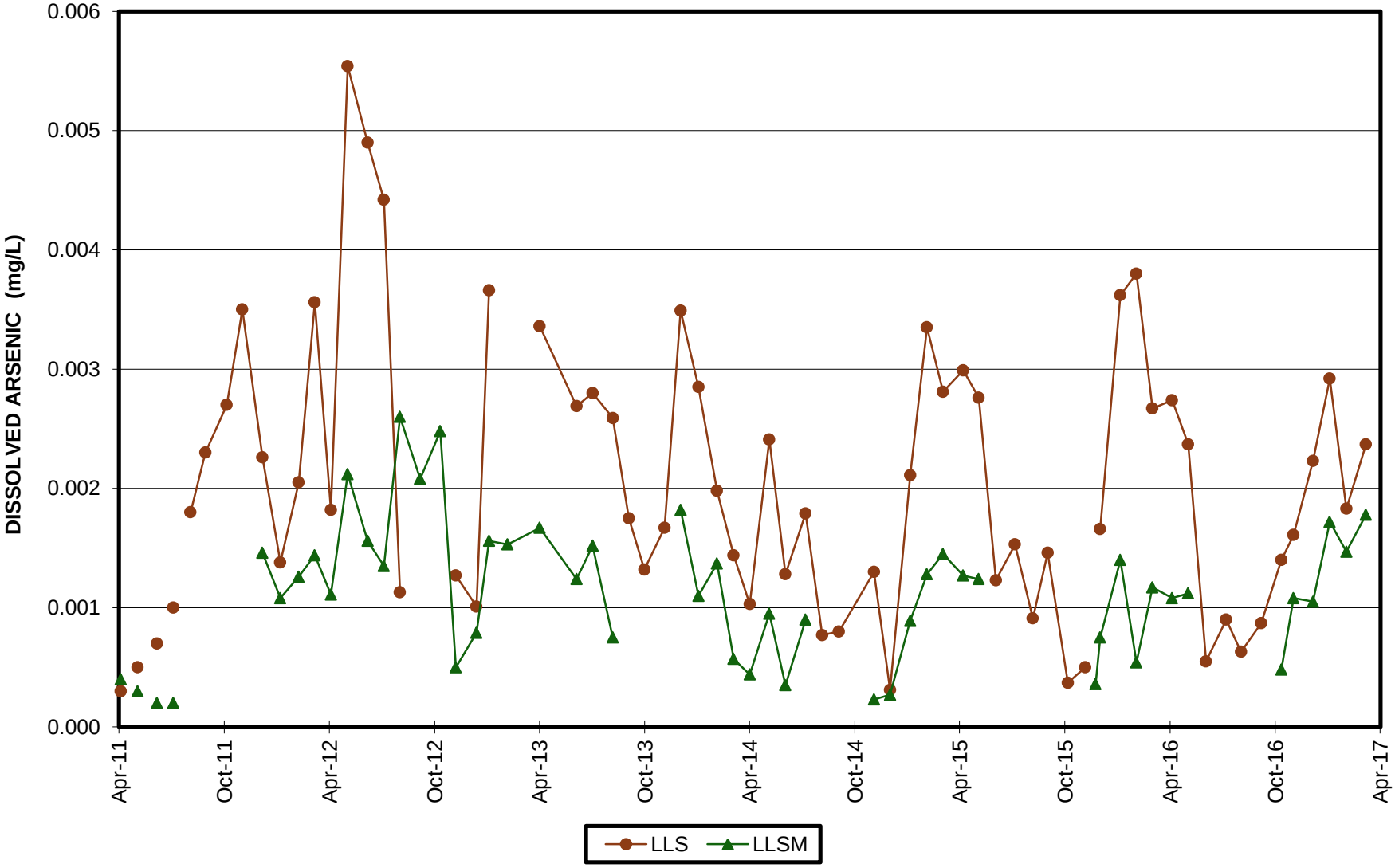


GRAPH 25

DISSOLVED ARSENIC

SEEPS INTO LONG LAKE

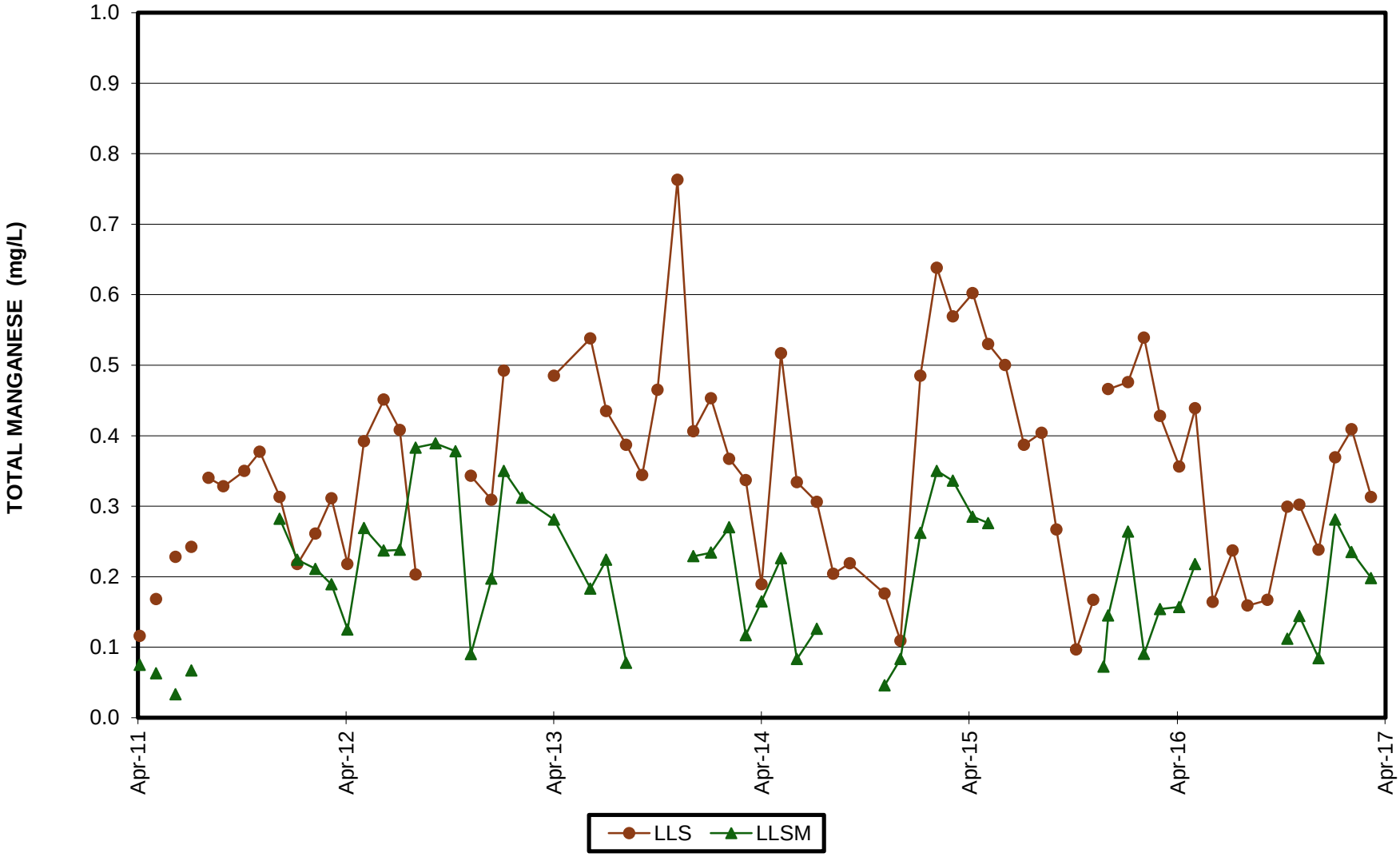
QUINSAM COAL



GRAPH 26

TOTAL MANGANESE

SEEPS INTO LONG LAKE

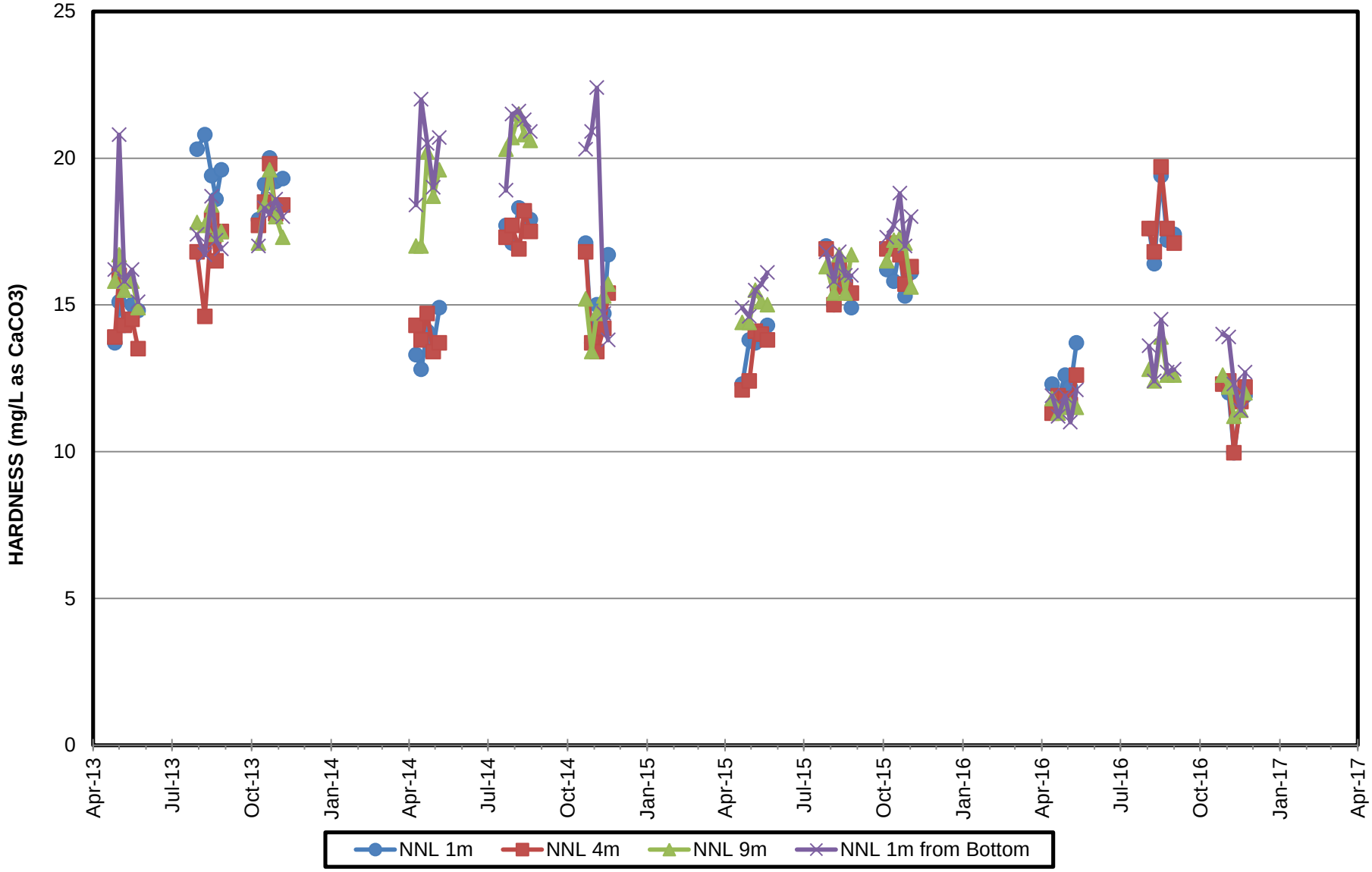


GRAPH 27

5 in 30 HARDNESS

NO NAME LAKE

QUINSAM COAL

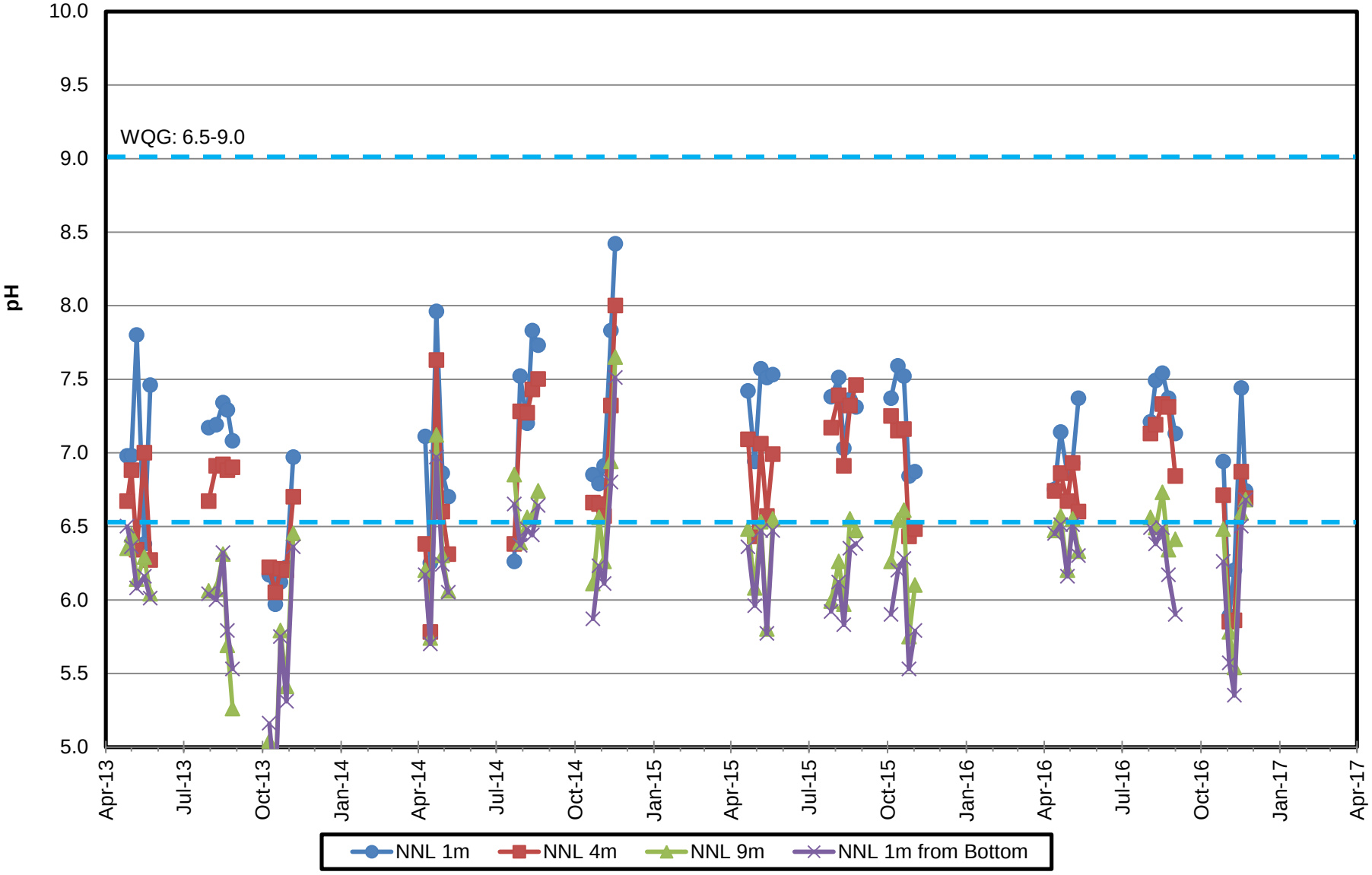


GRAPH 28

5 in 30 PH

NO NAME LAKE

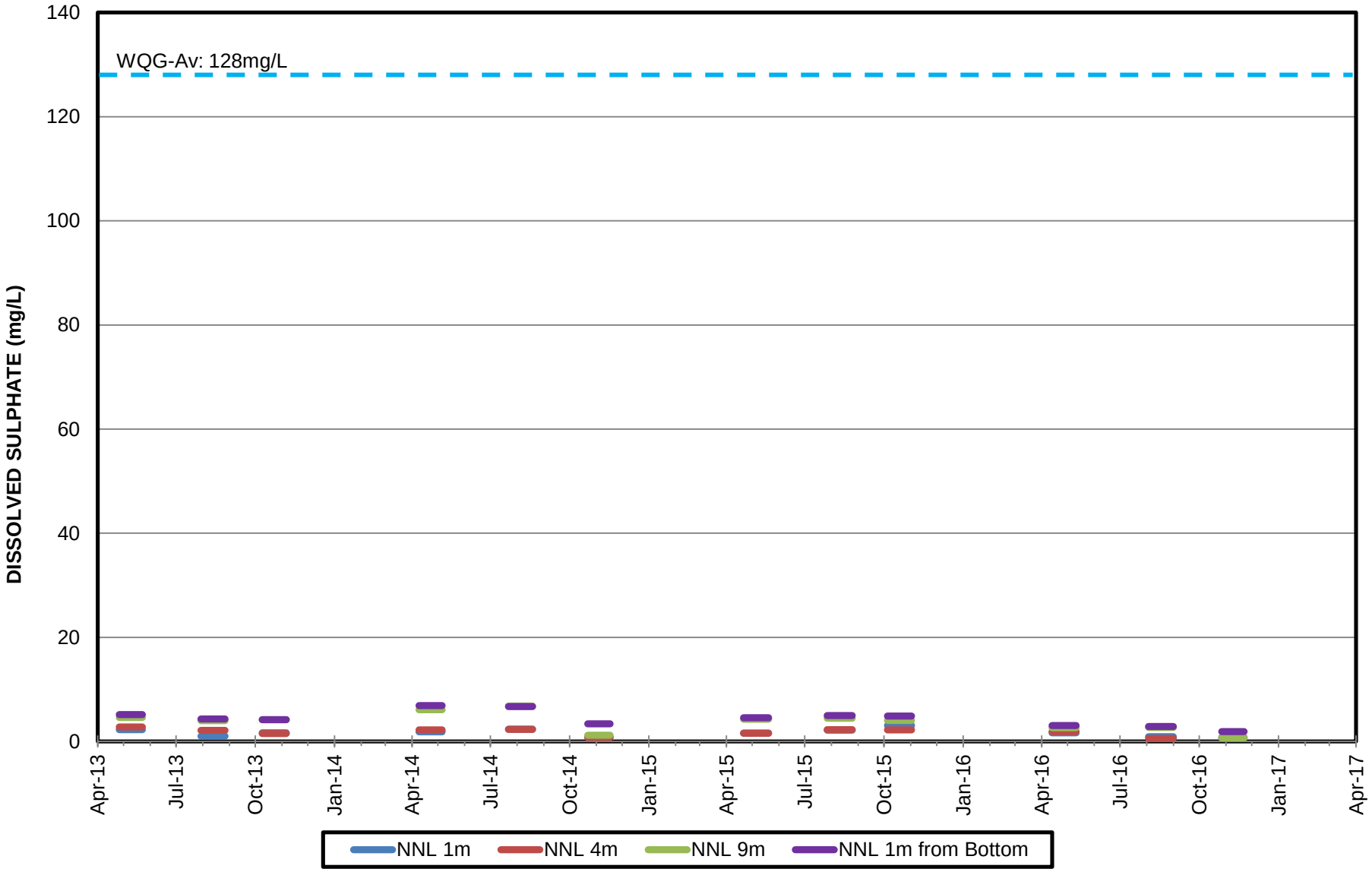
QUINSAM COAL



GRAPH 29

5 in 30 AVERAGE DISSOLVED SULPHATE

NO NAME LAKE

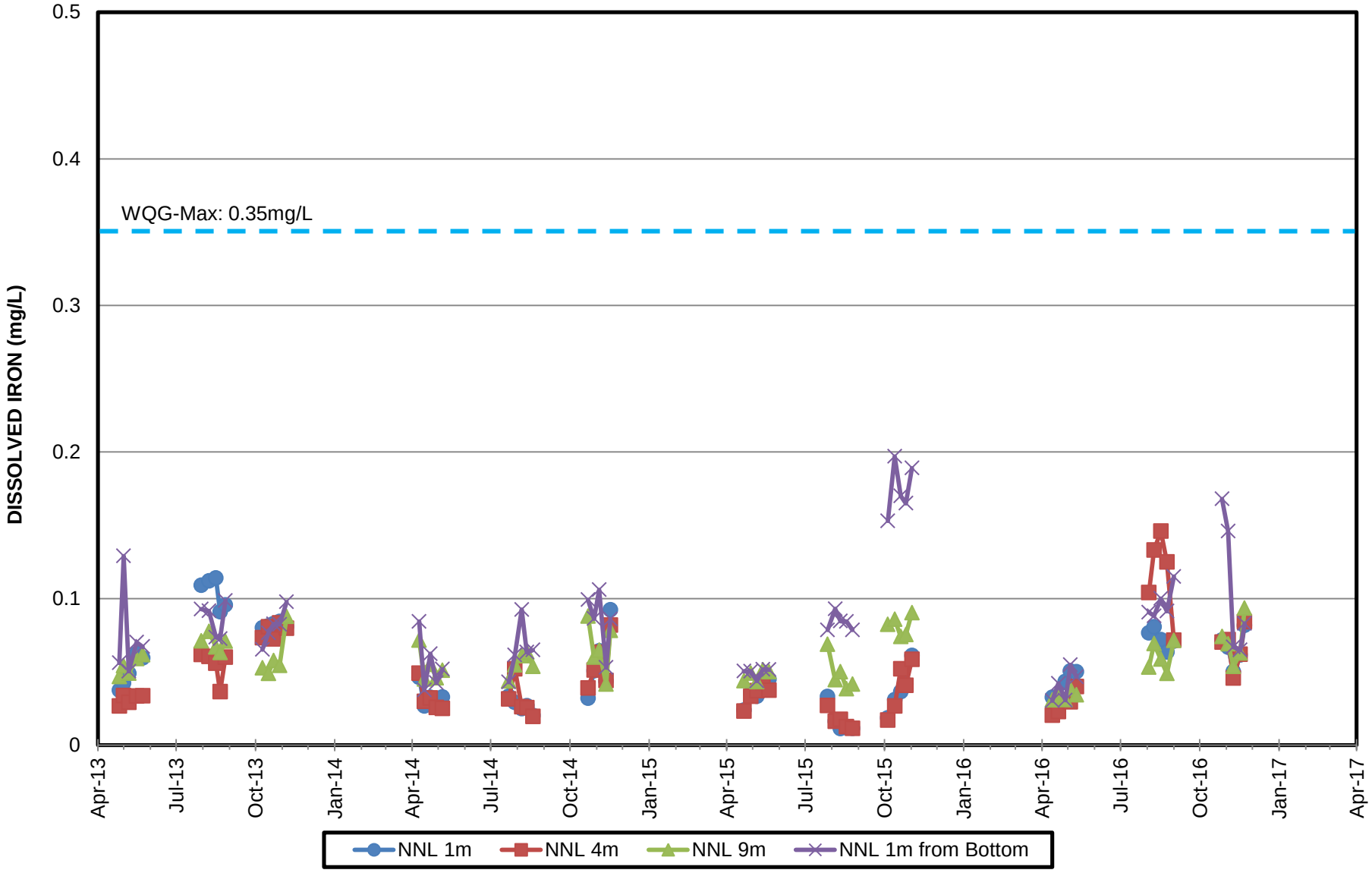


GRAPH 30

5 in 30 DISSOLVED IRON

NO NAME LAKE

QUINSAM COAL

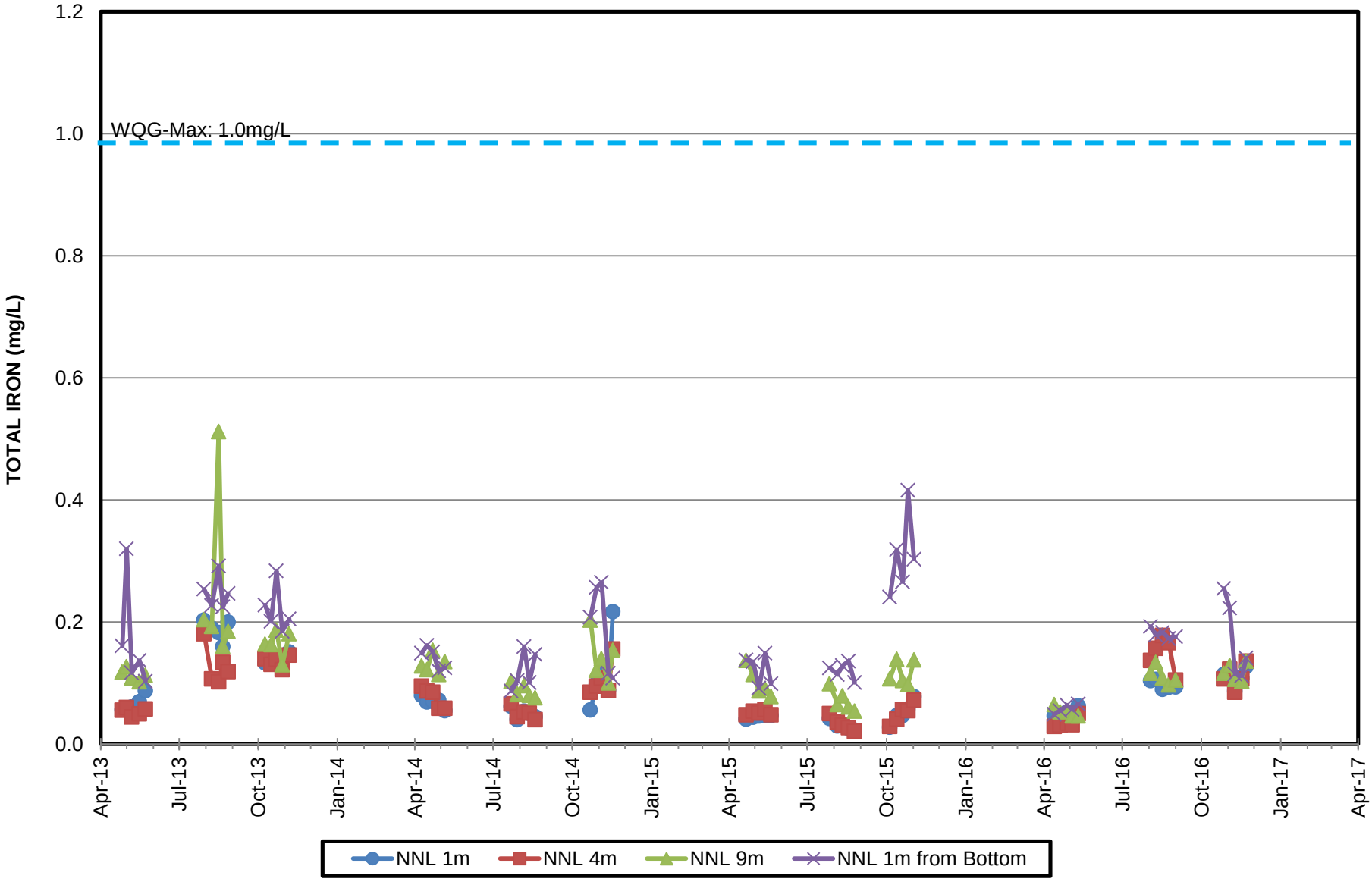


GRAPH 31

5 in 30 TOTAL IRON

NO NAME LAKE

QUINSAM COAL

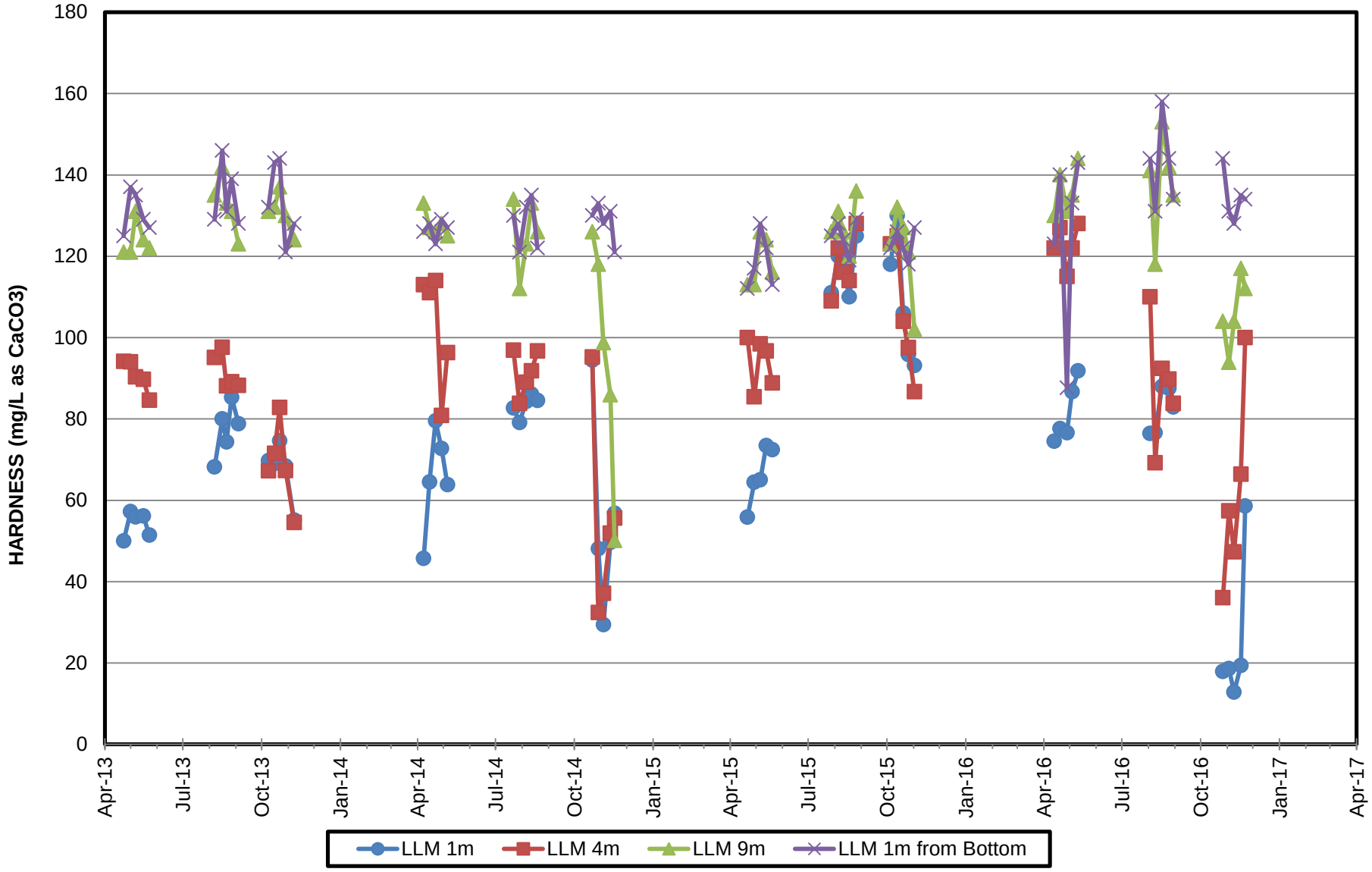


GRAPH 32

5 in 30 HARDNESS

LONG LAKE

QUINSAM COAL

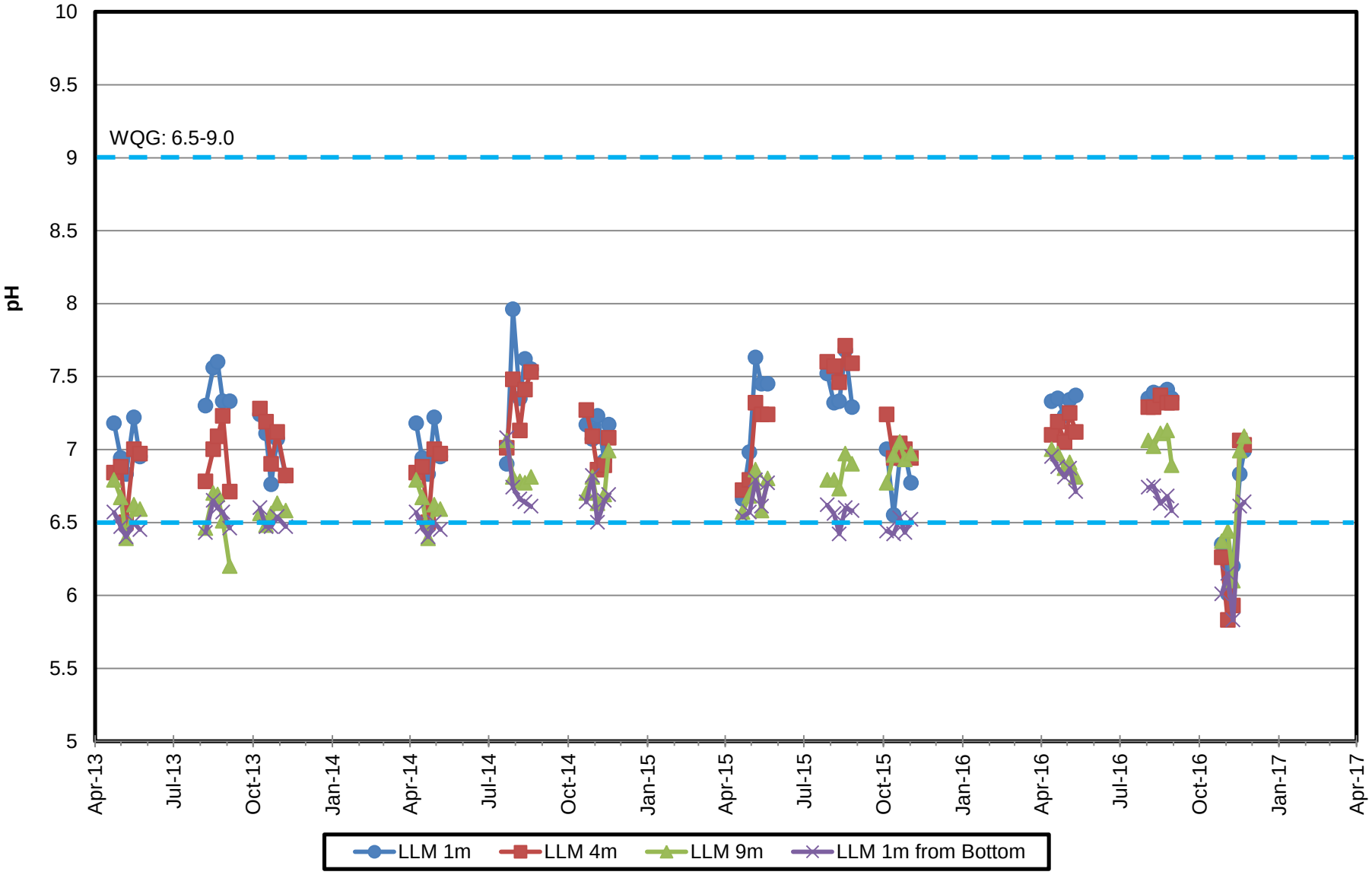


GRAPH 33

5 in 30 pH

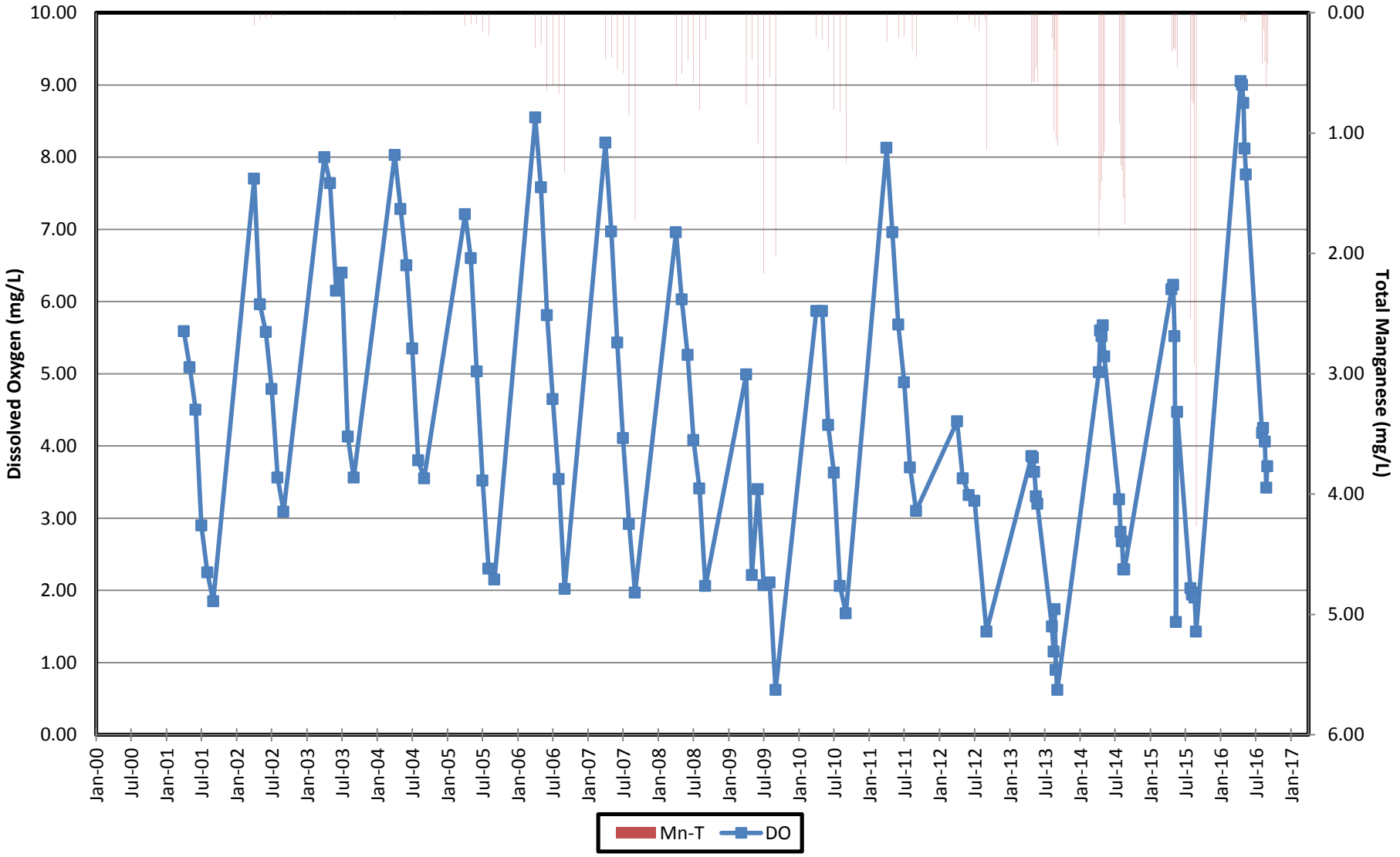
LONG LAKE

QUINSAM COAL



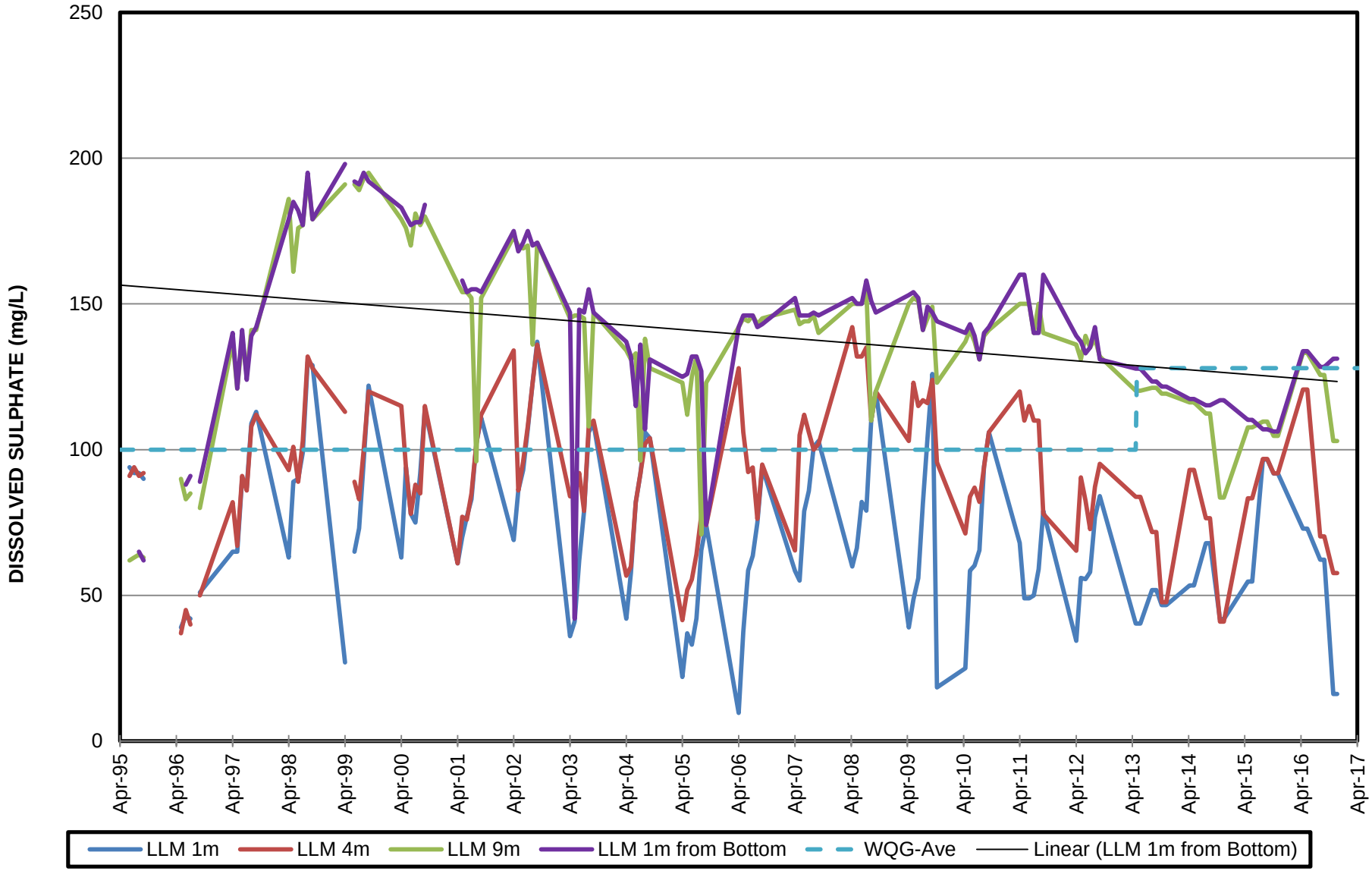
Graph 34

Historic Dissolved Oxygen vs Total Manganese
Long Lake 1 Metre From Bottom
2005-2016



Graph 35
HISTORIC DISSOLVED SULPHATE
LONG LAKE

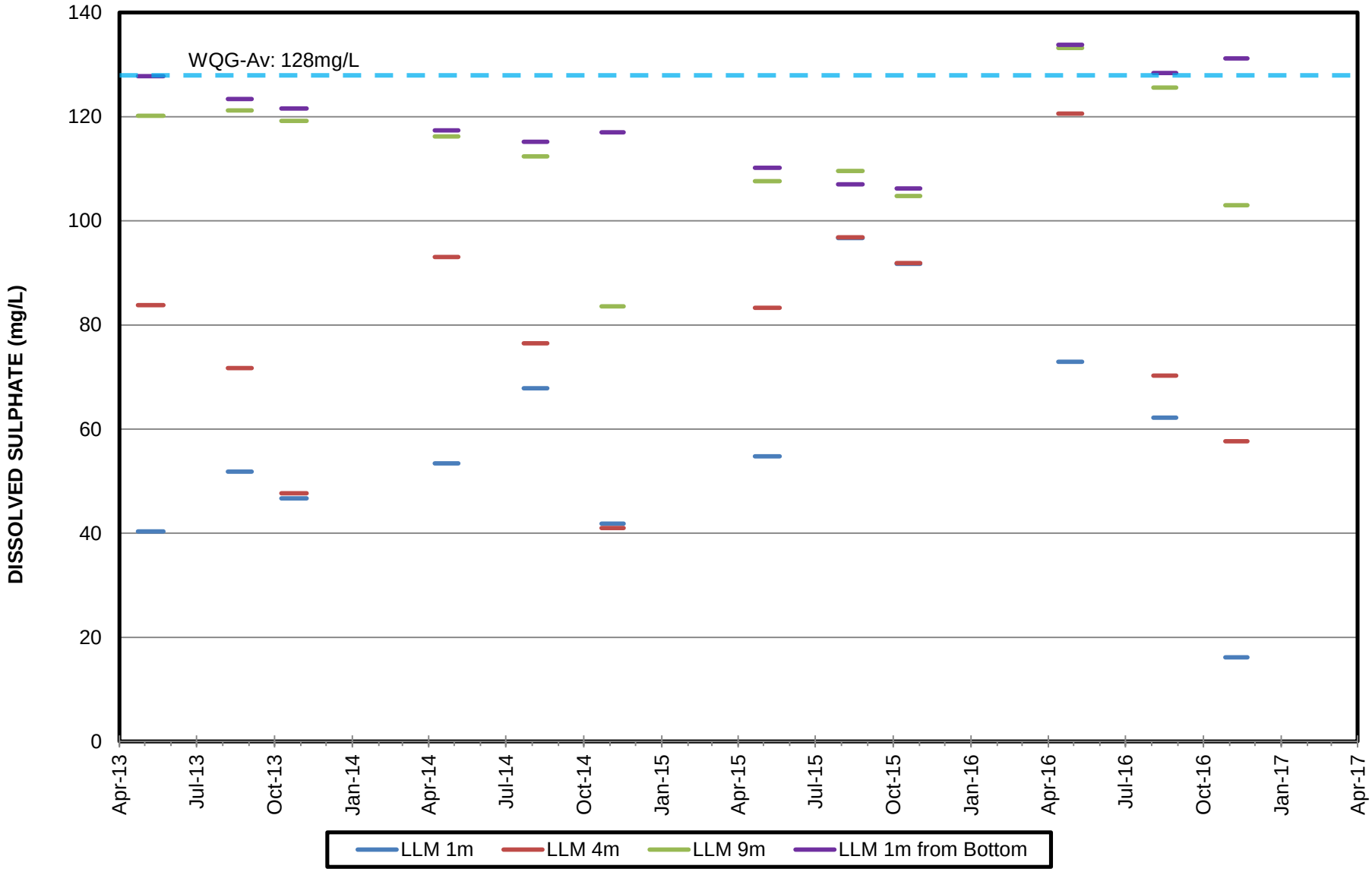
QUINSAM COAL



Graph 36

5 in 30 AVERAGE DISSOLVED SULPHATE

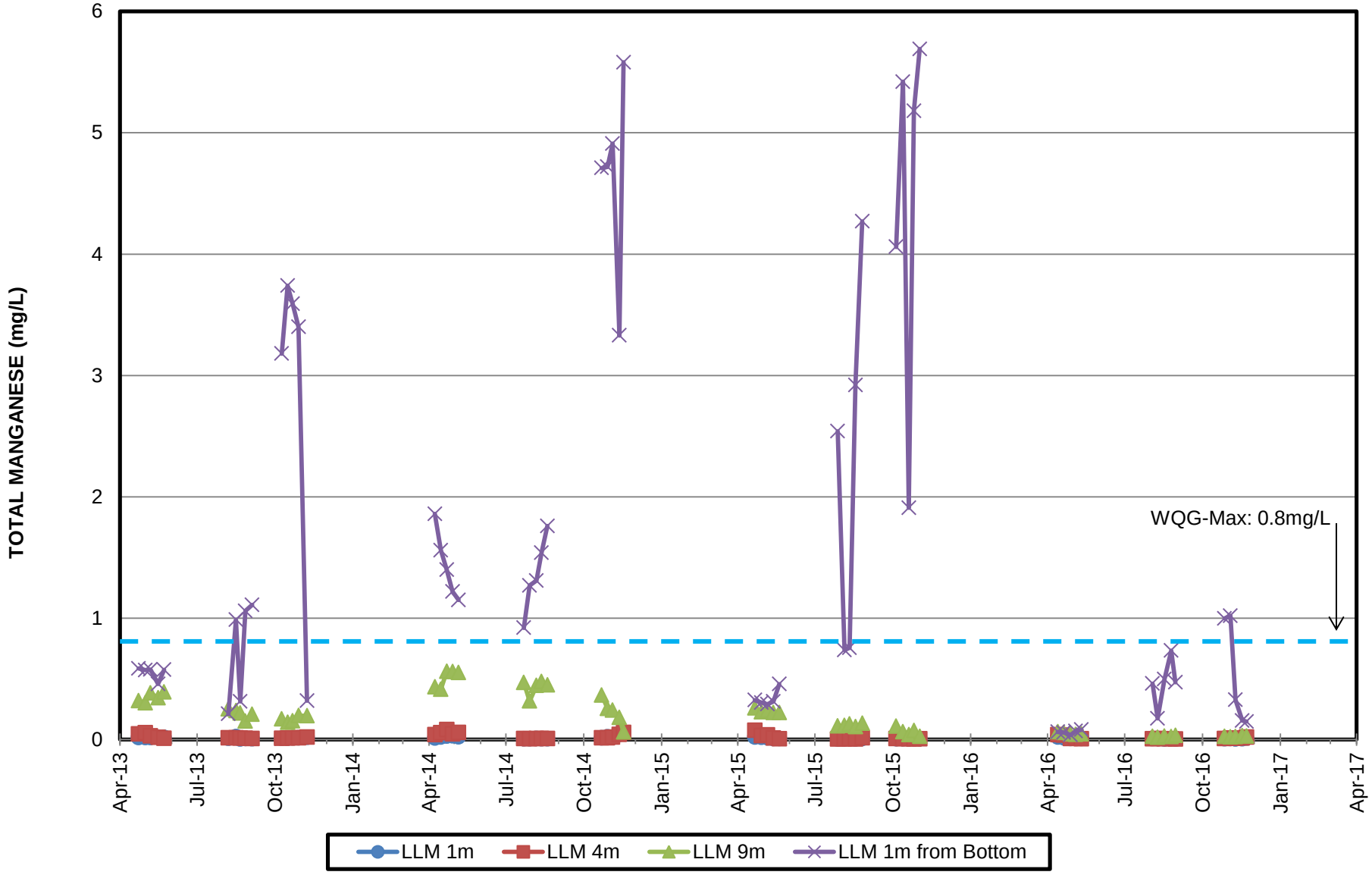
LONG LAKE



GRAPH 37

5 in 30 TOTAL MANGANESE

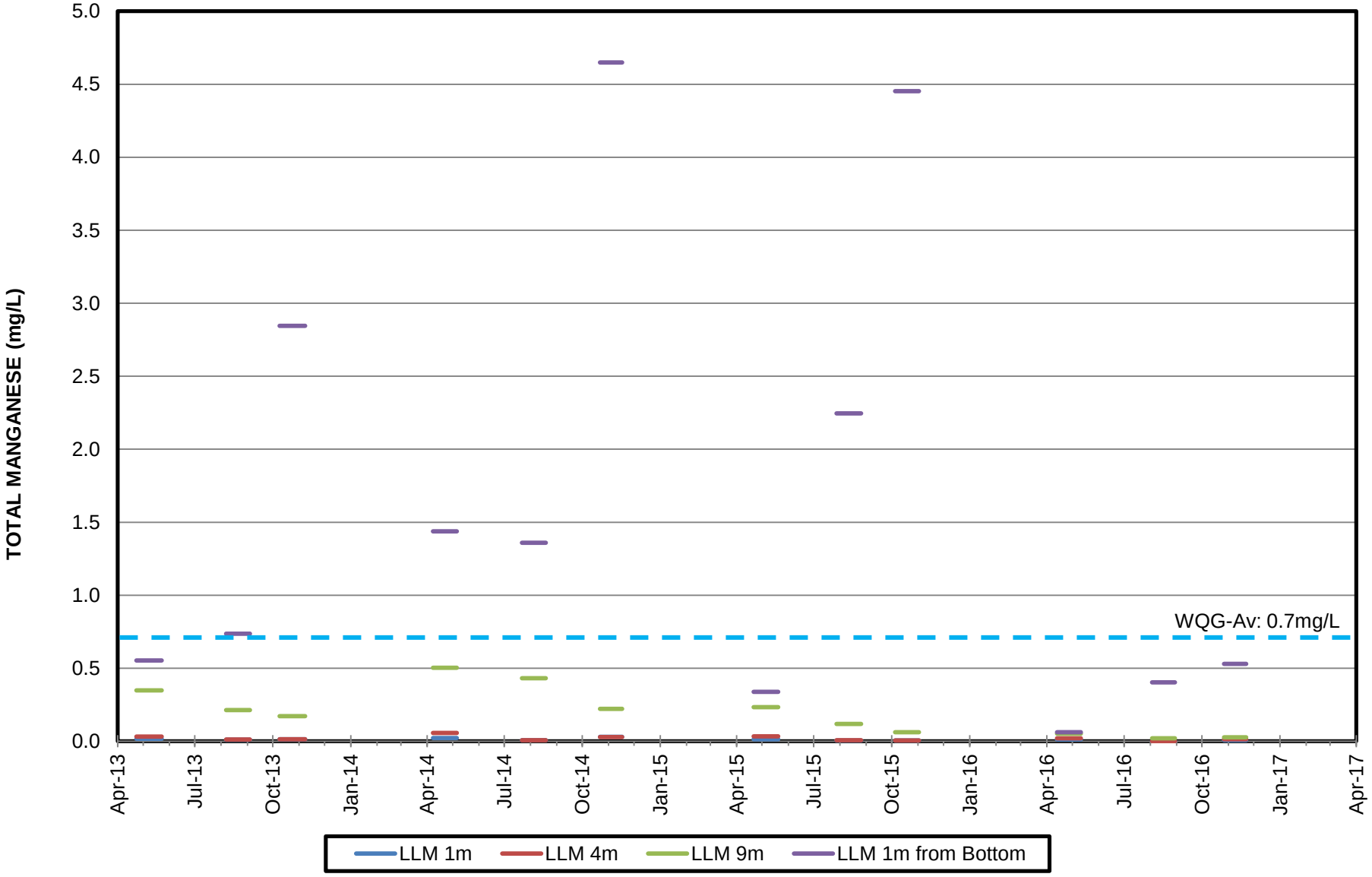
LONG LAKE



GRAPH 38

5 in 30 AVERAGE TOTAL MANGANESE

LONG LAKE

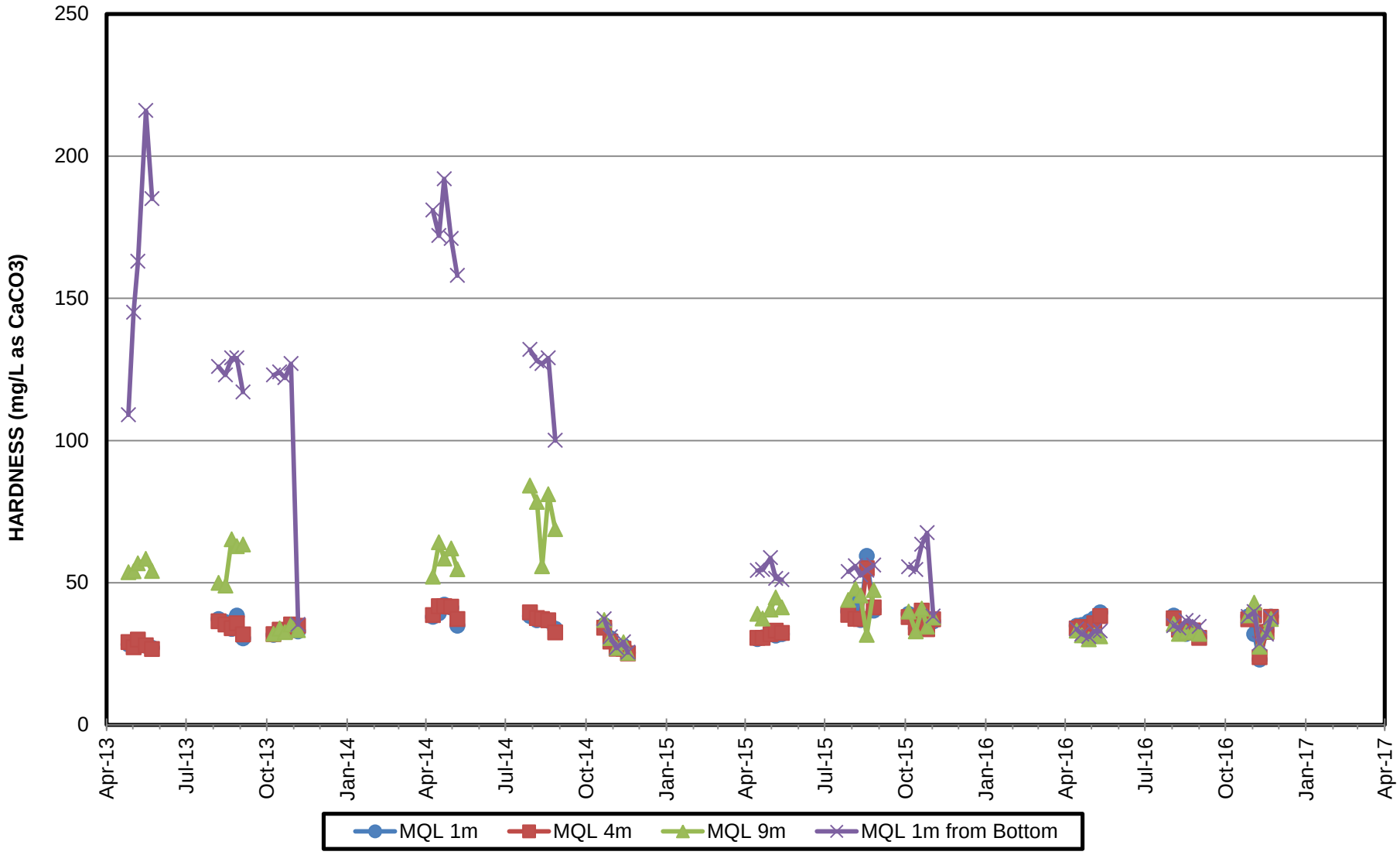


GRAPH 39

5 in 30 HARDNESS

MIDDLE QUINSAM LAKE

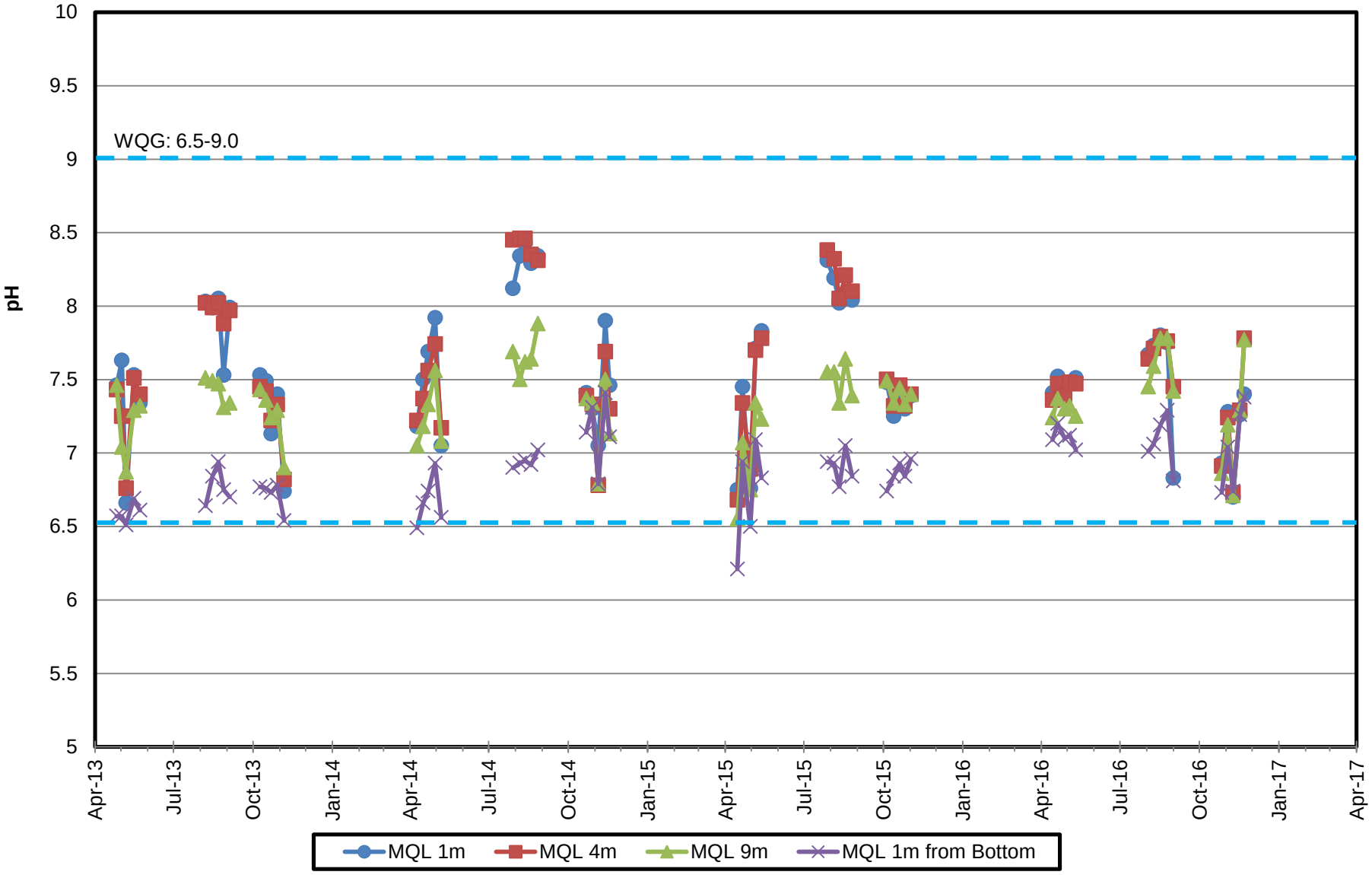
QUINSAM COAL



GRAPH 40

5 in 30 PH

MIDDLE QUINSAM LAKE

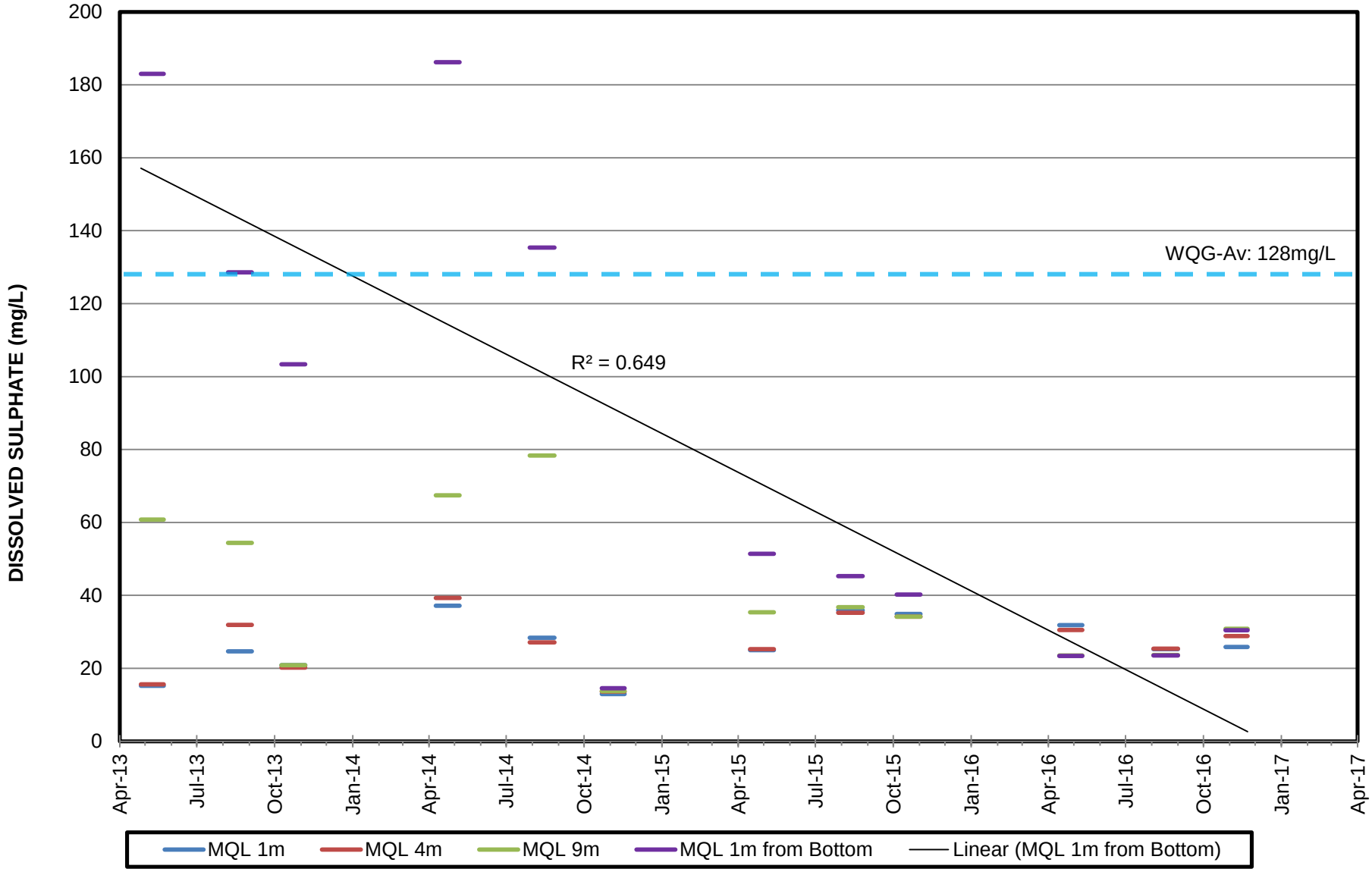


GRAPH 41

5 in 30 AVERAGE DISSOLVED SULPHATE

MIDDLE QUINSAM LAKE

QUINSAM COAL

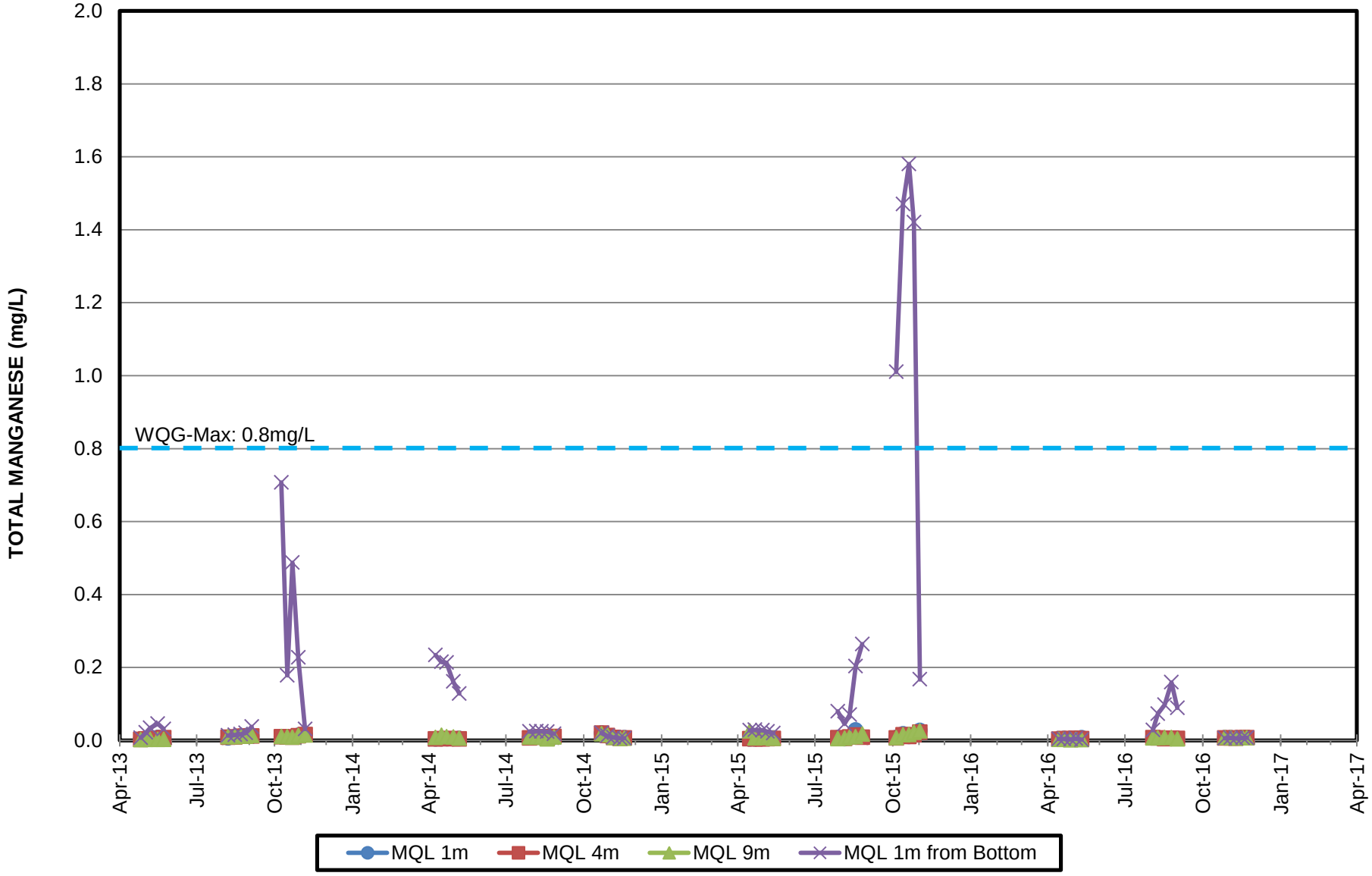


GRAPH 42

5 in 30 TOTAL MANGANESE

MIDDLE QUINSAM LAKE

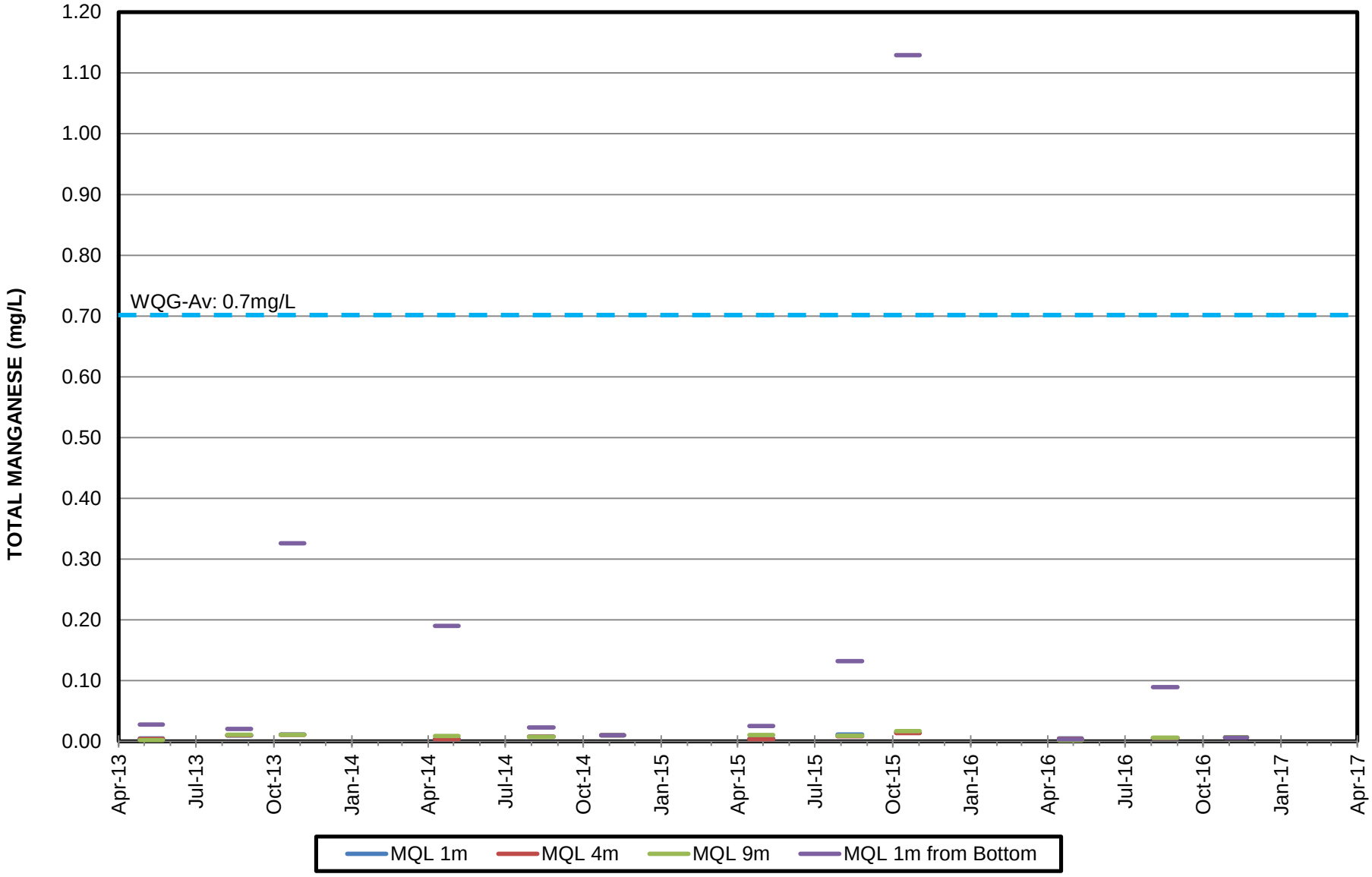
QUINSAM COAL



GRAPH 43

5 in 30 AVERAGE TOTAL MANGANESE

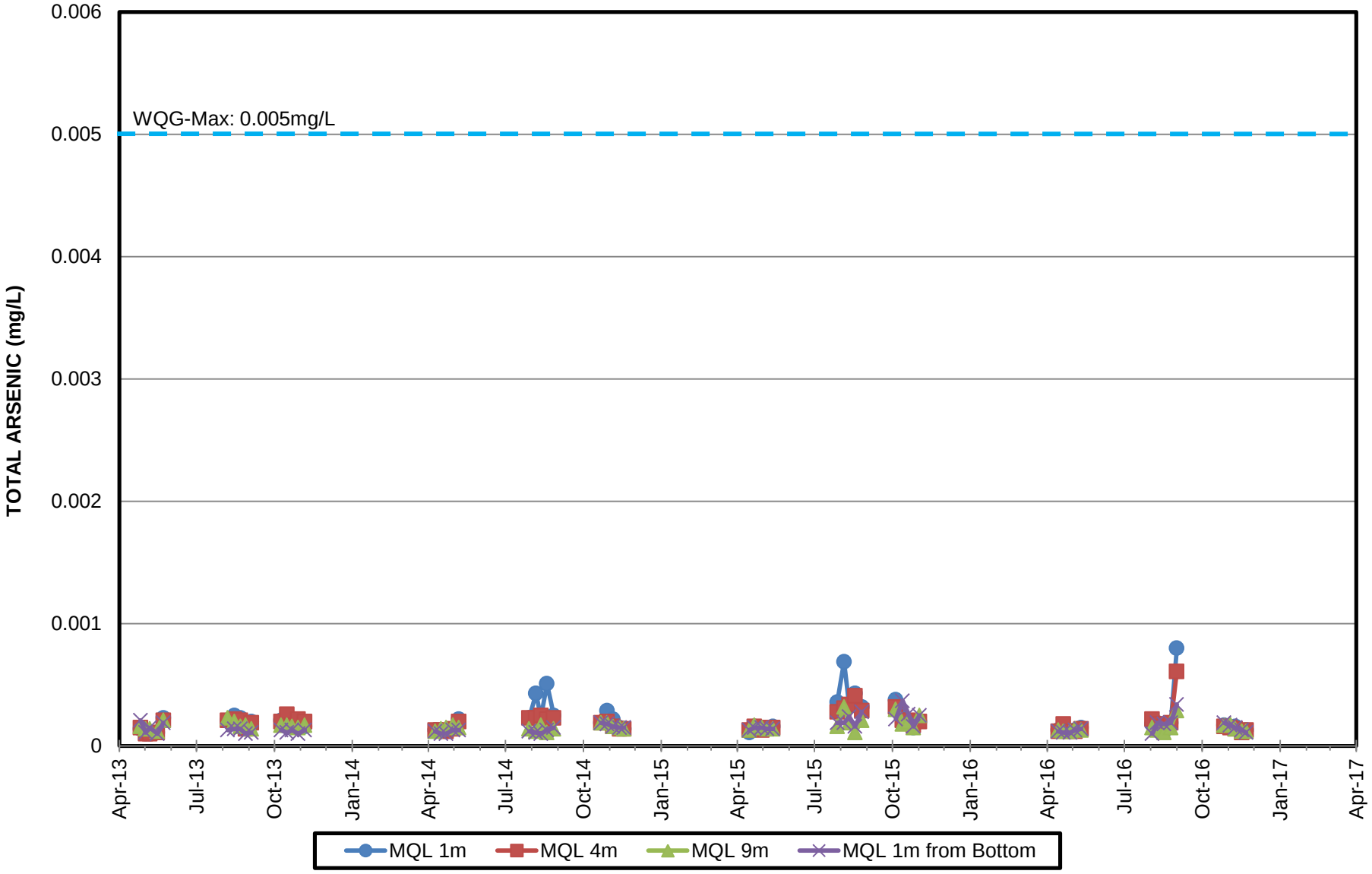
MIDDLE QUINSAM LAKE



GRAPH 44

5 in 30 TOTAL ARSENIC

MIDDLE QUINSAM LAKE

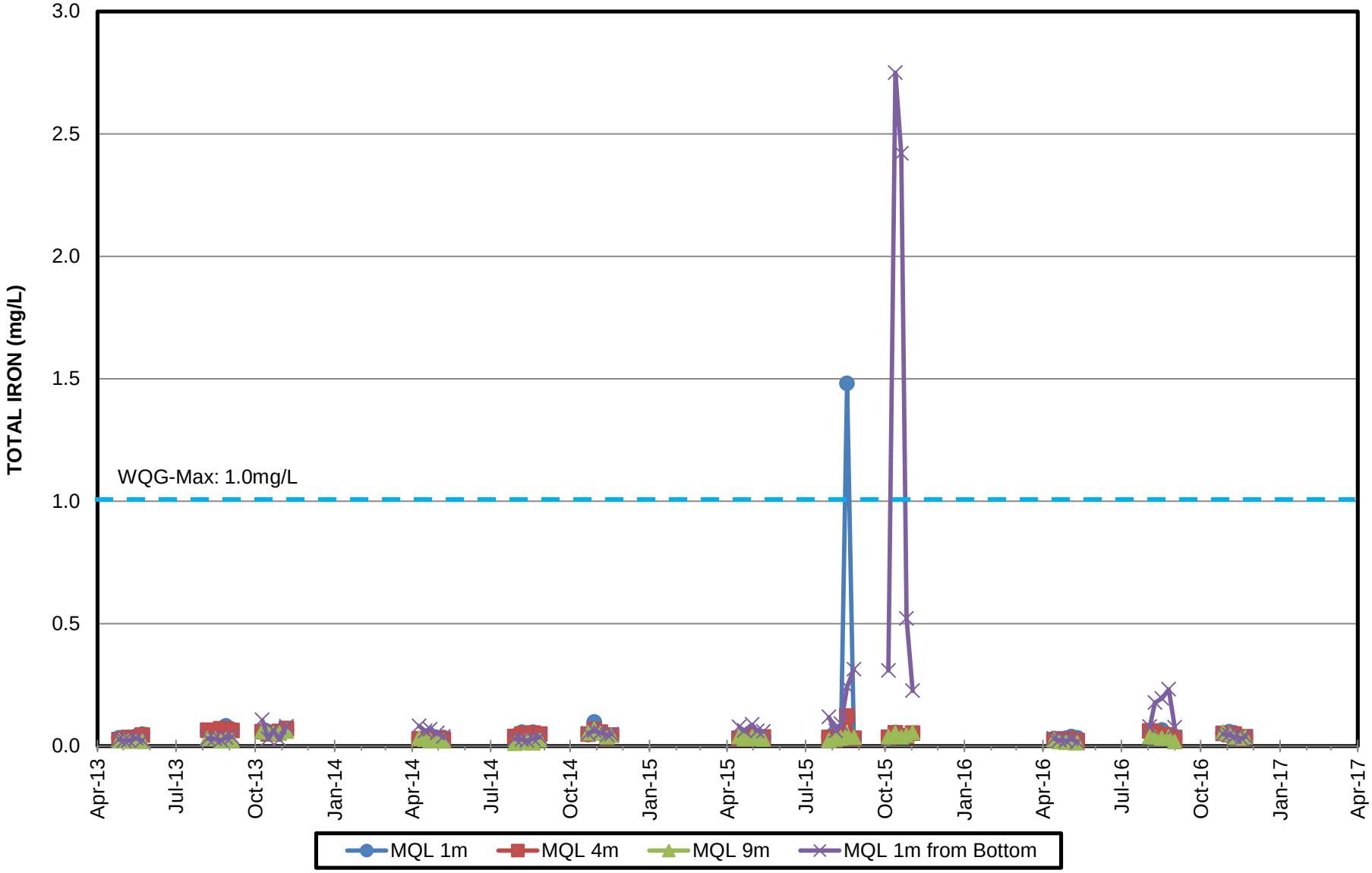


GRAPH 45

5 in 30 TOTAL IRON

MIDDLE QUINSAM LAKE

QUINSAM COAL

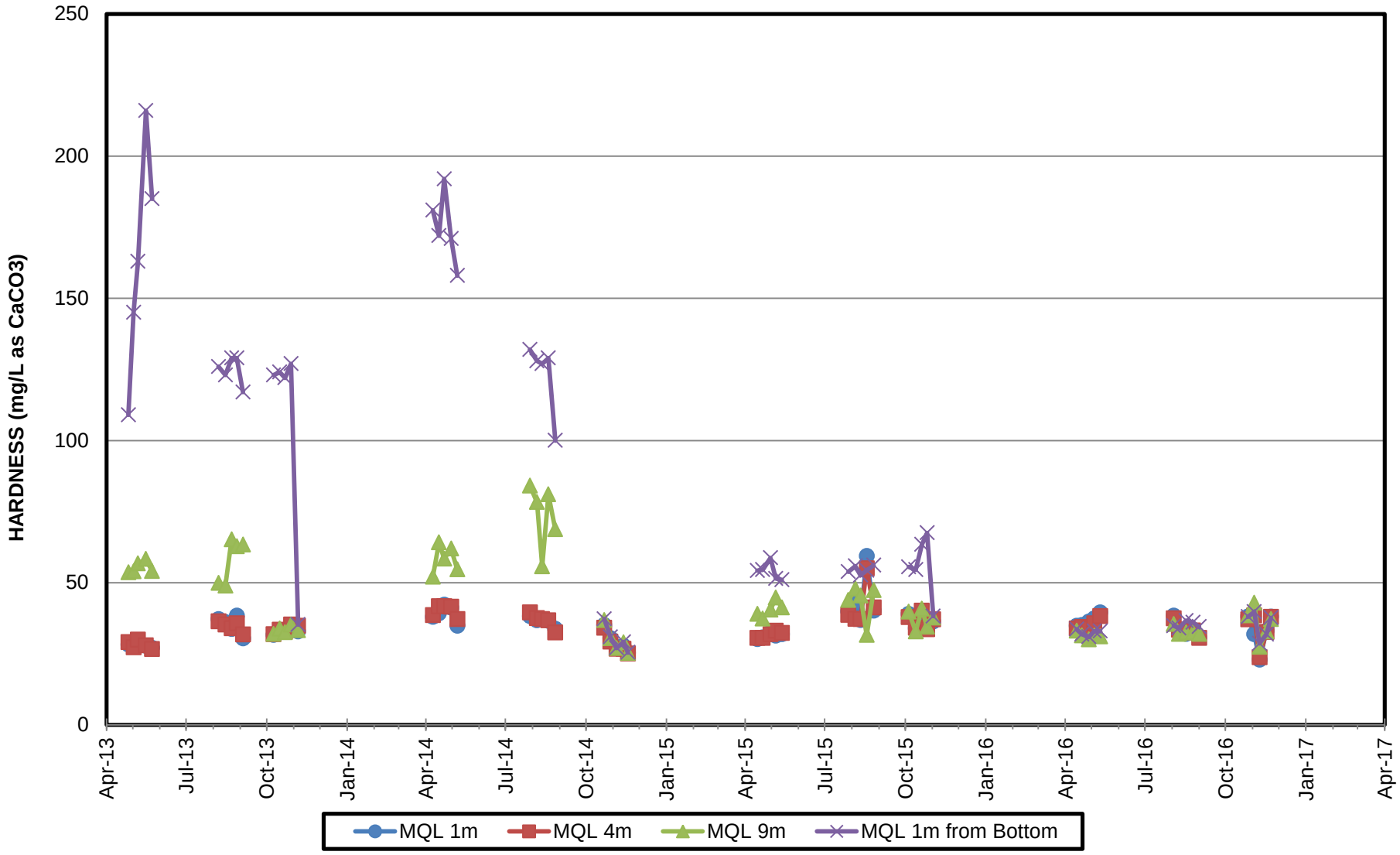


GRAPH 46

5 in 30 HARDNESS

MIDDLE QUINSAM LAKE

QUINSAM COAL

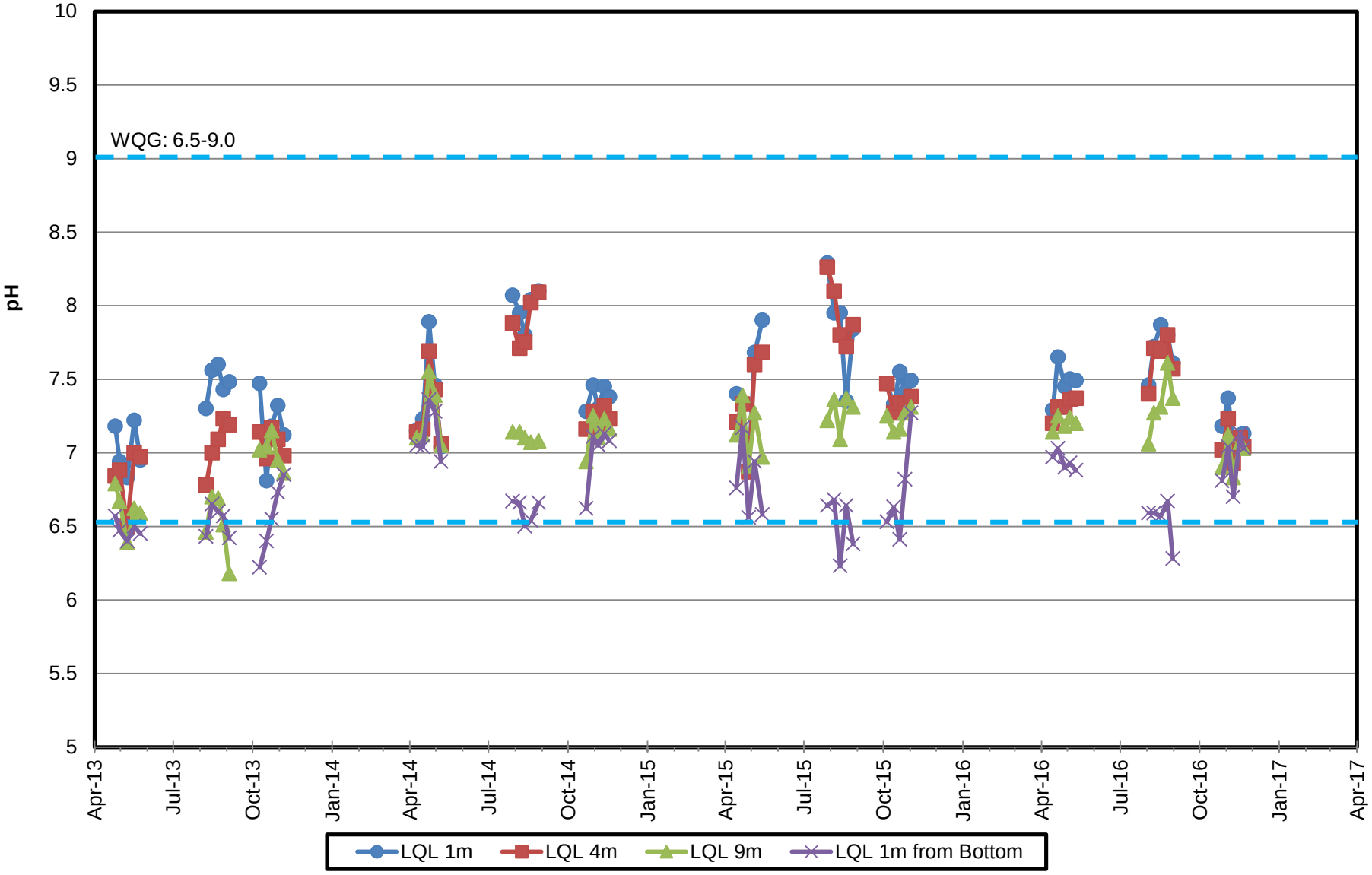


GRAPH 47

5 in 30 PH

LOWER QUINSAM LAKE

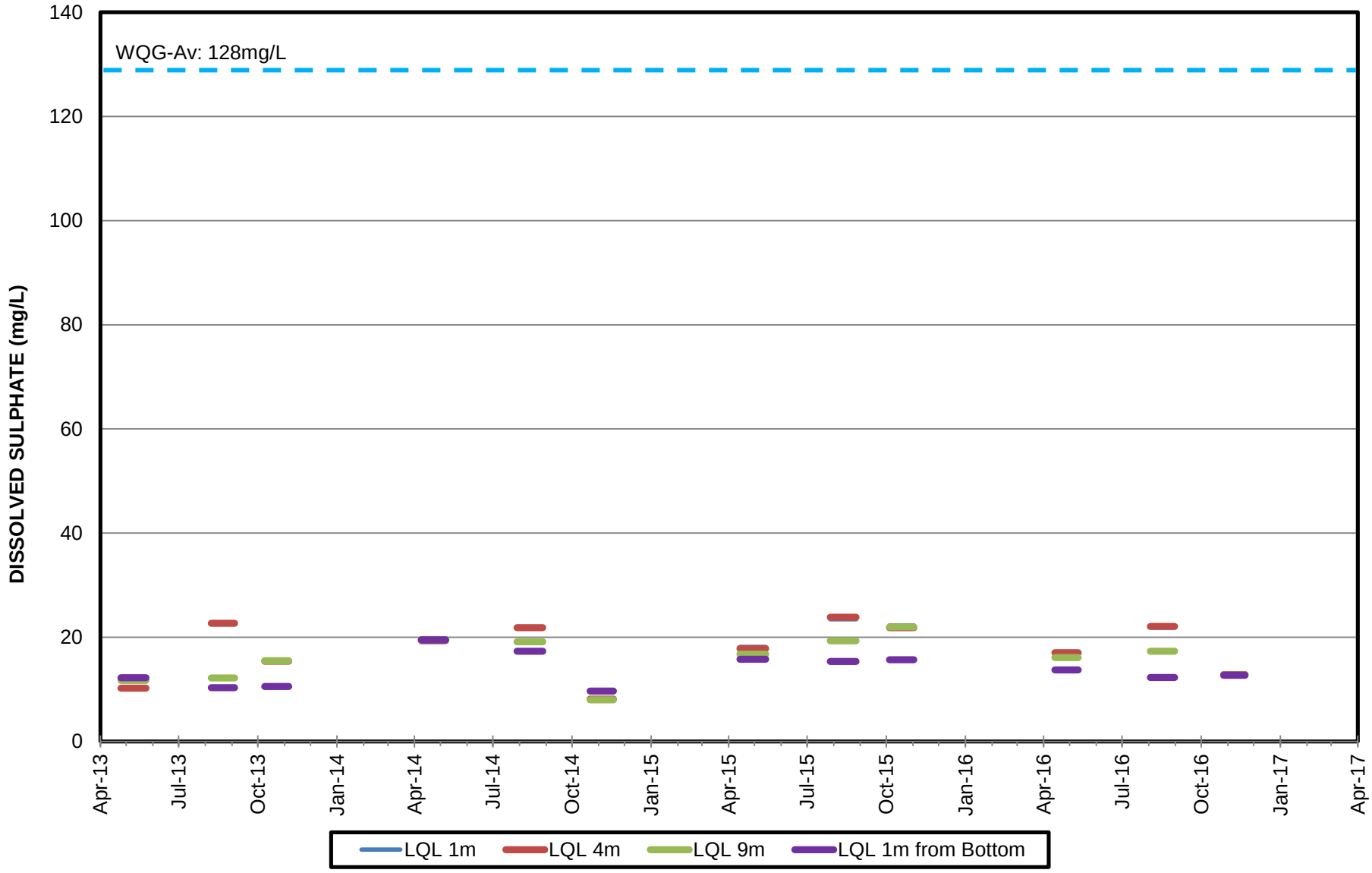
QUINSAM COAL



GRAPH 48

5 in 30 AVERAGE DISSOLVED SULPHATE

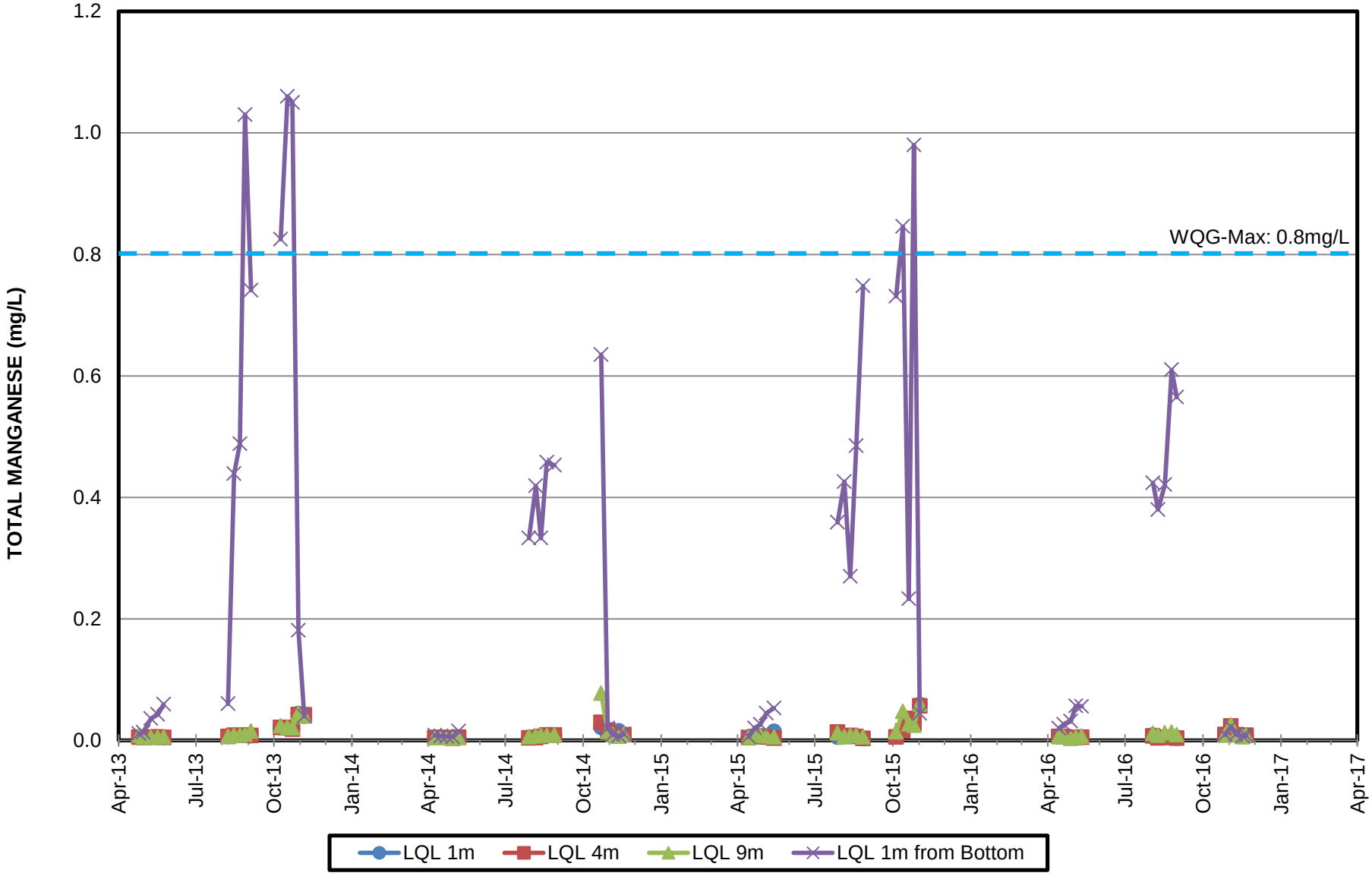
LOWER QUINSAM LAKE



GRAPH 49

5 in 30 TOTAL MANGANESE

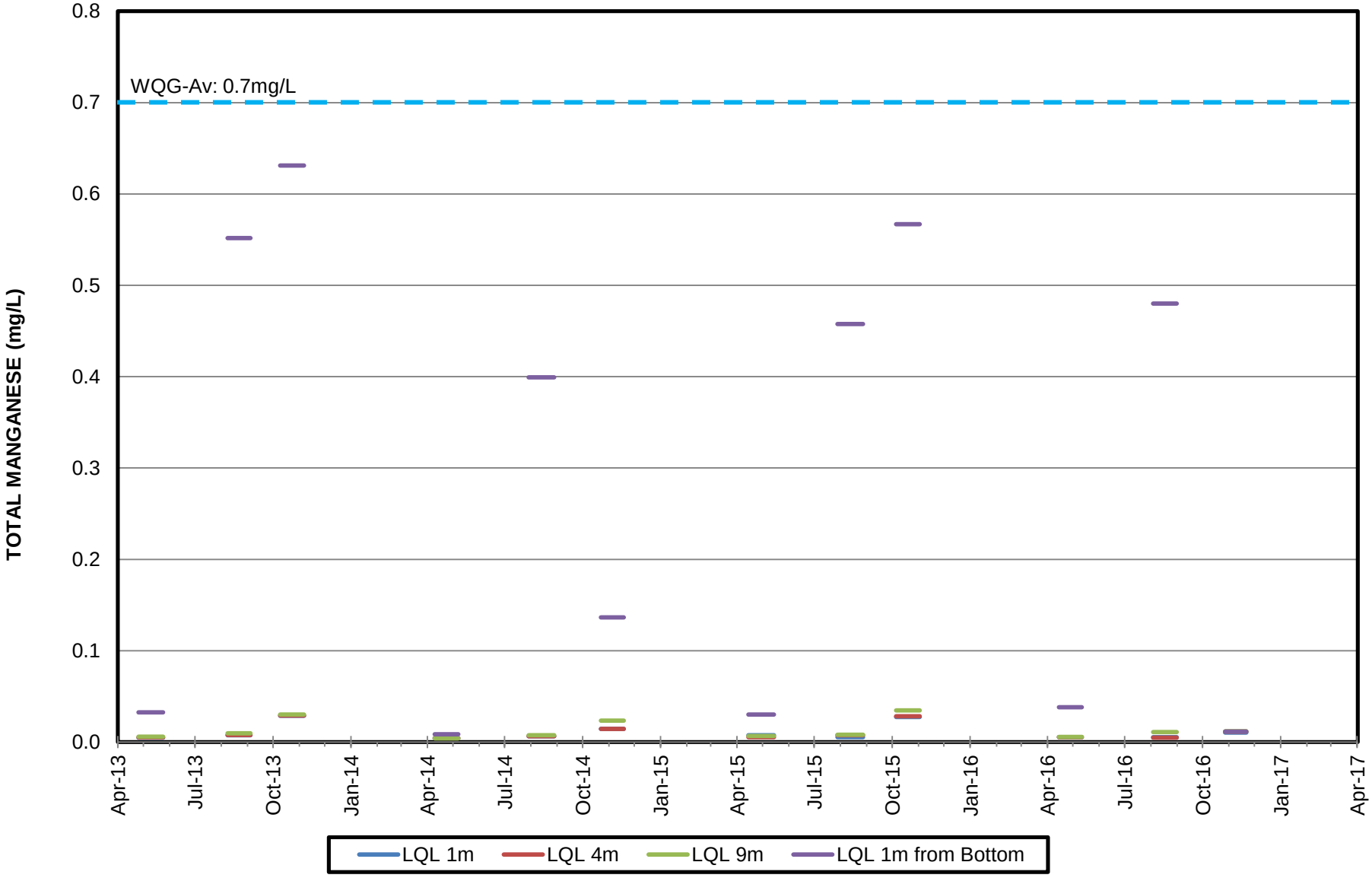
LOWER QUINSAM LAKE



GRAPH 50

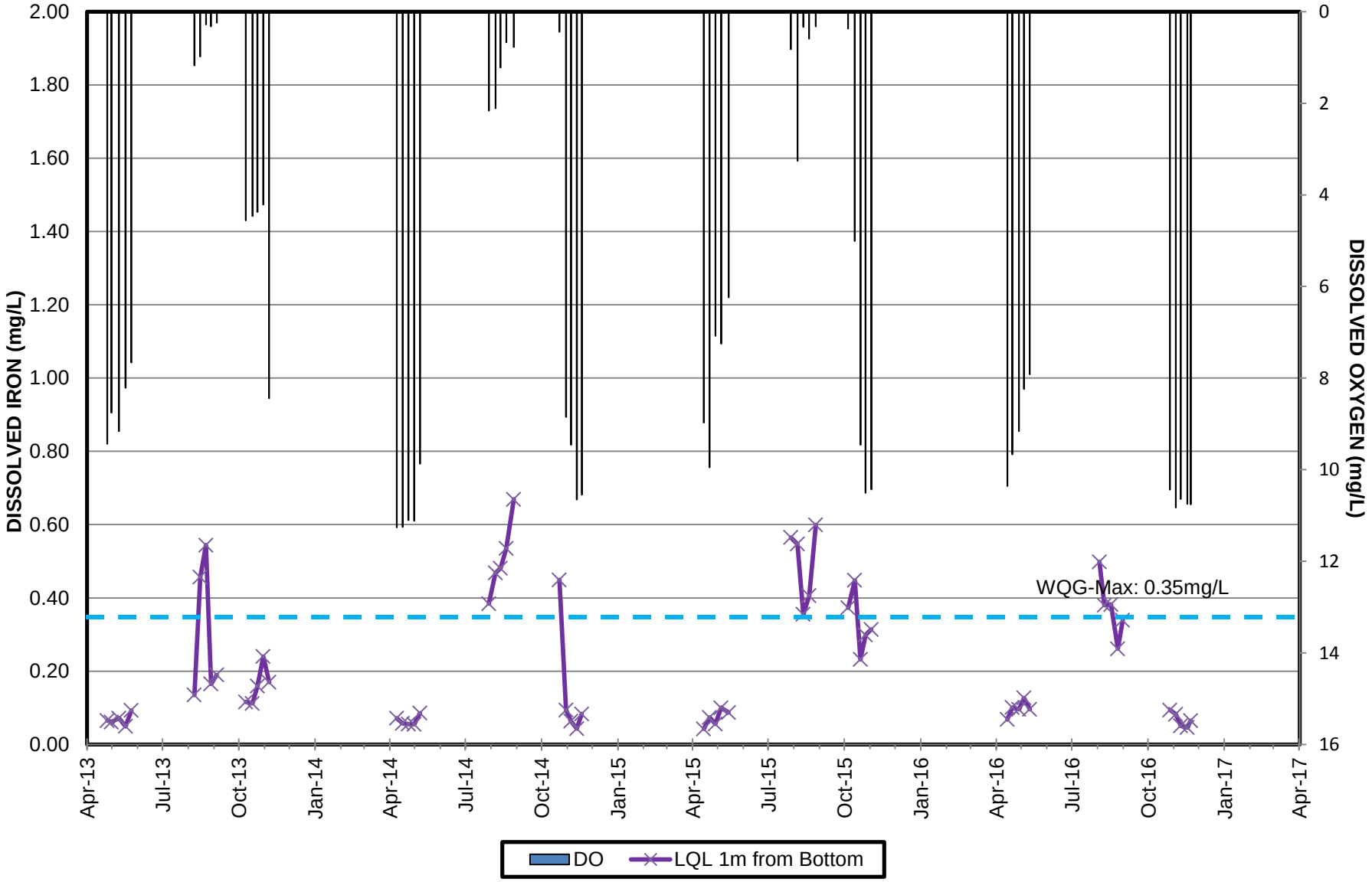
5 in 30 AVERAGE TOTAL MANGANESE

LOWER QUINSAM LAKE



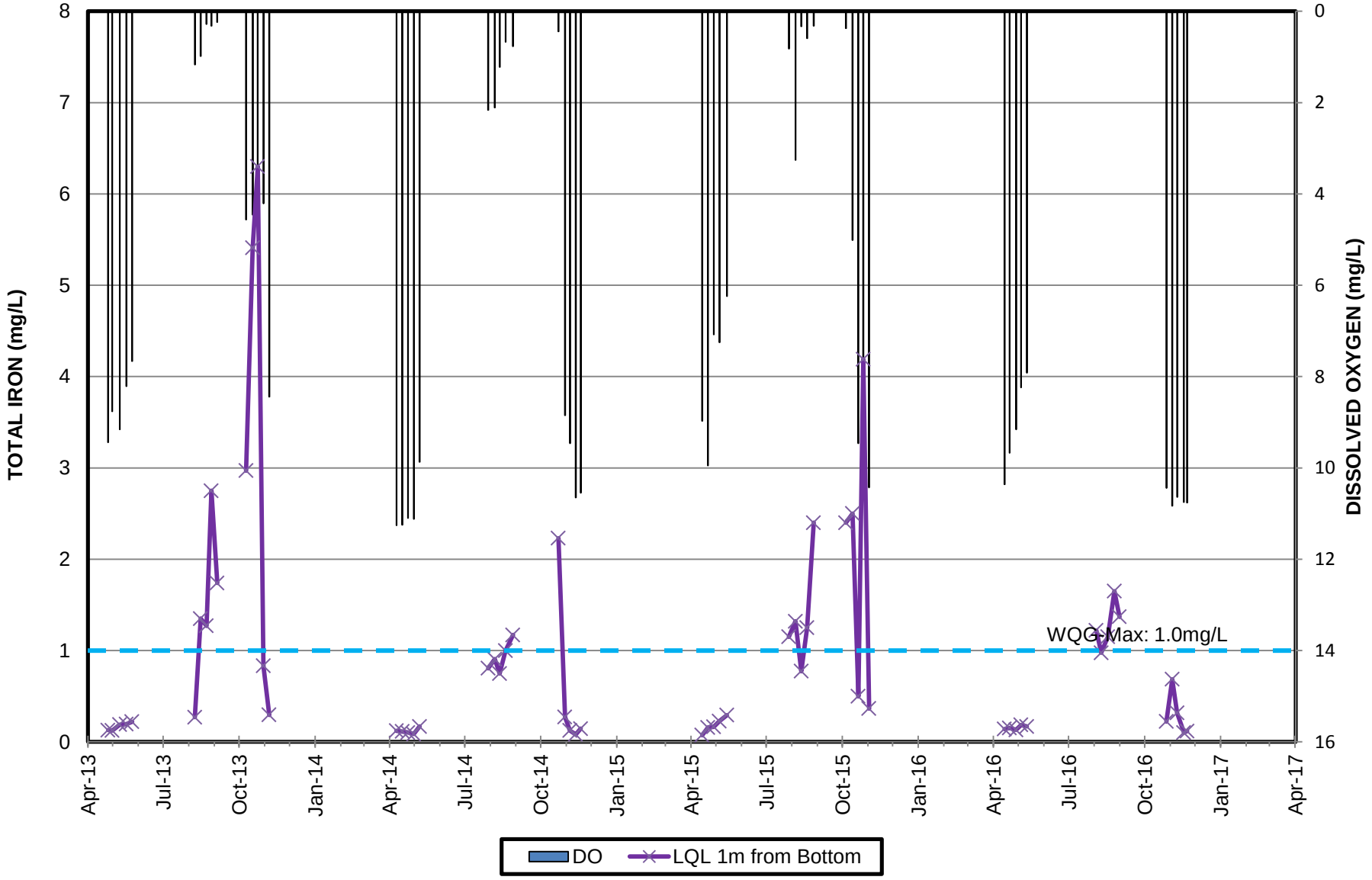
GRAPH 51
5 in 30 DISSOLVED IRON VS DISSOLVED OXYGEN
LOWER QUINSAM LAKE 1mb

QUINSAM COAL



GRAPH 52
5 in 30 TOTAL IRON VS DISSOLVED OXYGEN
LOWER QUINSAM LAKE 1mb

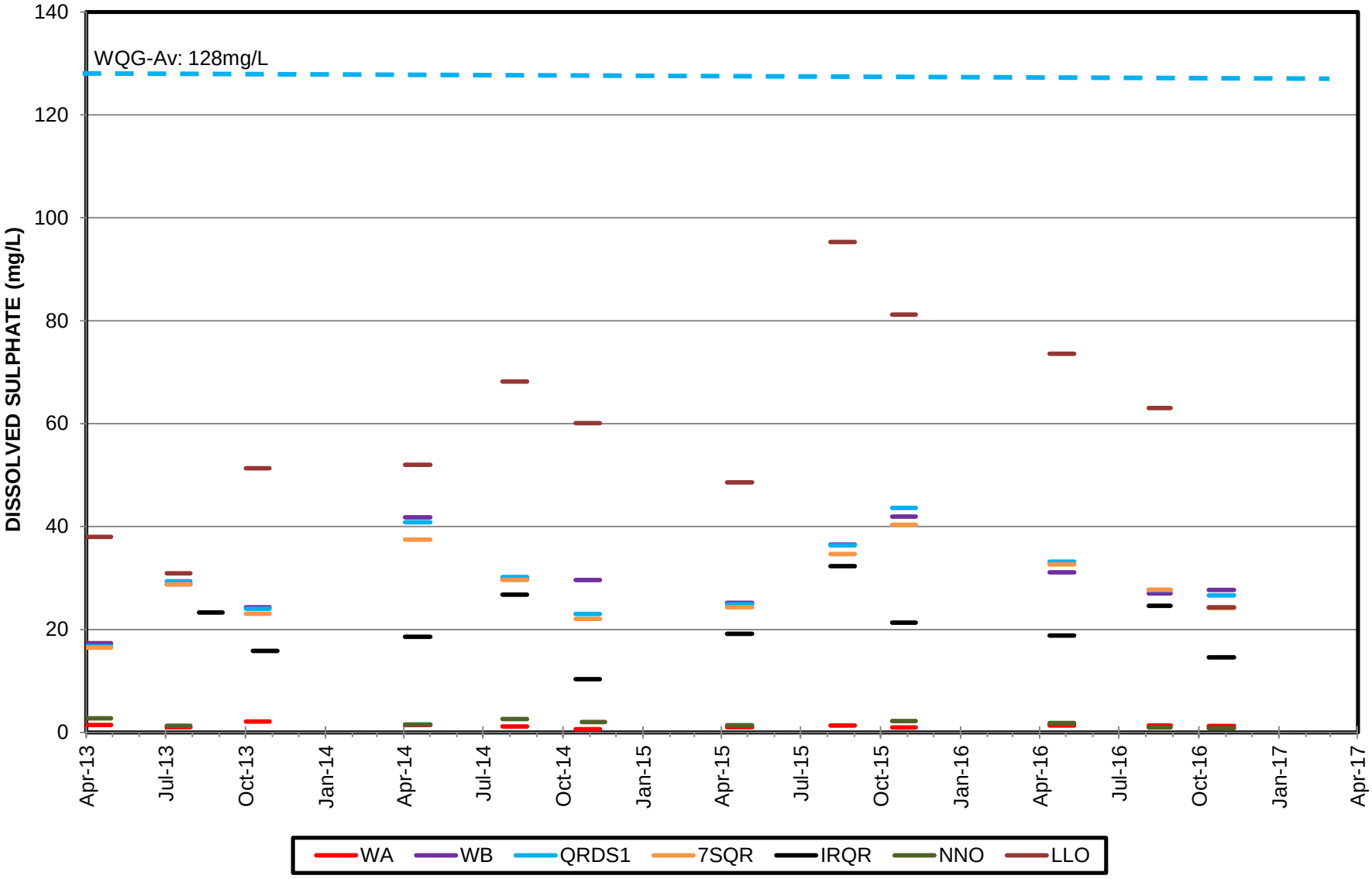
QUINSAM COAL



GRAPH 53

5 in 30 AVERAGE DISSOLVED SULPHATE

QUINSAM SUB BASIN: RIVERS AND STREAMS

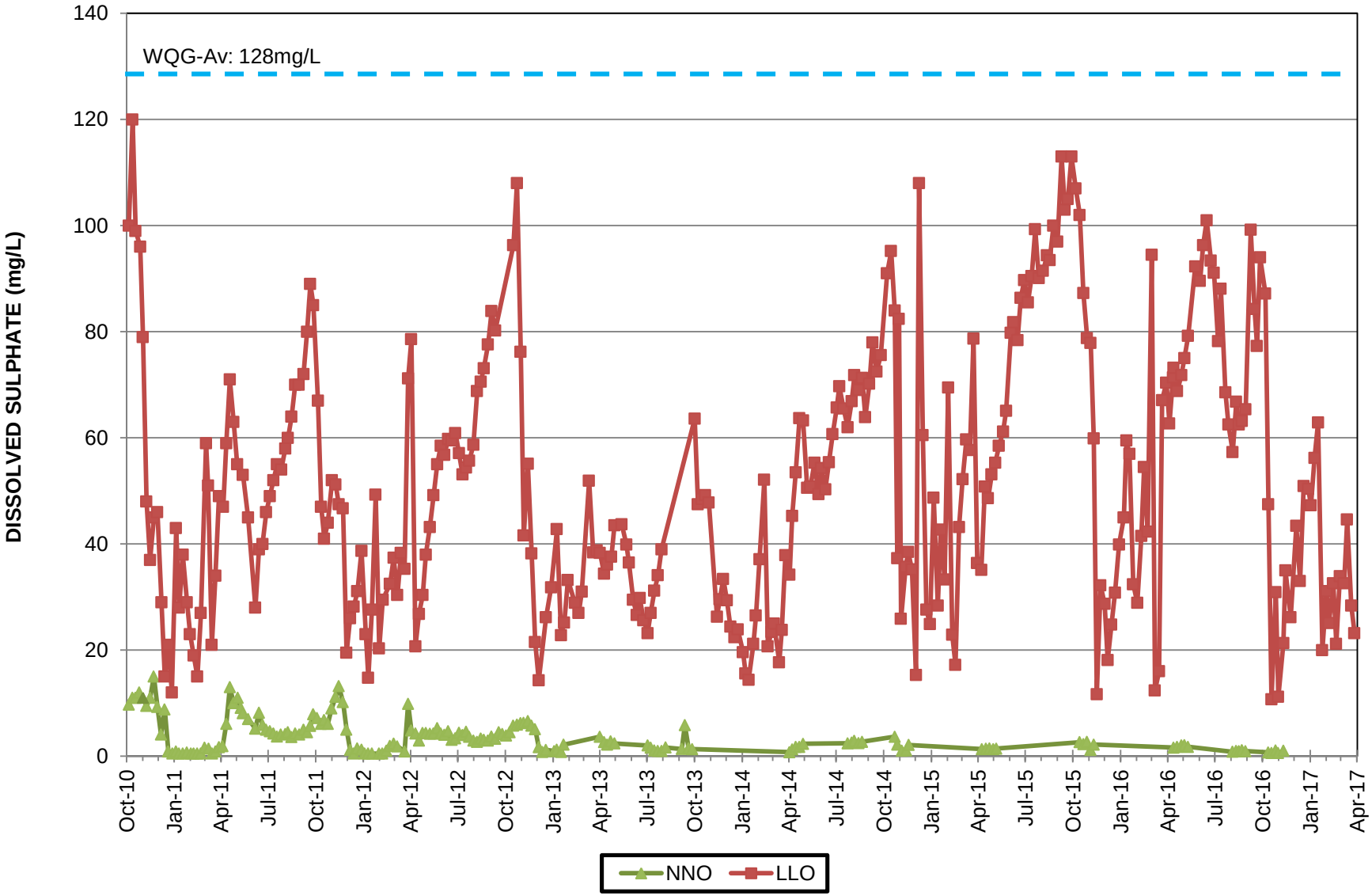


GRAPH 54

DISSOLVED SULPHATE

QUINSAM SUB BASIN: RIVERS AND STREAMS

QUINSAM COAL

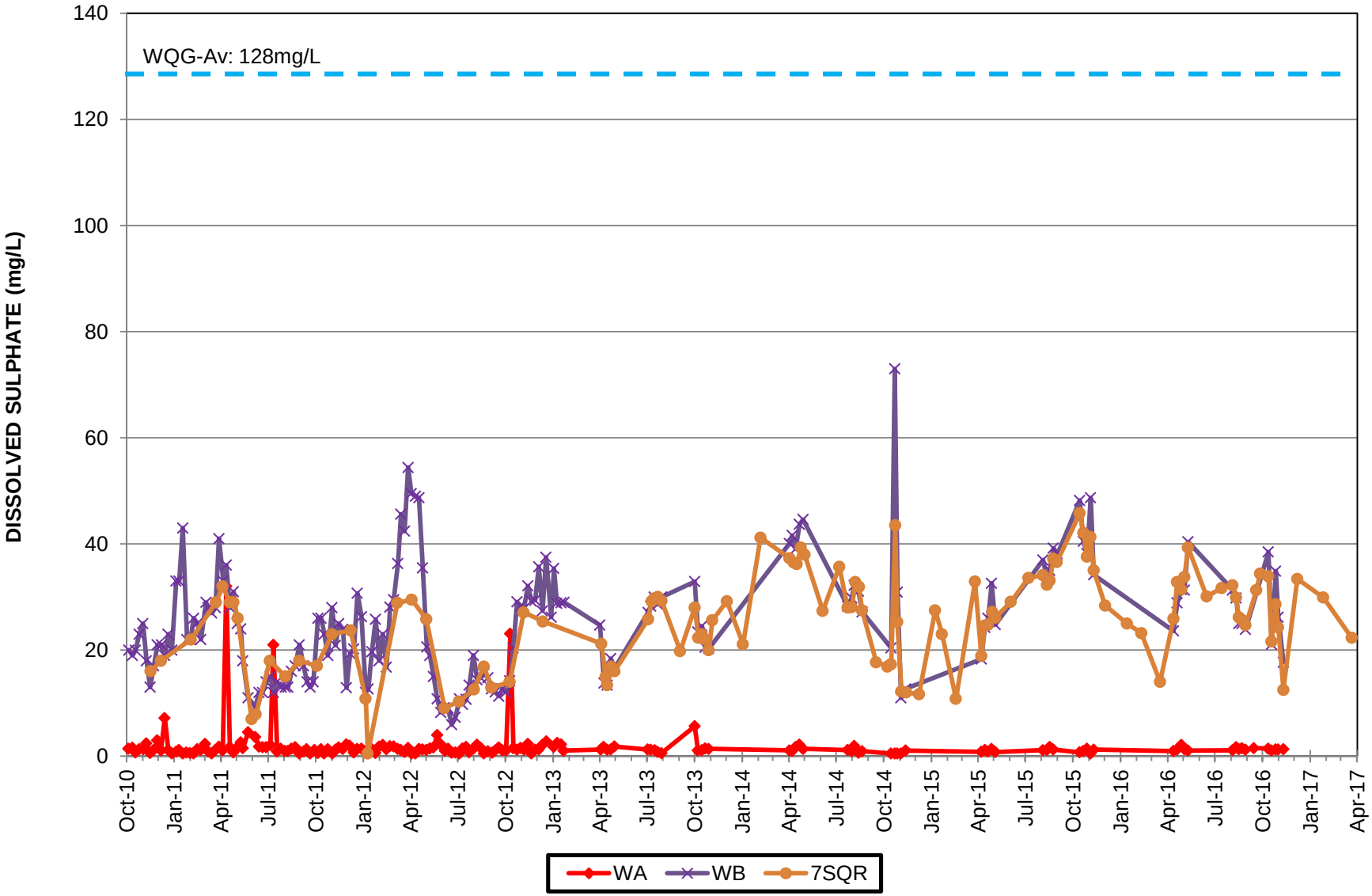


GRAPH 55

DISSOLVED SULPHATE

QUINSAM SUB BASIN: RIVERS AND STREAMS

QUINSAM COAL

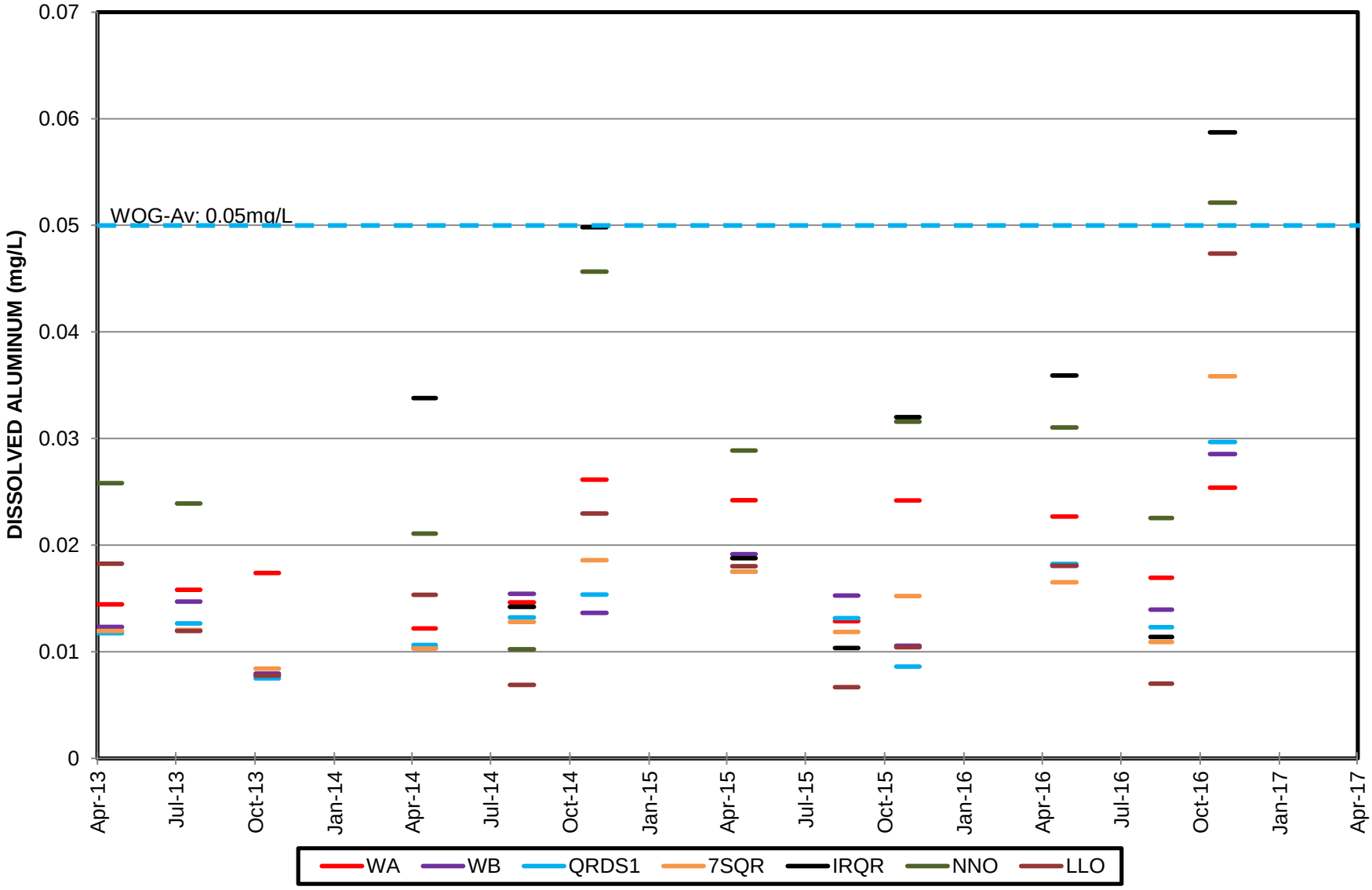


GRAPH 56

5 IN 30 AVERAGE DISSOLVED ALUMINUM

QUINSAM SUB BASIN: RIVERS AND STREAMS

QUINSAM COAL

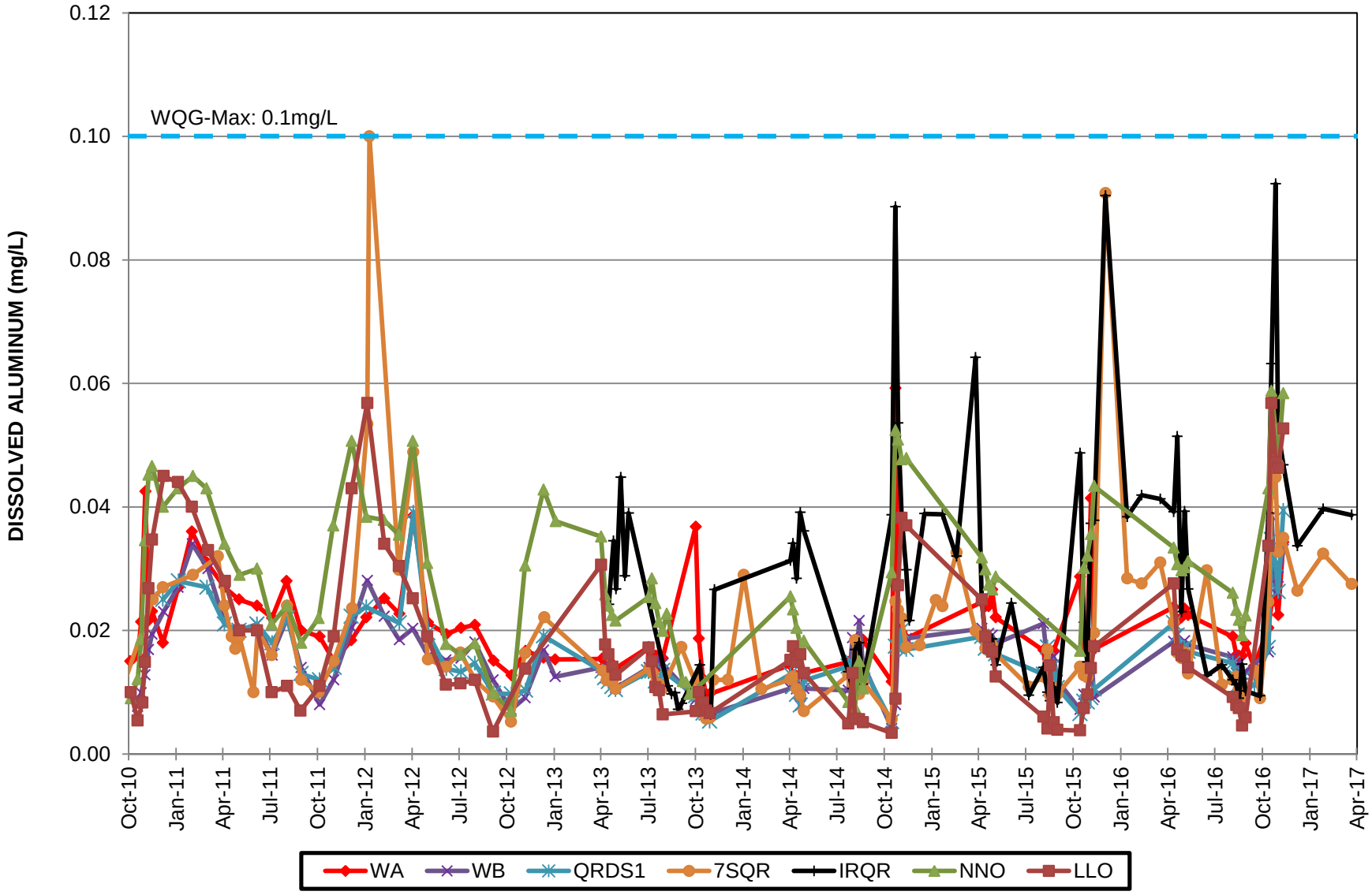


GRAPH 57

DISSOLVED ALUMINUM

QUINSAM SUB BASIN: RIVERS AND STREAMS

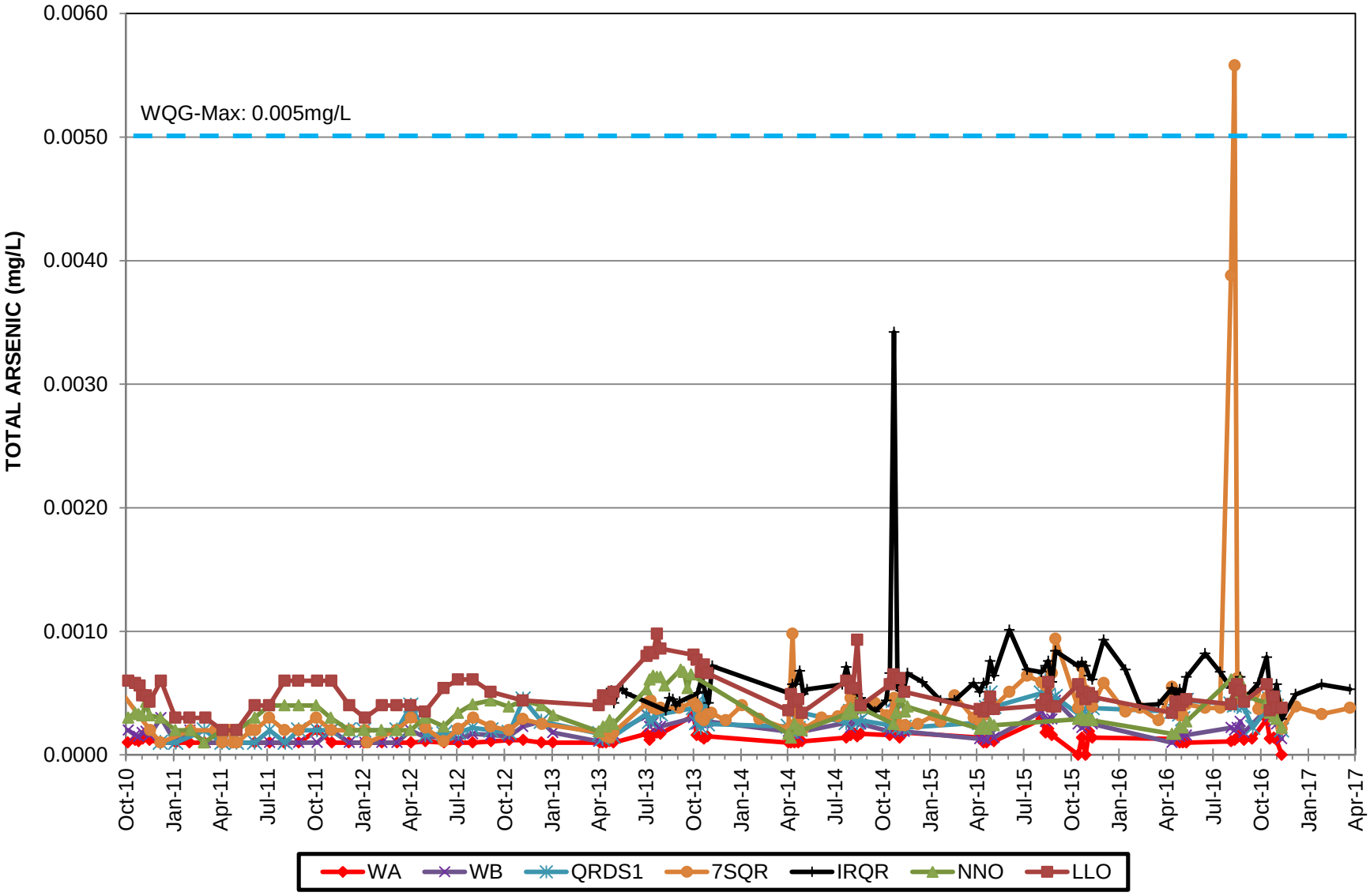
QUINSAM COAL



GRAPH 58

TOTAL ARSENIC

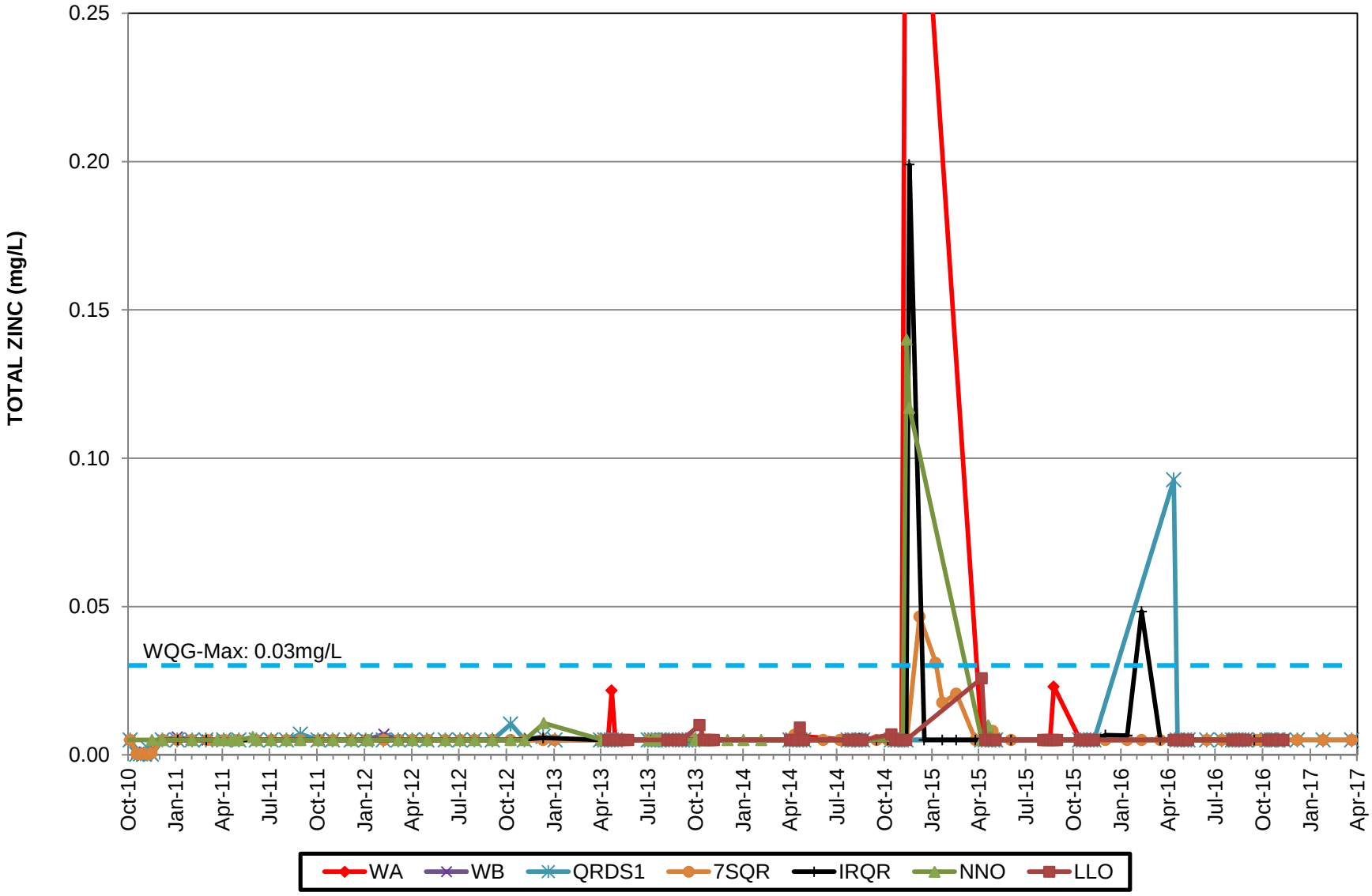
QUINSAM SUB BASIN: RIVERS AND STREAMS



GRAPH 59

TOTAL ZINC

QUINSAM SUB BASIN: RIVERS AND STREAMS

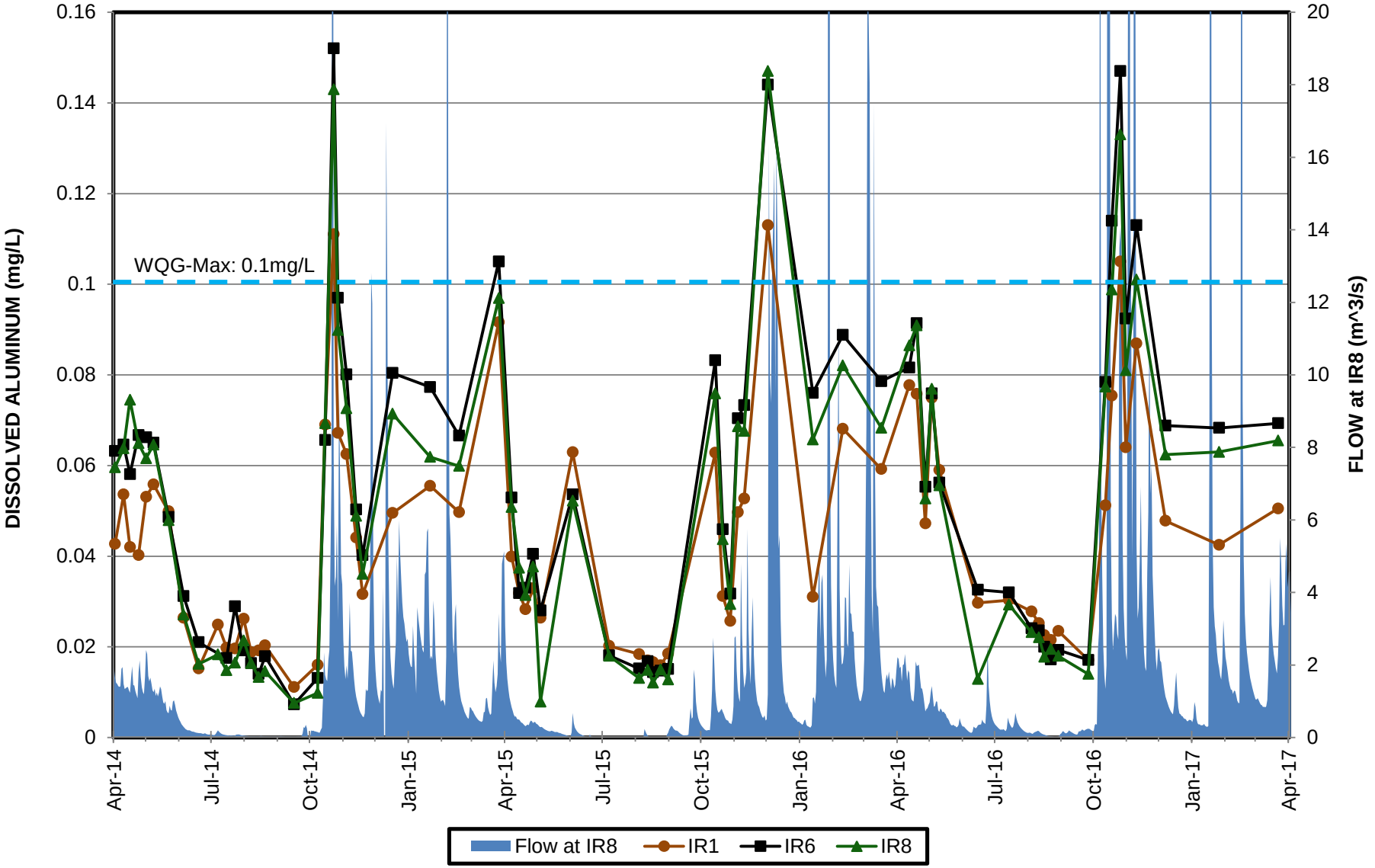


GRAPH 60

DISSOLVED ALUMINUM

IRON RIVER

QUINSAM COAL

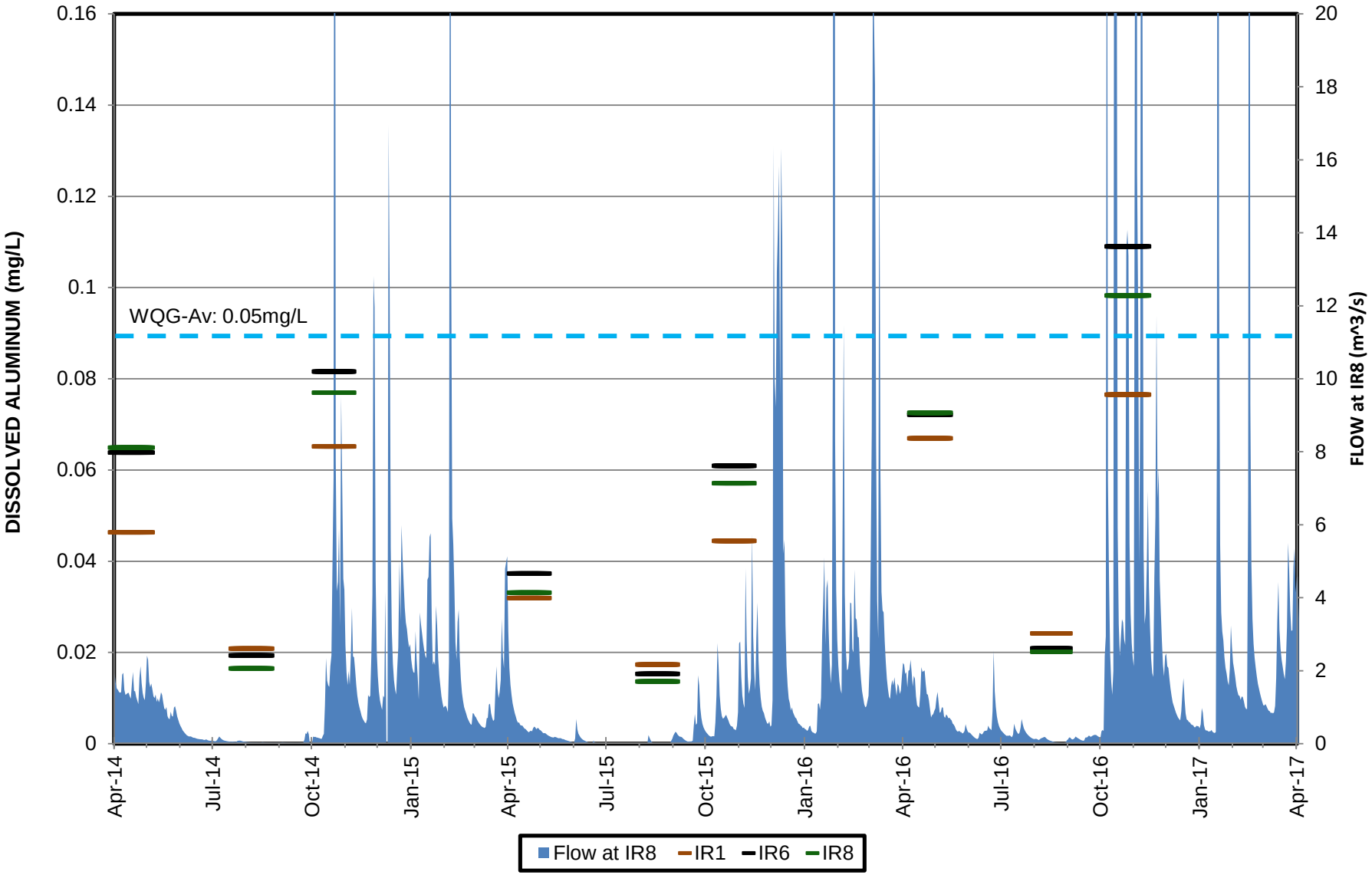


GRAPH 61

5 in 30 AVERAGE DISSOLVED ALUMINUM

IRON RIVER

QUINSAM COAL

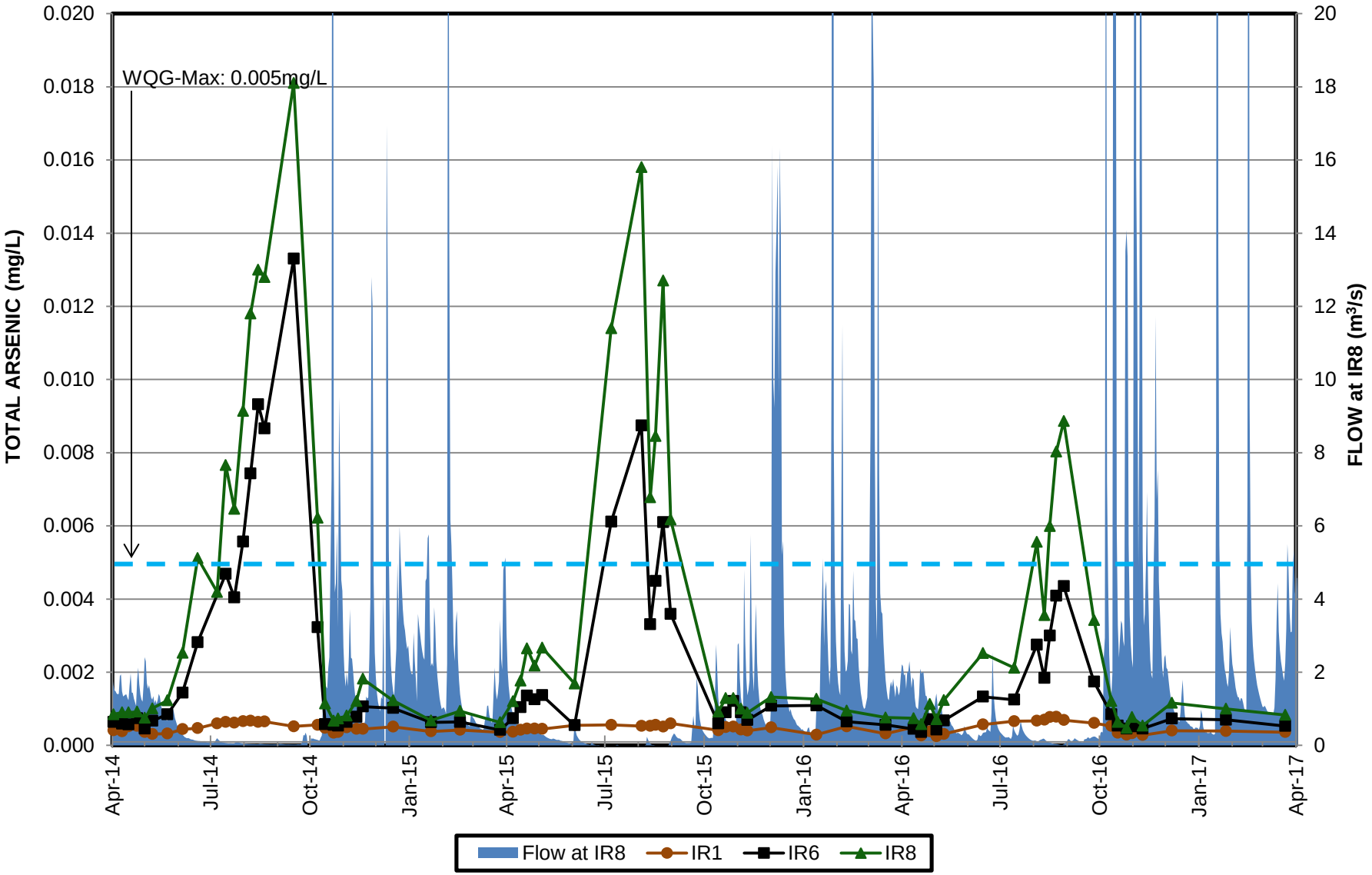


GRAPH 62

TOTAL ARSENIC VS FLOW

IRON RIVER

QUINSAM COAL

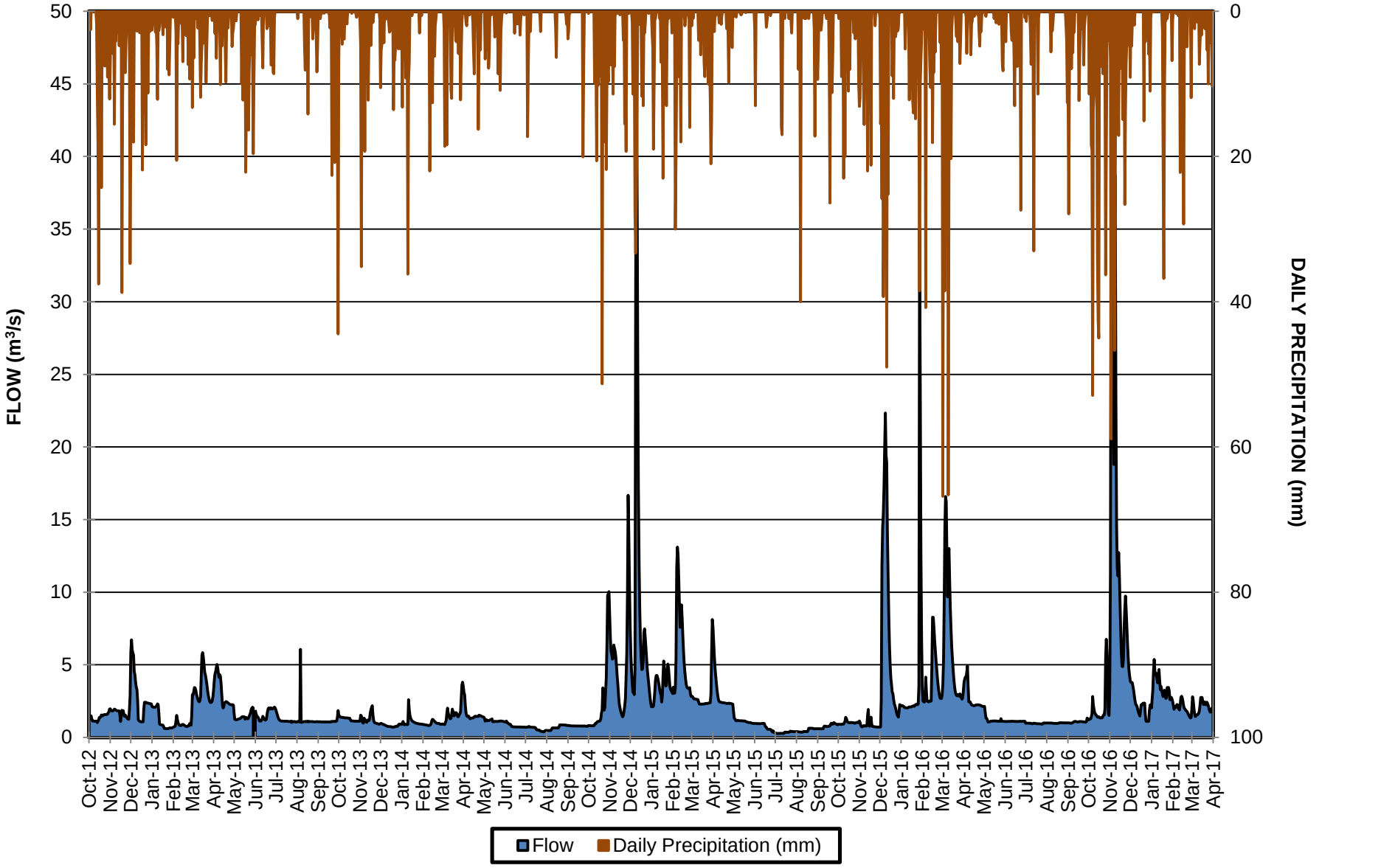


GRAPH 63

FLOW VS PRECIPITATION

WA

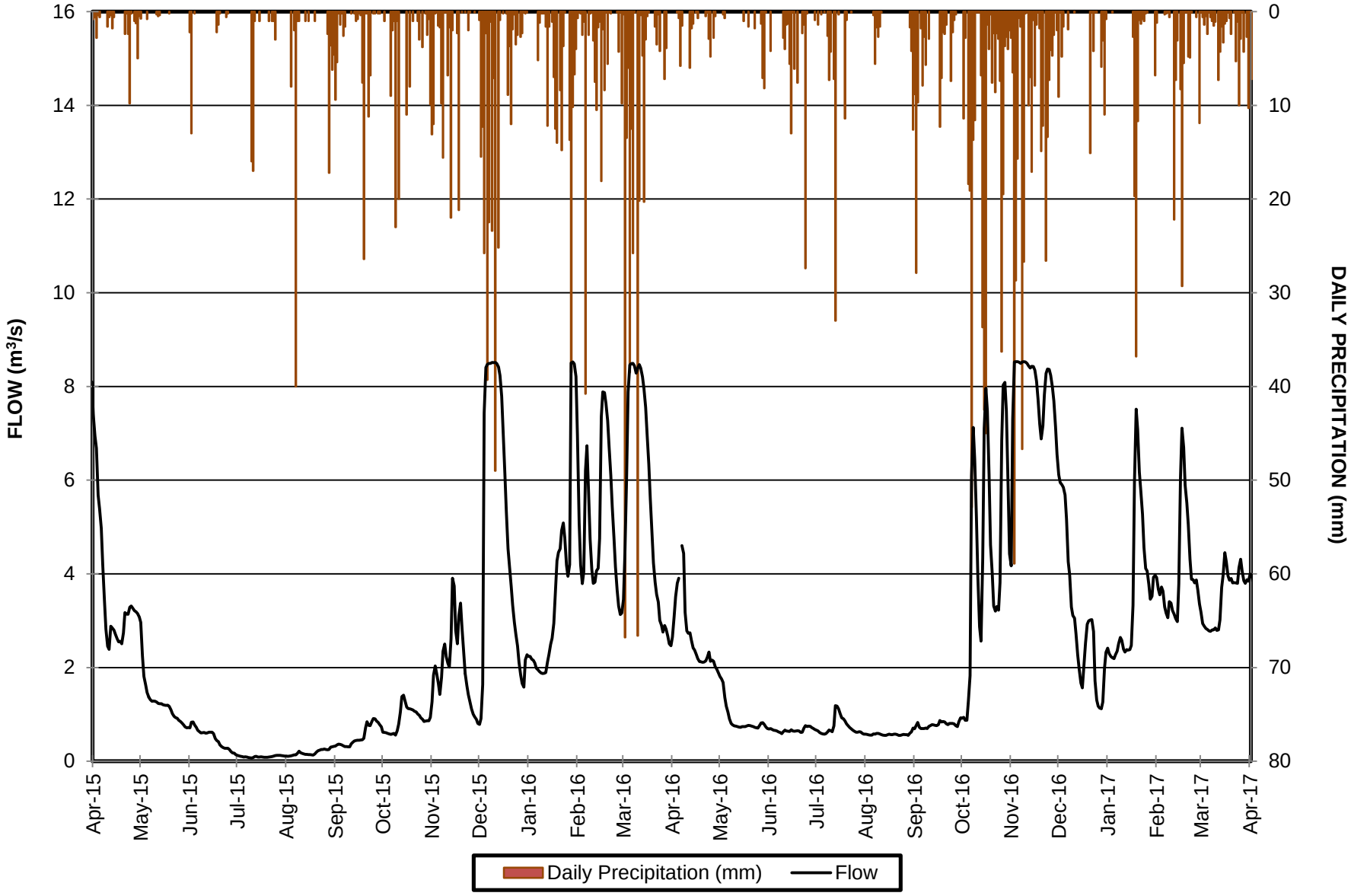
QUINSAM COAL



GRAPH 64

FLOW VS PRECIPITATION

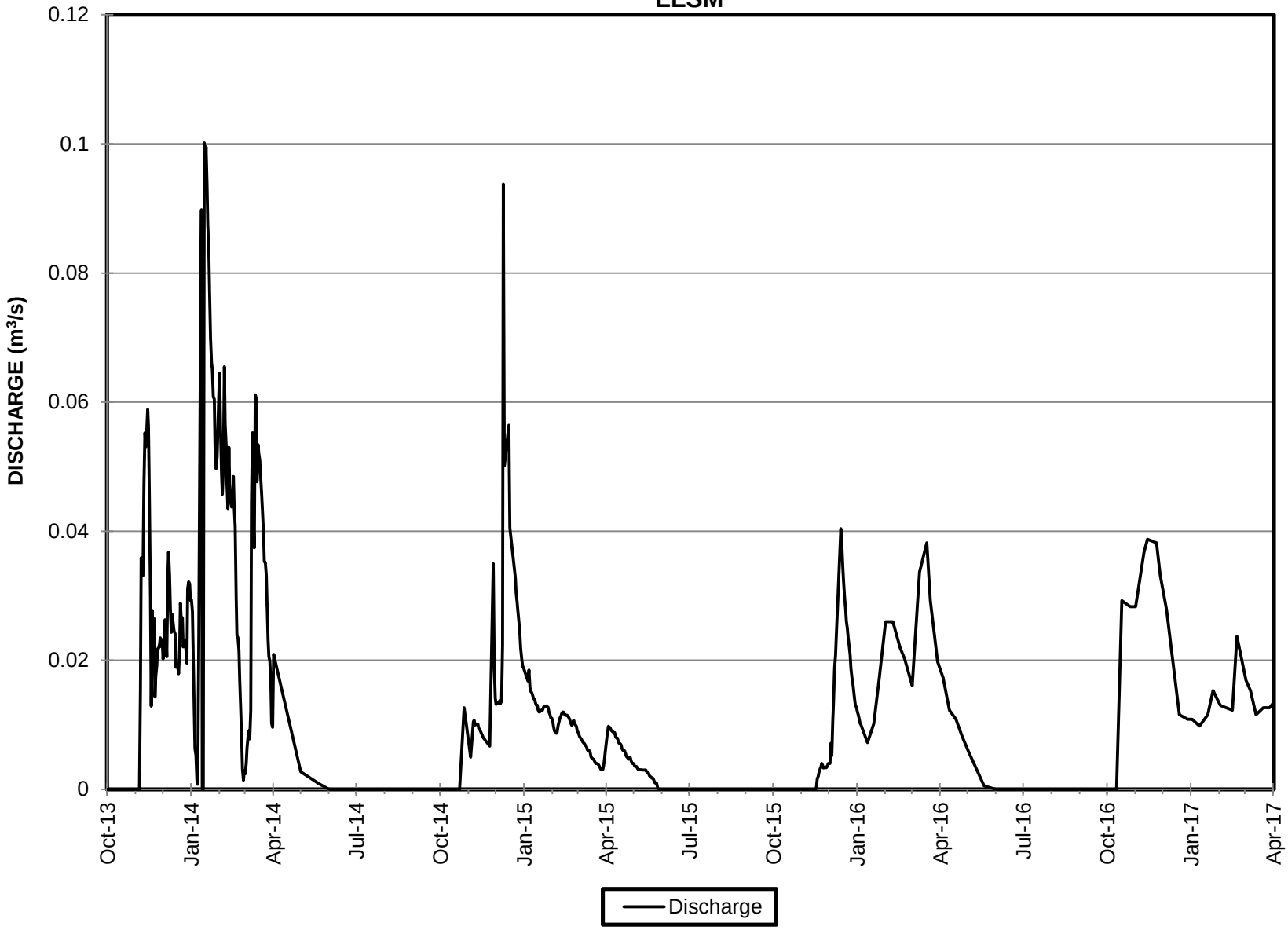
WB



GRAPH 65

DISCHARGE

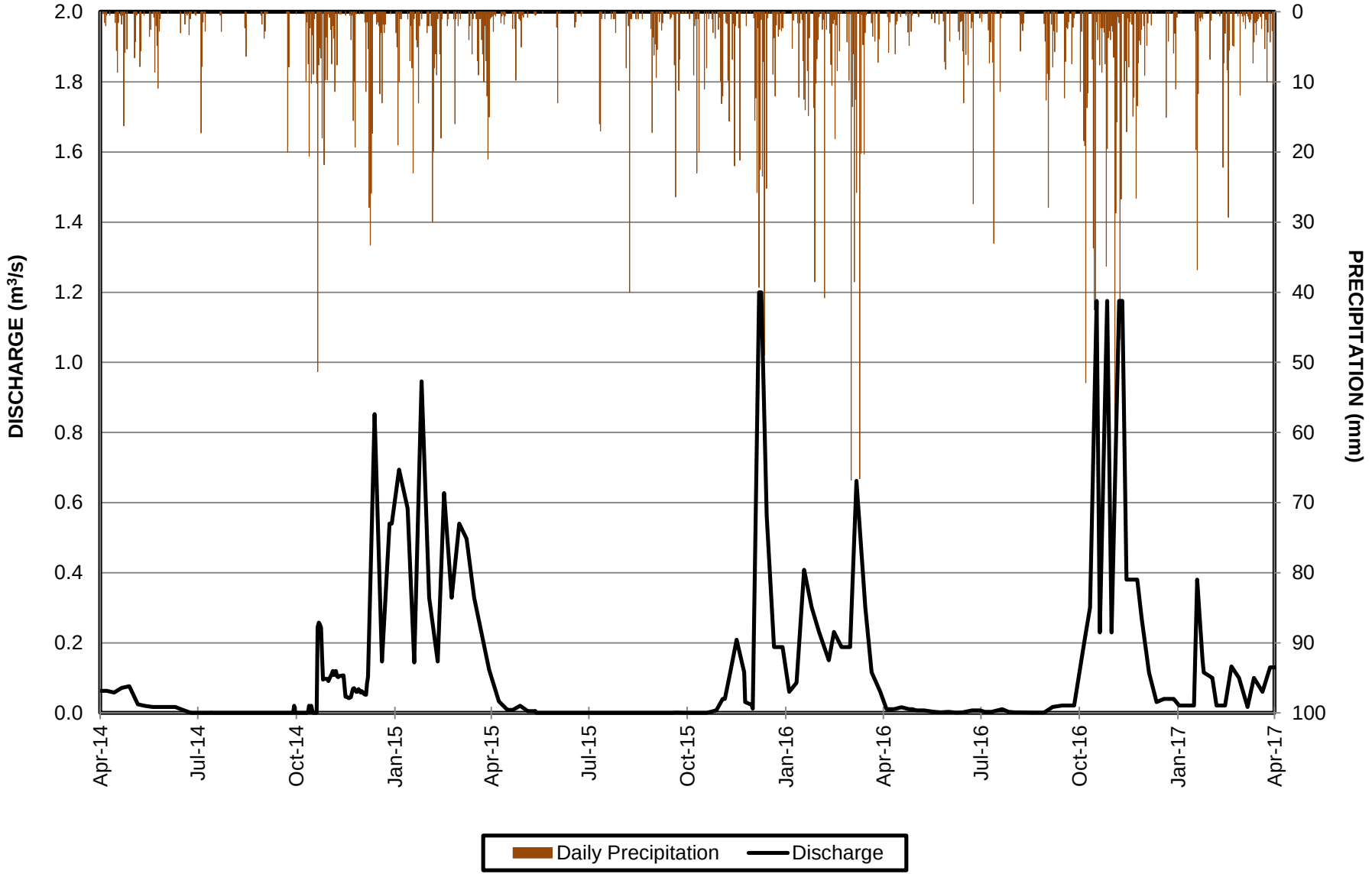
LLSM



GRAPH 66

DISCHARGE VS PRECIPITATION

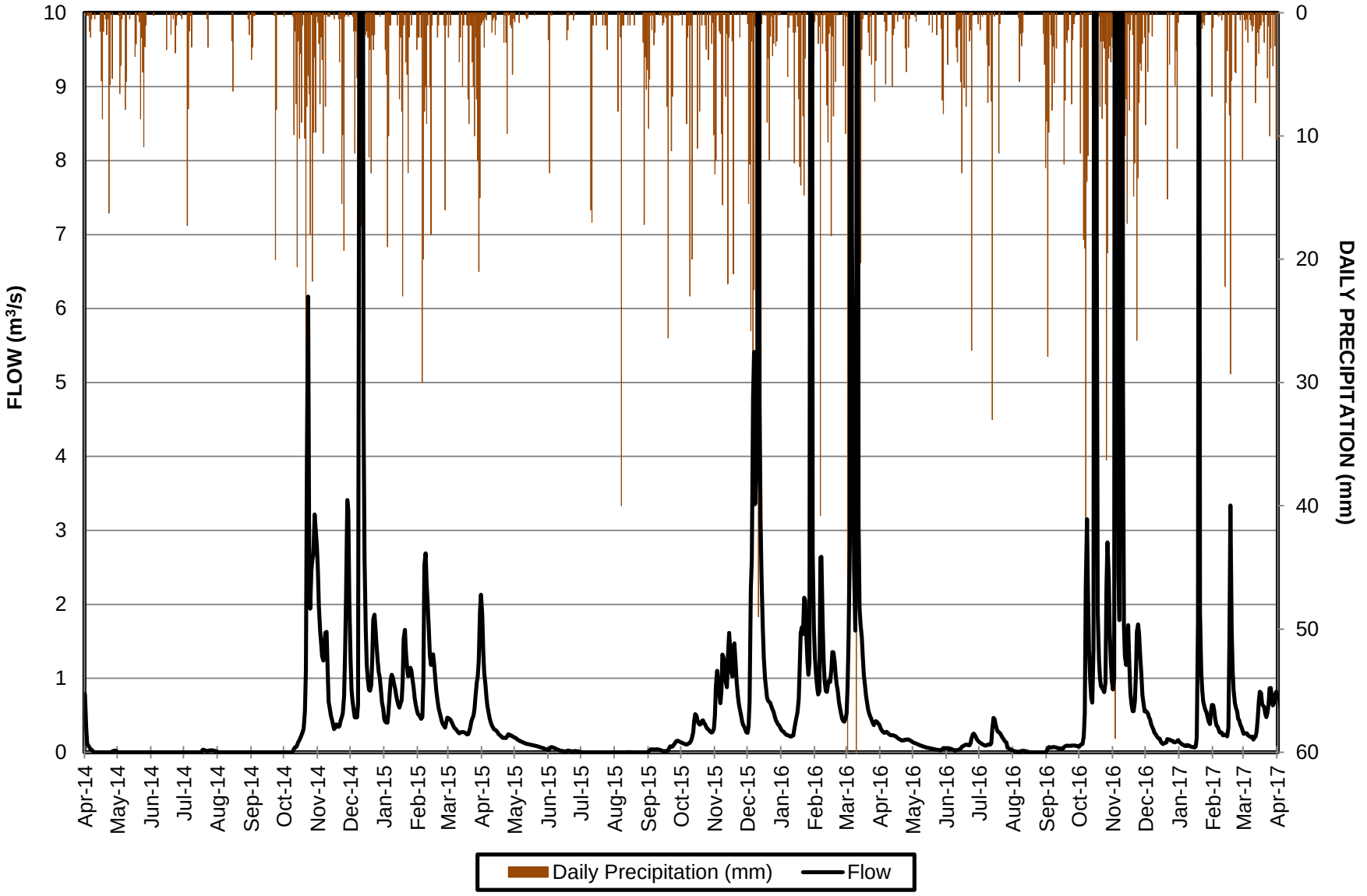
LLE



GRAPH 67

FLOW VS PRECIPITATION

LLO

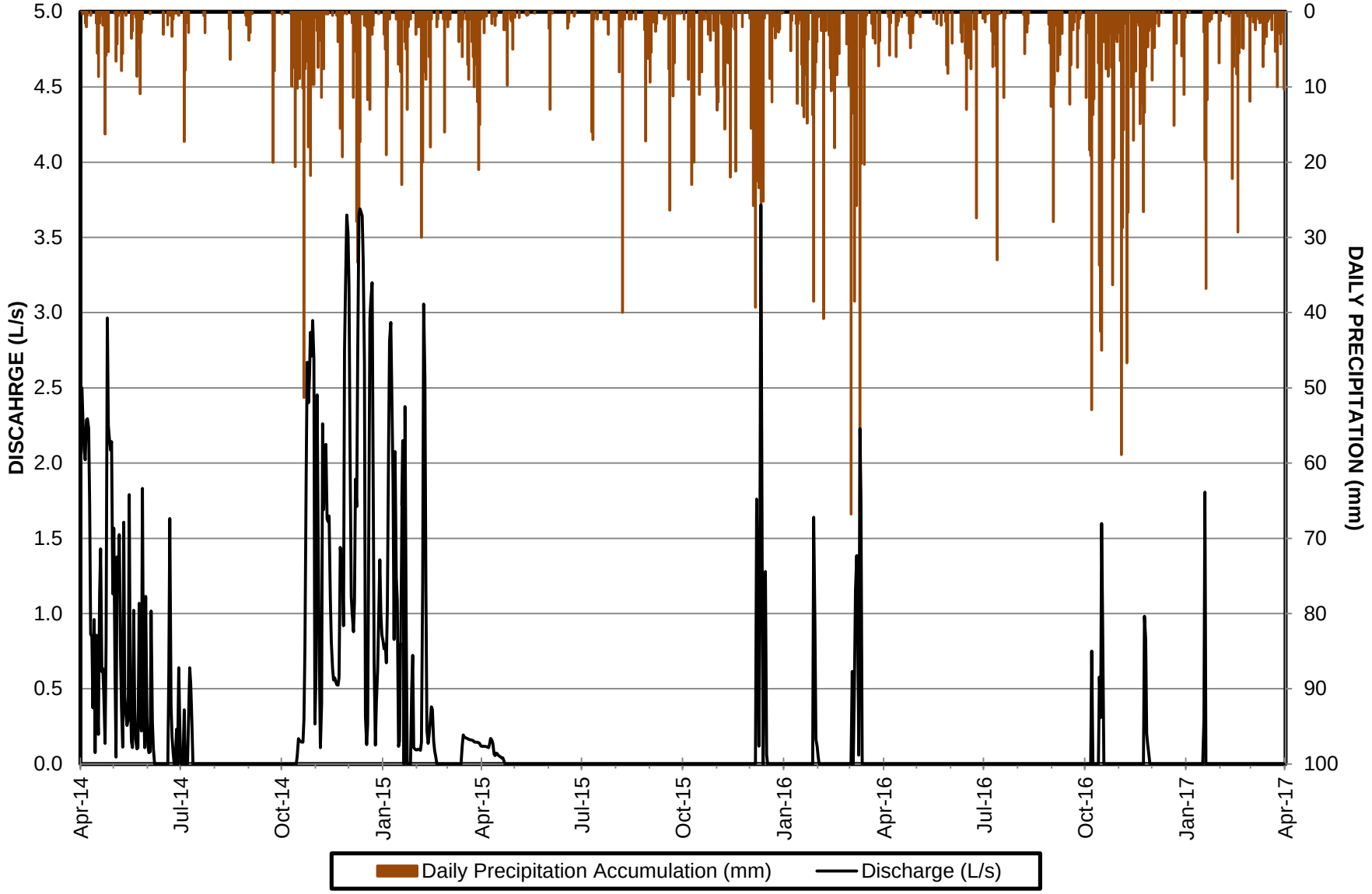


GRAPH 68

DAILY AVERAGE DISCHARGE VS PRECIPITATION

7SSD

QUINSAM COAL

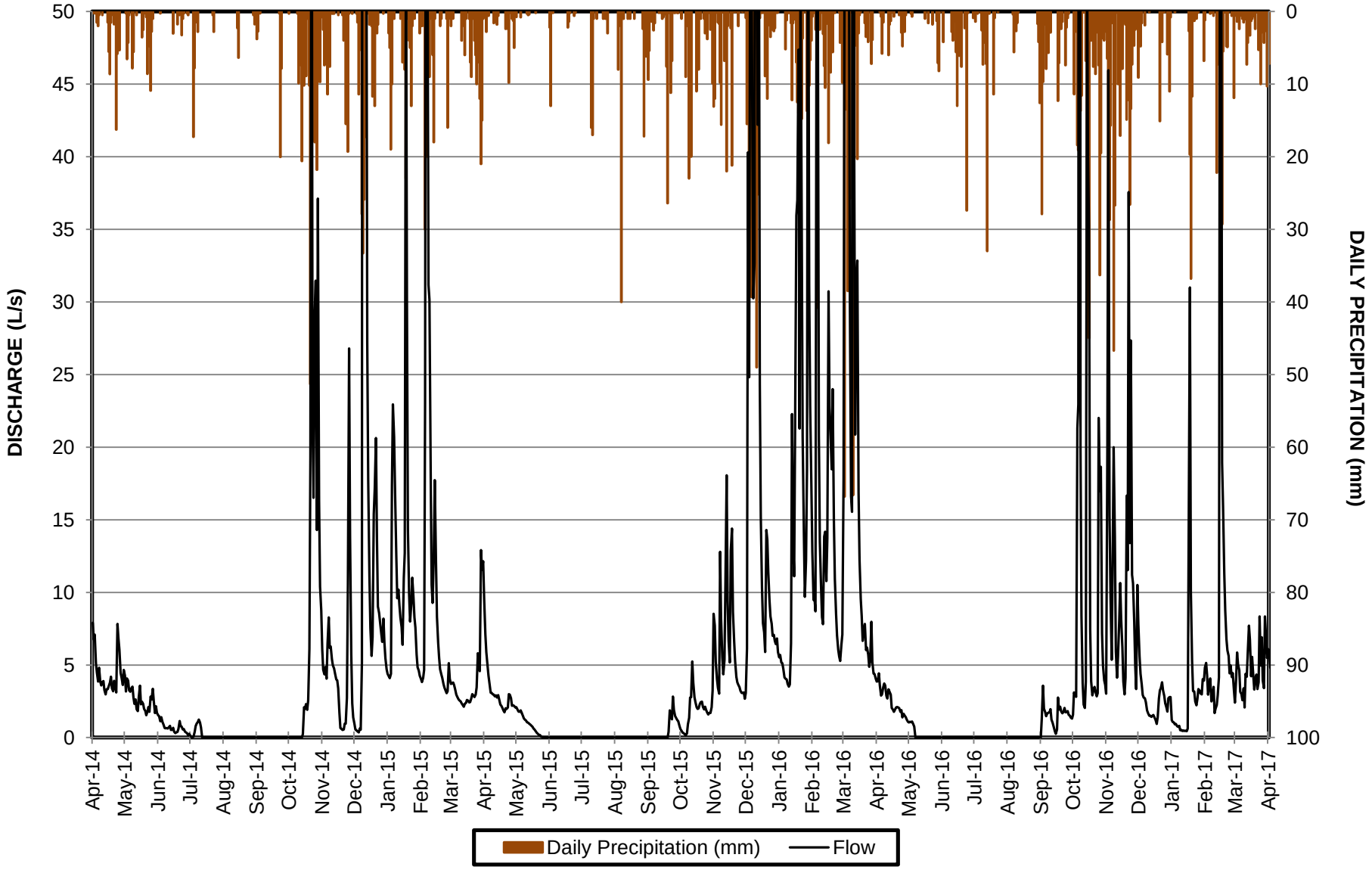


GRAPH 69

DAILY DISCHARGE VS PRECIPITATION

7S STREAM 1

QUINSAM COAL

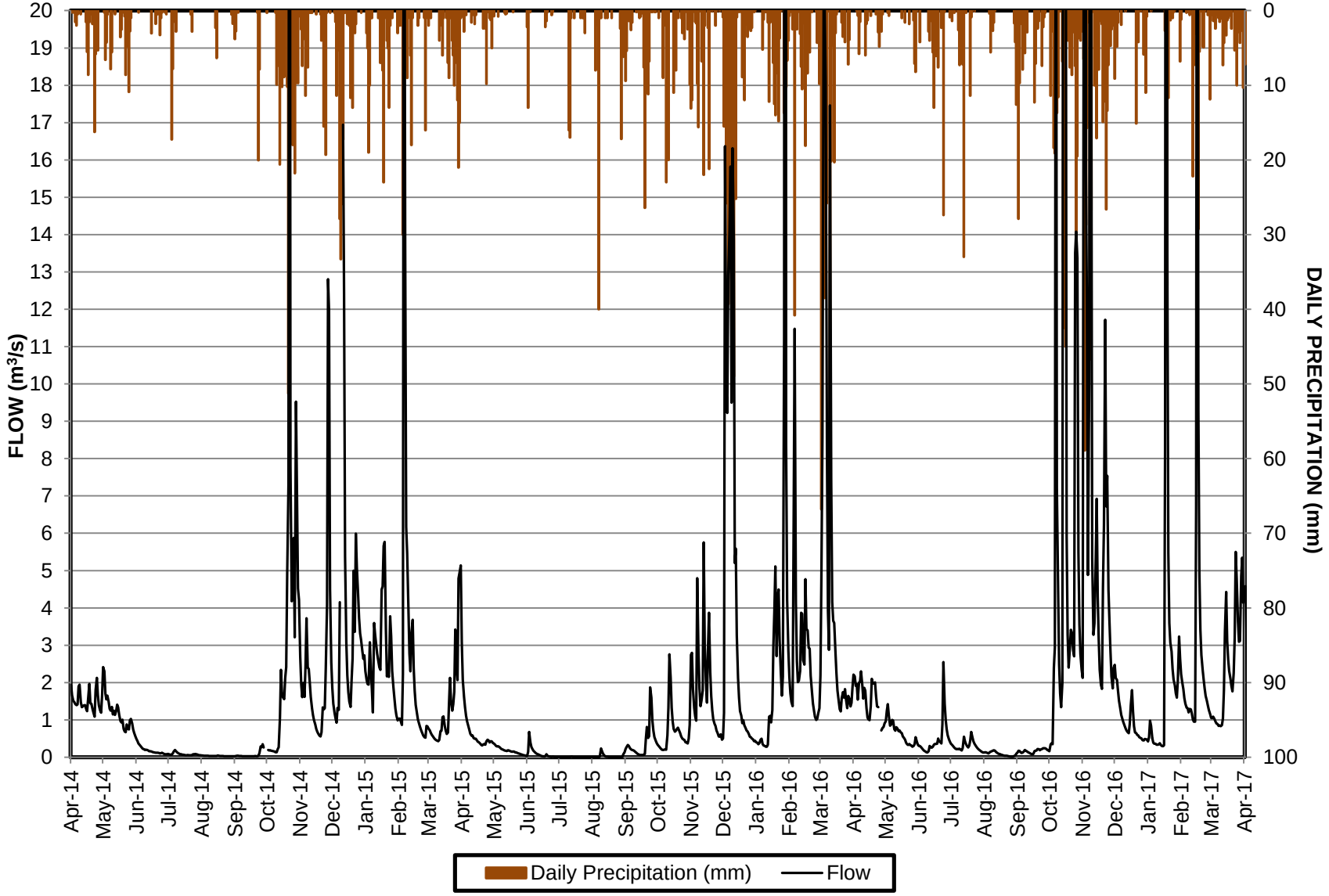


GRAPH 70

FLOW VS PRECIPITATION

IR8

QUINSAM COAL



Appendix III

Maxxam
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RESULTS OF RAINBOW TROUT SINGLE CONCENTRATION-100%

Success Through Science®

Client : 9239 QUINSAM COAL CORPORATION, Campbell River Job Number: B693613

Client Project Name & Number: TOXICITY SAMPLES

Test Result:

96 hrs Mortality % 0% Statistical Method: Visual

Sample Name : SPD Sample Matrix : Water

Description: Orange Sample Number: PV3510-01

Sample Collected: Oct 20, 2016 03:00 PM Sampling Method : Regular Site Collection: N/A

Sample Collected By: N/A Volume Received: 20 L Temp.Upon Arrival: 8 °C Storage: 2-6°C

Sample Received: Oct 21, 2016 01:30 PM pH: 7.2 Dissolved Oxygen: 11.8 mg/L

Analysis Start : Oct 24, 2016 12:15 PM Temperature : 6 °C Sample Conductance: 739 µS/cm

Concentration	Temperature (°C)	pH (pH)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)
% vol/vol	Start	Start	Start	Start	24 hrs	24 hrs	24 hrs	24 hrs	48 hrs	48 hrs	48 hrs	48 hrs
0	15	7.8	329	9.3	0	0	0	0	0	0	0	0
100	15	7.4	944	10.1	0	0	0	0	0	0	0	0

Concentration	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)	Temperature (°C)	pH (pH)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)
% vol/vol	72 hrs	72 hrs	72 hrs	72 hrs	96 hrs	96 hr	96 hrs	96 hrs	96 hrs	96 hrs	96 hrs	96 hrs
0	0	0	0	0	15	7.6	328	8.6	0	0	0	0
100	0	0	0	0	15	7.9	925	8.9	0	0	0	0

Comments : None

Culture/Control/Dilution Water City of Edmonton dechlorinated tap water

Hardness: 200 mg/L $CaCO_3$ Other parameters available on request.

Test Conditions Test concentration : 0,100 (% vol/vol)

Organisms per Vessel :	10	Test Temperature :	15 ± 1 °C	Solution Depth :	>15 cm
Total # of Organisms Used :	20	Pre-aeration Time :	120 min.	Rate of Aeration	6.5±1 mL/min/L
Test Volume :	20 L	Vessel Volume :	38L	Test pH Adjusted:	No
Loading Density :	0.4 g/L	Photoperiod :	16:8 (light: dark)		

Test Organism : Rainbow Trout *(Oncorhynchus mykiss)* Source : Spring Valley Trout Hatchery

Culture Temperature :	15 ± 2 °C	Weight (Mean) +- SD :	0.83 ± 0.12 g	Length (Mean) +- SD :	4.38 ± 0.21 cm
Culture Water Renewal :	≥ 1.0 L/min/kg fish	Weight (Range) :	0.59 – 1.02 g	Length (Range) :	4.00 – 4.80 cm
Culture Photoperiod :	16:8 (light: dark)			% Mortality within 7 days :	0%
Feeding rate and frequency :	daily: 1-5% biomass of trout.			Acclimation Time:	>14 days

Reference chemical: Phenol Test Date: Oct 14, 2016

Test Endpoint 96 hrs LC50 (95% confidence interval) : 9.88 (8.89, 10.8)mg/L Statistical Method : Probit

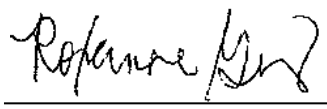
Historical Mean LC50 (warning limits) : 9.60 (6.20, 14.9) mg/L Concentration : 0,8,10,12,15,20 mg/L

Test Method EPS 1/RM/13

Method Deviations : None

Note: The results contained in this report refer only to the testing of the sample submitted. This report may not be reproduced, except in its entirety, without the written approval of the laboratory.

Analyst : Andrea Rowe, Natasha Mouck



Verified By : Roxanne Gill, Bioassay Supervisor Date: Oct 31, 2016 12:42 PM

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RESULTS OF RAINBOW TROUT SINGLE CONCENTRATION-100%

Success Through Science®

Client : 9239 QUINSAM COAL CORPORATION, Campbell River Job Number: B693616

Client Project Name & Number: TOXICITY SAMPLES

Test Result:

96 hrs Mortality % 0% Statistical Method: Visual

Sample Name : WD Sample Matrix : Water

Description: Yellow Sample Number: PV3517-01

Sample Collected: Oct 20, 2016 03:00 PM Sampling Method : Regular Site Collection: N/A

Sample Collected By: N/A Volume Received: 20 L Temp.Upon Arrival: 9 °C Storage: 2-6°C

Sample Received: Oct 21, 2016 01:30 PM pH: 7.4 Dissolved Oxygen: 11.0 mg/L

Analysis Start : Oct 24, 2016 12:15 PM Temperature : 6 °C Sample Conductance: 1117 µS/cm

Concentration	Temperature (°C)	pH (pH)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)
% vol/vol	Start	Start	Start	Start	24 hrs	24 hrs	24 hrs	24 hrs	48 hrs	48 hrs	48 hrs	48 hrs
0	15	7.9	328	9.2	0	0	0	0	0	0	0	0
100	15	7.6	1434	9.8	0	0	0	0	0	0	0	0

Concentration	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)	Temperature (°C)	pH (pH)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)
% vol/vol	72 hrs	72 hrs	72 hrs	72 hrs	96 hrs	96 hr	96 hrs	96 hrs	96 hrs	96 hrs	96 hrs	96 hrs
0	0	0	0	0	15	7.6	326	8.7	0	0	0	0
100	0	0	0	0	15	7.9	1347	8.6	0	0	0	0

Comments : None

Culture/Control/Dilution Water City of Edmonton dechlorinated tap water

Hardness: 200 mg/L $CaCO_3$ Other parameters available on request.

Test Conditions Test concentration : 0,100 (% vol/vol)

Organisms per Vessel :	10	Test Temperature :	15 ± 1 °C	Solution Depth :	>15 cm
Total # of Organisms Used :	20	Pre-aeration Time :	120 min.	Rate of Aeration	6.5±1 mL/min/L
Test Volume :	20 L	Vessel Volume :	38L	Test pH Adjusted:	No
Loading Density :	0.4 g/L	Photoperiod :	16:8 (light: dark)		

Test Organism : Rainbow Trout *(Oncorhynchus mykiss)* Source : Spring Valley Trout Hatchery

Culture Temperature :	15 ± 2 °C	Weight (Mean) +- SD :	0.85 ± 0.15 g	Length (Mean) +- SD :	4.49 ± 0.28 cm
Culture Water Renewal :	≥ 1.0 L/min/kg fish	Weight (Range) :	0.64 – 1.13 g	Length (Range) :	4.10 – 5.00 cm
Culture Photoperiod :	16:8 (light: dark)			% Mortality within 7 days :	0%
Feeding rate and frequency :	daily: 1-5% biomass of trout.			Acclimation Time:	>14 days

Reference chemical: Phenol Test Date: Oct 14, 2016

Test Endpoint 96 hrs LC50 (95% confidence interval) : 9.88 (8.89, 10.8)mg/L Statistical Method : Probit

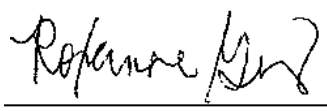
Historical Mean LC50 (warning limits) : 9.60 (6.20, 14.9) mg/L Concentration : 0,8,10,12,15,20 mg/L

Test Method EPS 1/RM/13

Method Deviations : None

Note: The results contained in this report refer only to the testing of the sample submitted. This report may not be reproduced, except in its entirety, without the written approval of the laboratory.

Analyst : Andrea Rowe, Natasha Mouck



Verified By : Roxanne Gill, Bioassay Supervisor Date: Oct 31, 2016 12:43 PM

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RESULTS OF RAINBOW TROUT SINGLE CONCENTRATION-100%

Success Through Science®

Client : 9239 QUINSAM COAL CORPORATION, Campbell River Job Number: B691735

Client Project Name & Number: TOXICITY SAMPLES

Test Result:

96 hrs Mortality % 0% Statistical Method: Visual

Sample Name : 7SSD Sample Matrix : Water

Description: Yellow Sample Number: PU2486-01

Sample Collected: Oct 17, 2016 03:00 PM Sampling Method : Regular Site Collection: N/A

Sample Collected By: KR Volume Received: 20 L Temp.Upon Arrival: 5 °C Storage: 2-6°C

Sample Received: Oct 18, 2016 10:25 AM pH: 6.8 Dissolved Oxygen: 9.7 mg/L

Analysis Start : Oct 20, 2016 08:50 AM Temperature : 14 °C Sample Conductance: 140 µS/cm

Concentration	Temperature (°C)	pH (pH)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)
% vol/vol	Start	Start	Start	Start	24 hrs	24 hrs	24 hrs	24 hrs	48 hrs	48 hrs	48 hrs	48 hrs
0	15	7.8	330	9.1	0	0	0	0	0	0	0	0
100	15	6.8	141	9.1	0	0	0	0	0	0	0	0

Concentration	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)	Temperature (°C)	pH (pH)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)	Atypical Behaviour (%)
% vol/vol	72 hrs	72 hrs	72 hrs	72 hrs	96 hrs	96 hr	96 hrs	96 hrs	96 hrs	96 hrs	96 hrs	96 hrs
0	0	0	0	0	15	7.7	337	8.8	0	0	0	0
100	0	0	0	0	15	7.3	146	8.8	0	0	0	0

Comments : None

Culture/Control/Dilution Water City of Edmonton dechlorinated tap water

Hardness: 200 mg/L $CaCO_3$ Other parameters available on request.

Test Conditions Test concentration : 0,100 (% vol/vol)

Organisms per Vessel :	10	Test Temperature :	15 ± 1 °C	Solution Depth :	>15 cm
Total # of Organisms Used :	20	Pre-aeration Time :	30 min.	Rate of Aeration	6.5±1 mL/min/L
Test Volume :	20 L	Vessel Volume :	38L	Test pH Adjusted:	No
Loading Density :	0.4 g/L	Photoperiod :	16:8 (light: dark)		

Test Organism : Rainbow Trout *(Oncorhynchus mykiss)* Source : Spring Valley Trout Hatchery

Culture Temperature :	15 ± 2 °C	Weight (Mean) +- SD :	0.74 ± 0.13 g	Length (Mean) +- SD :	4.25 ± 0.31 cm
Culture Water Renewal :	≥ 1.0 L/min/kg fish	Weight (Range) :	0.54 – 0.91 g	Length (Range) :	3.70 – 4.70 cm
Culture Photoperiod :	16:8 (light: dark)			% Mortality within 7 days :	0%
Feeding rate and frequency :	daily: 1-5% biomass of trout.			Acclimation Time:	>14 days

Reference chemical: Phenol Test Date: Oct 14, 2016

Test Endpoint 96 hrs LC50 (95% confidence interval) : 9.88 (8.89, 10.8)mg/L Statistical Method : Probit

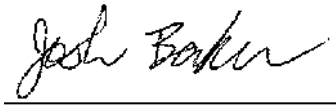
Historical Mean LC50 (warning limits) : 9.60 (6.20, 14.9) mg/L Concentration : 0,8,10,12,15,20 mg/L

Test Method EPS 1/RM/13

Method Deviations : None

Note: The results contained in this report refer only to the testing of the sample submitted. This report may not be reproduced, except in its entirety, without the written approval of the laboratory.

Analyst : Andrea Rowe, Natasha Mouck



Verified By : Joshua Baker, Senior Analyst Date: Nov 01, 2016 02:44 PM

maxxam.ca

MAXXAM ANALYTICS
4606 Canada Way
Burnaby, BC V5G 1K5

Office 604 734 7276
Toll Free 800 665 8566
Fax 604 731 2386

CERIODAPHNIA DUBIA TOXICITY TEST ON 7S SAMPLE

SAMPLING PERIOD: OCTOBER 17, 2016

Prepared for:

Quinsam Coal Corporation
5800 Argonaut Rd
Campbell River, BC
Canada V9W 5C5

Prepared by:

Ecotoxicology Group
Maxxam Analytics

Project No.: 2-11-0691
Job No.: B691736
November 2016

Summary of Test Results for Quinsam Coal Corporation
Sample Date: October 17, 2016

Job B691736

Sample Name (Sample #)	Survival		Reproduction	
	LC25 (%v/v)	LC50 (%v/v)	IC25 (%v/v)	IC50 (%v/v)
7S (PU2487)	>100 (NA)	>100 (NA)	>100 (NA)	>100 (NA)

95% confidence limits in parenthesis

Ceriodaphnia dubia Test Data Summary

Client Name/Location	Quinsam Coal Corporation / Campbell River, BC
Testing Lab/Location	Maxxam Analytics / Burnaby, BC
Collection Approach	1 effluent grab sample split into 10 sub-samples
Test Type	Static-renewal
Effluent Sample	
Sample name	7S
Information on labelling/coding	See Chain of Custody form
Sample collection date (y/m/d)	2016/Oct/17
Date (y/m/d)/time of sample receipt at lab	2016/Oct/18 @ 10:25
Test Organisms	
Species	*Ceriodaphnia dubia*
Source	In house culture started from organisms obtained from Aquatic Biosystems Inc., Fort Collins.
Age at start of test	<24 hours old; within 12 hours of each other
Unusual appearance, behaviour or treatment of test organisms, before use in test	None
Mean percent mortality of brood in 7d preceding test	The mean percent mortality was 5.0%. See "*Ceriodaphnia dubia,* Culture Health - Mortality and Mean Neonates"
Mean number of surviving young produced per adult in culture during the first 3 broods	The mean number of surviving young was 26.8. See "*Ceriodaphnia dubia,* Culture Health - Mortality and Mean Neonates"
Number of young produced in the 3rd or subsequent brood	See "*Ceriodaphnia dubia* - Clearing Records
Ephippia in the culture	No Ephippia present
Test Conditions & Facilities	
Test method	EPS 1/RM/21, 2nd Ed., February 2007 BBY2SOP-00001 *Ceriodaphnia dubia* Chronic Survival and Reproduction Test
Dates or days when subsamples used	See "Initial Measurements and Observations" sheet
Date test started (y/m/d)	2016/Oct/19
Date (y/m/d) of test completion	2016/Oct/25
Test vessels	20 mL glass culture tubes
Persons performing test	N. Shergill, S. Rostama, N. Blassnitz

Rate of preaeration	Minimal and controlled (100 bubbles/min)
Duration of preaeration	See “Initial Measurements and Observations” sheet
Rate/duration of aeration during test	No aeration
Procedure for pH adjustment	No pH adjustment of sample
Procedure for filtration	The sample was not filtered
Source of control/dilution water & quantity of chemicals added	Type I deionized water hardened to 80-100 mg/L $CaCO_3$ with 20% Perrier water, Vitamin B_{12} & Selenium
Number and concentration of test solutions	7 conc. (100, 50, 25, 12.5, 6.25, 3.13, and 1.56% v/v) plus control
Volume and depth of solution in test vessels	15 mL & 9 cm
Number of replicates per conc.	10
Number of organisms per test vessel	1
DO & pH of sample just before its use	See “Initial Measurements and Observations” sheet
Temperature, DO, & pH of test solutions and controls	See daily water quality for each concentration on "Observations & Measurement Data sheet"
Test solution renewal intervals	See “Initial Measurements and Observations” sheet
Test observations and/or deviations from test method and standard practices	A mechanical failure of the refrigeration unit in our cold storage room occurred on October 21-23, 2016. During this period, days 4, 5, and 6 renewal aliquots were impacted. By Sunday morning, our cold room reached a temperature of 13^{o}C , which is outside the required storage temperature range of 2-6^{o}C. It is estimated that the sample temperature was out of compliance for approximately 24-48 hours. By Sunday afternoon, the refrigeration unit was fixed and the temperature was back within specification. It is likely the impact to sample quality was minimal.
Results	Results contained in this report refer only to the testing of samples as submitted.
Survival endpoint statistics	
Name & citation of program(s) and methods used for calculating statistical endpoint(s)	CETIS v1.9.2.4 – Linear Interpolation (ICPIN)
Mean percent survival for 1st generation in each test solution at test end	See CETIS reports for mean percent survival
Reproduction endpoint statistics	
Name & citation of program(s) and methods used for calculating statistical endpoint(s)	CETIS v1.9.2.4– Linear Interpolation (ICPIN)
Mean number of neonates in each test solution at test end	See CETIS reports for mean numbers
Weighting techniques applied?	N/A
Residuals Analysis	N/A

Outliers?	Yes, replicate 1 of the control and replicate 2 of the 50% v/v concentration were determine to be outliers for reproduction; however, they were not removed from the statistical analysis.
QA	
Did the test pass the test validity criteria of: •Mean mortality of the control adults is ≤20% •Average of ≥15 neonates/surviving adult in the control •3 broods produced by ≥60% of control organisms by the end of the 8th day.	Yes •Mean mortality of control adults is – 10% •Average live young produced/surviving adult – 24.8 •Percent of control organisms producing 3 broods – 90%
Reference toxicant test LC50 (95% CL) (mg NaCl/L) for survival	1757 (1595, 1936)
Reference toxicant test historic mean & 2SD range (mg NaCl/L) for survival	1755 2SD (1497, 2057)
Reference toxicant test IC50 (95% CL) (mg NaCl/L) for reproduction	1568 (1456, 1633)
Reference toxicant test historic mean & 2SD range (mg NaCl/L) for reproduction	1425 2SD (1119, 1815)
Invalid Reference toxicant test?	No
Date of reference toxicant test (y/m/d) and duration	2016 October 19 6 days
Conditions of reference toxicant test	Same as test conditions

Ceriodaphnia 7-d Survival and Reproduction Test — **Maxxam Analytics**

Analysis ID:	08-3542-4594	**Endpoint:**	6d Survival Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	02 Nov-16 11:53	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	16-6900-7066	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	S. Rostama
Start Date:	19 Oct-16 16:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	Dilute Perrier Water
Ending Date:	25 Oct-16 16:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	6d 0h	**Source:**	In-House Culture	**Age:**	
Sample ID:	10-9561-8667	**Code:**	B691736	**Client:**	Quinsam Coal Corp
Sample Date:	17 Oct-16 15:00	**Material:**	Industrial Effluent	**Project:**	2-11-0691
Receipt Date:	18 Oct-16 10:25	**Source:**	Quinsam Coal		
Sample Age:	49h	**Station:**	7S		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1175904	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
LC5	>100	n/a	n/a	<1	n/a	n/a
LC10	>100	n/a	n/a	<1	n/a	n/a
LC15	>100	n/a	n/a	<1	n/a	n/a
LC20	>100	n/a	n/a	<1	n/a	n/a
LC25	>100	n/a	n/a	<1	n/a	n/a
LC40	>100	n/a	n/a	<1	n/a	n/a
LC50	>100	n/a	n/a	<1	n/a	n/a

6d Survival Rate Summary — Calculated Variate(A/B)

Conc-%	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	N	10	0.9000	0.0000	1.0000	0.1000	0.3162	35.14%	0.0%	9	10
1.56		10	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-11.11%	10	10
3.13		10	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-11.11%	10	10
6.25		10	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-11.11%	10	10
12.5		10	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-11.11%	10	10
25		10	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-11.11%	10	10
50		10	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-11.11%	10	10
100		10	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-11.11%	10	10

6d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.56		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3.13		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

2016 NOV 02 2016 nov 03

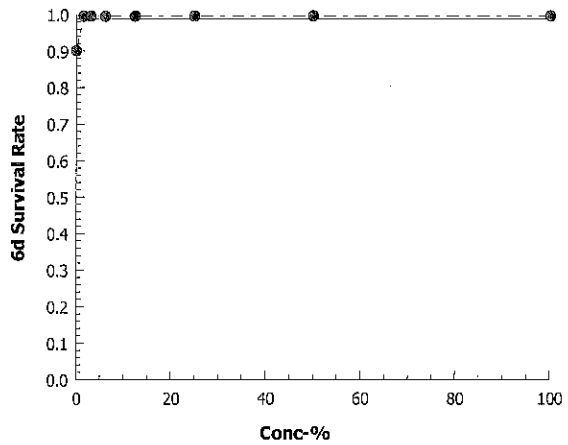
Ceriodaphnia 7-d Survival and Reproduction Test **Maxxam Analytics**

Analysis ID: 08-3542-4594 **Endpoint:** 6d Survival Rate **CETIS Version:** CETISv1.9.2
Analyzed: 02 Nov-16 11:53 **Analysis:** Linear Interpolation (ICPIN) **Official Results:** Yes

6d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.13		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



2016 NOV02 Analyst: KT

2016 NOV03 QA:

Ceriodaphnia 7-d Survival and Reproduction Test — **Maxxam Analytics**

Analysis ID:	04-7222-5313	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.2
Analyzed:	02 Nov-16 11:53	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	16-6900-7066	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	S. Rostama
Start Date:	19 Oct-16 16:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	Dilute Perrier Water
Ending Date:	25 Oct-16 16:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	6d 0h	**Source:**	In-House Culture	**Age:**	
Sample ID:	10-9561-8667	**Code:**	B691736	**Client:**	Quinsam Coal Corp
Sample Date:	17 Oct-16 15:00	**Material:**	Industrial Effluent	**Project:**	2-11-0691
Receipt Date:	18 Oct-16 10:25	**Source:**	Quinsam Coal		
Sample Age:	49h	**Station:**	7S		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1405247	200	Yes	Two-Point Interpolation

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value Test	3.731	3.306	0.0076	Outlier Detected

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	65.58	0.6977	90.5	1.525	1.105	143.3
IC10	85.91	31.94	n/a	1.164	n/a	3.131
IC15	>100	n/a	n/a	<1	n/a	n/a
IC20	>100	n/a	n/a	<1	n/a	n/a
IC25	>100	n/a	n/a	<1	n/a	n/a
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

Reproduction Summary

			Calculated Variate						
Conc-%	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	23.5	12	28	1.485	4.696	19.98%	0.0%
1.56		10	22	17	28	1.075	3.399	15.45%	6.38%
3.13		10	24.4	21	27	0.8055	2.547	10.44%	-3.83%
6.25		10	24.1	17	31	1.178	3.725	15.46%	-2.55%
12.5		10	23	18	31	1.22	3.859	16.78%	2.13%
25		10	23.9	20	28	0.752	2.378	9.95%	-1.7%
50		10	23.7	10	31	1.886	5.964	25.16%	-0.85%
100		10	20.5	16	25	0.9098	2.877	14.03%	12.77%

Reproduction Detail

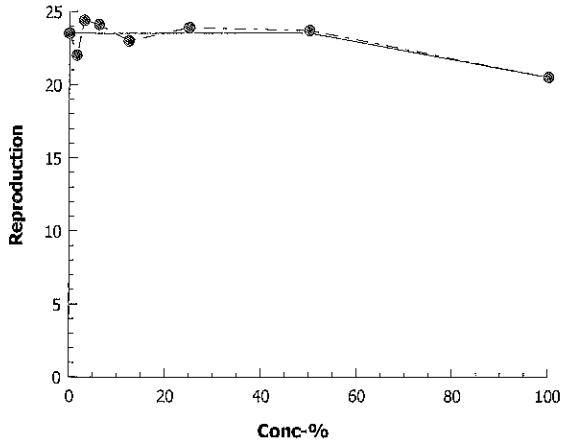
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	12	27	26	25	24	28	23	27	20	23
1.56		20	21	24	24	20	26	19	21	28	17
3.13		27	27	24	21	23	22	25	27	21	27
6.25		22	24	28	22	23	25	17	24	31	25
12.5		24	25	31	26	20	24	22	19	18	21
25		22	22	24	28	25	25	26	22	20	25
50		24	10	19	23	27	30	24	26	31	23
100		16	21	19	22	24	25	22	19	20	17

2016 NOV02 2016 nov03 DMC

Ceriodaphnia 7-d Survival and Reproduction Test — **Maxxam Analytics**

Analysis ID:	04-7222-5313	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.2
Analyzed:	02 Nov-16 11:53	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Analyst: KA 2016 NOV 02 QA: 2016 NOV 03

ECOTOXICOLOGY

Ceriodaphnia dubia Survival and Reproduction Test - Initial Measurements and Observations

MaxXam
BBY2FCD-00149/8
Tab - Observations

Client # & Name: 9239 & Quinsam Coal Job/Sample: BB91736 / PV2487

Sample ID: TS Date & Time Sampled: 2016 Oct 17 @ 15:00

Date & Time Started: 2016 Oct 19 @ 16:00 Date & Time Received: 2016 Oct 18 @ 10:25

Date & Time Ended: 2016 Oct 25 @ 1615 Organism Lot #: AB2016 oct 10

Before Use Measurements After Temperature Adjustment Deviations - See BLNC ☐ Worksheet Created: ☑

Day	Date	Initial DO (mg/L)	Initial Temp (°C)	Initial pH	Aeration* (min)	Post Aeration DO (mg/L)	Post Aeration Temp (°C)	Analyst
0	2016oct19	9.7	25.8	8.0	20	@ 7:55 8.8	24.9	NS
1	2016oct20	10.8	25.4	N/A	20	8.8	25.1	SR
2	2016Oct21	9.4	25.0	N/A	20	8.9	24.9	SR
3	2016 Oct22	9.4	25.9	N/A	20	9.1	25.3	MB
4	2016oct23	9.1	25.3	N/A	20	8.6	25.0	SR
5	2016Oct24	8.7	25.8	N/A	20	8.5	24.9	SR
6				~~N/A~~				
7				N/A	N/A	SR 2016 OCT 25		

BWC06 2016 OCT 19

* Rate of aeration must be ≤ 100 bubbles/minute Instrument ID's: BB42-0011, BB42-0009, BB42-0014

Sample Description: pale yellow Initials: NS

Sample Hardness: 20 Initials: NS

Observations during the Test (e.g. aeration duration, behaviour of test organisms, bag effluent taken from etc.)

Day		Analyst Initials
0	Date: 2016oct19 (Bottle) / Carboy #: 1 Pre - Aerated From: 1417 - 1437 Feeding volume (µL) PKS: 150 YCT: 50 Test Seeded @: 16:00	NS
1	Date: 2016 oct 20 (Bottle) / Carboy #: 2 Pre - Aerated From: 12:20 - 12:40 Feeding volume (µL) PKS: 150 YCT: 50 Test Water Change @: 17:00	SR
2	Date: 2016 oct 21 (Bottle) / Carboy #: 3 Pre - Aerated From: 12:15 - 12-35 Feeding volume (µL) PKS: 150 YCT: 50 Test Water Change @: 14:55	SR MB
3	Date: 2016 Oct 22 (Bottle) / Carboy #: 4 Pre - Aerated From: 8:10 - 8:30 Feeding volume (µL) PKS: 150 YCT: 50 Test Water Change @: 14:09	MB
4	Date: 2016 oct 23 (Bottle) / Carboy #: 5 Pre - Aerated From: 10:00 - 10:20 Feeding volume (µL) PKS: 150 YCT: 50 Test Water Change @: 15:05	SR
5	Date: 2016 oct 24 (Bottle) / Carboy #: 6 Pre - Aerated From: 13:00 - 13:20 Feeding volume (µL) PKS: 150 YCT: 50 Test Water Change @: 17:19	SR
6	Date: 2016 oct 25 Bottle / Carboy #: N/A Pre - Aerated From: N/A Feeding volume (µL) PKS: N/A YCT: N/A Test Water Change @: Test ended @ 16:15	SR
7	Date: NS 2016 Oct 27	
8	Date:	

ECOTOXICOLOGY

Ceriodaphnia dubia Survival and Reproduction Test - Observations and Measurements

MaxXam
BBY2FCD-00149/8
Tab - Test Concentrations

Job/Sample # B691736/PU2487

Analyst(s): N.Sherrill, NB Glassnitz S.Rostama

Concentration: Control

Control Water Batch:

Date(s): 26 Oct 17

Hardness(es): 88

Day	Reproduction (# Live neonates)										Conductivity (µS/cm)	Temperature (°C)		DO (mg/L)		pH		Analyst	
	1	2	3	4	5	6	7	8	9	10	Initial	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	0	0	0	0	0	0	0	0	0	0	175	24.8	24.8	8.4	8.3	8.1	8.2	NS	SR
2	0	0	0	0	0	0	0	0	0	0	176	24.4	24.8	8.4	8.5	8.1	8.3	SR	NB SR
3	5	6	5	6	4	5	3	6	5	6	180	24.3	25.4	8.4	8.4	8.2	8.3	SR	NB
4	7	11	10	7	9	10	9	10	6	7	179	24.7	24.7	8.3	8.2	8.2	8.2	NB	SR
5	9X	10	0	0	0	0	0	11	9	10	179	24.7	25.0	8.4	8.0	8.2	8.2	SR	SR
6		0	11	12	11	13	11	0	0	0	180	24.5	25.1	8.3	7.9	8.2	8.1	SR	SR
7													NS 26 Oct 17						
8																			
Total	12x	27	26	25	24	28	23	27	20	23								KT	SR

X = dead adult
M = missing/lost adult
S = small adult
P = pale adult
(#) = immobilised neonates
* = dead neonates present

Ceriodaphnia dubia Survival and Reproduction Test - Observations and Measurements

Concentration (%v/v): 1.56 Job/Sample #: B691736/PU2487

Day	Reproduction (# Live neonates)										Conductivity (µS/cm)	Temperature (°C)		DO (mg/L)		pH		Analyst	
	1	2	3	4	5	6	7	8	9	10	Initial	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	0	0	0	0	0	0	0	0	0	0	174	24.9	25.2	8.3	8.3	8.1	8.3	NS	SR
2	0	0	0	0	0	0	0	0	0	0	174	24.5	25.2	8.4	8.4	8.1	8.3	SR	NB SR
3	4	4	5	3	4	6	1	4	6	0	178	24.3	25.6	8.4	8.3	8.2	8.3	SR	NB
4	4	9	8	9	0	7	9	7	10	0	177	24.9	25.3	8.3	8.2	8.2	8.2	NB	SR
5	0	8	0	0	5	0	0	10	0	4	177	24.8	25.0	8.4	7.9	8.2	8.2	SR	SR
6	5	0	11	12	11	13	9	0	12	13	178	24.6	25.4	8.3	7.8	8.2	8.1	SR	SR
7																			
8																			
Total	20	21	24	24	20	26	19	21	28	17								KL	DML

NS 2016-OCT-27

COMMENTS: Refer to Test Observations Data Sheet

X = dead adult S = small adult (#) immobilised neonates
M = missing/lost adult P = pale adult * = dead neonates present

Concentration (%v/v): 3.13

Job/Sample #: B691736/PU2487

Day	Reproduction (# Live neonates)										Conductivity (µS/cm)	Temperature (°C)		DO (mg/L)		pH		Analyst	
	1	2	3	4	5	6	7	8	9	10	Initial	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	0	0	0	0	0	0	0	0	0	0	171 (B) 166	25.0	25.1	8.4	8.3	8.1	8.3	NS	SR
2	0	0	0	0	0	0	0	0	0	0	172	24.4	25.3	8.4	8.4	8.2	8.2	SR	NB/SR
3	6	6	5	3	5	4	6	4	4	6	177	24.3	25.6	8.4	8.3	8.2	8.3	SR	NB
4	12	8	0	6	8	9	6	11	9	12	176	24.9	25.4	8.3	8.1	8.2	8.2	NB	SR
5	0	0	9	0	0	0	0	12	8	9	176	24.9	25.1	8.4	7.9	8.2	8.2	SR	SR
6	9	13	10	12	10	9	13	0	0	0	176	24.5	25.4	8.3	7.7	8.2	8.1	SR	SR
7																			
8																			
Total	27	27	24	21	23	22	25	27	21	27								KT	

NS 2016 OCT 27

X = dead adult
M = missing/lost adult
S = small adult
P = pale adult

(#) = immobilised neonates
* = dead neonates present

(B) WE NS 2016 OCT 19

Concentration (%v/v) 6.25 Job/Sample #: B691736/PU2487

Day	Reproduction (# Live neonates)										Conductivity (µS/cm)	Temperature (°C)		DO (mg/L)		pH		Analyst	
	1	2	3	4	5	6	7	8	9	10	Initial	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	0	0	0	0	0	0	0	0	0	0	167	25.0	25.2	8.4	8.3	8.1	8.3	NS	SR
2	0	0	0	0	0	0	0	0	0	0	169	24.4	25.3	8.4	8.4	8.2	8.2	SR	NB/SR
3	5	5	5	6	7	5	3	5	5	6	173	24.4	25.6	8.4	8.2	8.2	8.3	SR	NB
4	8	9	11	10	8	7	6	11	13	10	171	25.1	25.4	8.3	8.1	8.2	8.1	NB	SR
5	0	0	0	6	0	0	0	8	0	9	171	24.8	25.2	8.3	7.7	8.2	8.1	SR	SR
6	9	10	12	0	8	13	8	0	13	0	171	24.5	25.4	8.3	7.7	8.2	8.1	SR	SR
7												NR 2016OCT27							
8																			
Total	22	24	28	22	23	25	17	24	31	25								KT	DM

X = dead adult S = small adult (#) = immobilised neonates
M = missing/lost adult P = pale adult * = dead neonates present

Ceriodaphnia dubia Survival and Reproduction Test - Observations and Measurements

Concentration (%v/v): 12.5

Job/Sample #: B691736/PU2487

Day	Reproduction (# Live neonates)										Conductivity (µS/cm)	Temperature (°C)		DO (mg/L)		pH		Analyst	
	1	2	3	4	5	6	7	8	9	10	Initial	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	0	0	0	0	0	0	0	0	0	0	159	25.0	25.2	8.4	8.3	8.1	8.3	NS	SR
2	0	0	0	0	0	0	0	0	0	0	160	24.5	25.3	8.4	8.4	8.2	8.2	SR	NB/SR
3	6	5	5	6	4	4	6	5	4	3	165	24.3	25.6	8.4	8.2	8.2	8.3	SR	NB
4	8	6	12	7	0	0	7	6	0	7	163	25.0	25.4	8.3	8.0	8.2	8.1	NB	SR
5	0	0	0	0	8	8	0	8	6	11	162	24.8	25.0	8.3	7.8	8.2	8.1	SR	SR
6	10	14	14	13	8	12	9	0	8	0	168	24.5	25.5	8.3	7.7	8.2	8.1	SR	SR
7																			
8																			
Total	24	25	31	26	20	24	22	19	18	21								KT	DM

NS on Day 7

X = dead adult
M = missing/lost adult
S = small adult
P = pale adult
(#) = immobilised neonates
* = dead neonates present

Concentration (%v/v) 25

Job/Sample #: B691736/PU2487

Day	Reproduction (# Live neonates)										Conductivity (µS/cm)	Temperature (°C)		DO (mg/L)		pH		Analyst	
	1	2	3	4	5	6	7	8	9	10	Initial	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	0	0	0	0	0	0	0	0	0	0	143	25.0	25.1	8.4	8.3	8.1	8.3	NS	SR
2	0	0	0	0	0	0	0	0	0	0	145	24.5	25.3	8.5	8.4	8.1	8.2	SR	NB/SR
3	7	5	5	6	3	5	4	6	4	6	145	24.3	25.6	8.4	8.2	8.1	8.2	SR	NB
4	8	7	8	10	7	7	0	4	5	7	147	25.1	25.4	8.4	8.0	8.2	8.1	NB	SR
5	0	0	0	12	0	0	8	12	11	12	147	25.0	25.0	8.3	7.6	8.2	8.1	SR	SR
6	7	10	11	0	15	13	14	0	0	0	147	24.7	25.4	8.3	7.7	8.2	8.1	SR	SR
7												NS 2016 Oct 27							
8																			
Total	22	22	24	28	25	25	26	22	20	25								KT	DMC

COMMENTS: Refer to Test Observations Data Sheet

X = dead adult
M = missing/lost adult
S = small adult
P = pale adult

(#) immobilised neonates
* = dead neonates present

Ceriodaphnia dubia Survival and Reproduction Test - Observations and Measurements

Concentration (%v/v): 50

Job/Sample #: B691736/PU2487

Day	Reproduction (# Live neonates)										Conductivity (µS/cm)	Temperature (°C)		DO (mg/L)		pH		Analyst	
	1	2	3	4	5	6	7	8	9	10	Initial	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	0	0	0	0	0	0	0	0	0	0	108	25.0	25.2	8.4	8.3	8.0	8.3	NB	SR
2	0	0	0	0	0	0	0	0	0	0	111	24.6	25.3	8.5	8.4	8.1	8.2	SR	NB
3	4	6	6	0	5	6	6	5	6	4	112	24.4	25.6	8.5	8.2	8.1	8.2	SR	NB
4	7	1	4	5	7	9	5	7	12	9	111	25.2	25.4	8.5	8.0	8.1	8.1	NB	SR
5	0	0	0	10	6	0	0	0	0	0	112	25.0	25.0	8.4	7.7	8.2	8.1	SR	SR
6	13	3	9	8	15	15	13	14	13	10	114	24.7	25.5	8.3	7.7	8.1	8.1	SR	SR
7																			
8																			
Total	24	10	19	23	27	30	24	26	31	23								KT	DM

X = dead adult
M = missing/lost adult
S = small adult
P = pale adult
(#) immobilised neonates
* = dead neonates present

Concentration (%v/v): 100

Job/Sample #: B691736/PU2487

Day	Reproduction (# Live neonates)										Conductivity (µS/cm)	Temperature (°C)		DO (mg/L)		pH		Analyst	
	1	2	3	4	5	6	7	8	9	10	Initial	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	0	0	0	0	0	0	0	0	0	0	40	25.0	25.2	8.7	8.3	7.9	8.3	NS	SR
2	0	0	0	0	0	0	0	0	0	0	43	24.9	25.3	8.9	8.4	8.0	8.2	SR	NB
3	3	4	6	5	4	5	5	4	6	4	41	24.6	25.8	8.7	8.3	~~8.7~~ 7.7 (A)	~~8.1~~ 8.0 (B)	SR	NB
4	5	5	7	7	8	10	9	5	6	7	41	25.2	25.4	8.7	8.0	8.0	8.2	NB	SR
5	0	0	0	0	0	0	8	10	8	6	41	25.0	25.0	8.4	7.6	8.2	8.2	SR	SR
6	8	12	6	10	12	10	0	0	0	0	43	24.9	25.5	8.3	7.6	8.2	8.1	SR	SR
7												NB 2016 OCT 27							
8																			
Total	16	21	19	22	24	25	22	19	20	17								KT	DML

X = dead adult
M = missing/lost adult
S = small adult
P = pale adult
(#) immobilised neonates
* = dead neonates present

(A) WES R2016 OCT 21 (B) WE NB 2016 OCT 22

Culture Date: 2016 Oct 10

% MORTALITY

Day	Date	Started	Deaths	Removed or Lost	Total Number	% Daily Mortality	% Mortality in Previous 7 Days
0	11-Oct	80	0	0	80	0.00%	
1	12-Oct		0	0	80	0.00%	
2	13-Oct		0	0	80	0.00%	
3	14-Oct		0	0	80	0.00%	
4	15-Oct		0	0	80	0.00%	
5	16-Oct		0	0	80	0.00%	
6	17-Oct		3	0	77	3.75%	
7	18-Oct		1	0	76	1.30%	
8	19-Oct		0	1	75	0.00%	5.00%
9					#VALUE!	#VALUE!	5.00%
10					#VALUE!	#VALUE!	5.00%
11					#VALUE!	#VALUE!	5.00%
12					#VALUE!	#VALUE!	5.19%
13					#VALUE!	#VALUE!	1.32%
14					#VALUE!	#VALUE!	0.00%
15					#VALUE!	#VALUE!	#VALUE!

MEAN NEONATES

Day	1	2	3	4	5	6	7	Total
Date	11-Oct	12-Oct	13-Oct	14-Oct	15-Oct	16-Oct	17-Oct	
Replicate 1	0	0	0	5	13	13	0	31
Replicate 2	0	0	0	2	9	12	*15	23
Replicate 3	0	0	0	6	9	13	0	28
Replicate 4	0	0	0	4	10	15	*12	29
Replicate 5	0	0	0	3	10	13	*19	26
Replicate 6	0	0	0	4	10	11	*18	25
Replicate 7	0	0	0	6	8	14	*17	28
Replicate 8	0	0	0	5	0	10	12	27
Replicate 9	0	0	0	3	10	14	*19	27
Replicate 10	0	0	0	4	10	10	*15	24
Mean								**26.8**

Proofed: KH 2016 NOV02

Health Criteria

An average of at least 15 young per adult must be produced in the first 3 broods (Environment Canada).

An average of at least 20 young per adult must be produced in the first 3 broods (US EPA).

Comments: * Fourth or subsequent brood not counted.

Clearing Records for Young Produced by Each Brood Organism Used in a Test

Check once (√) if 2-7 neonates present (1 neonate ≠ a brood)
Check twice (√√) if ≥8 neonates
Check thrice (√√√) if ≥16 neonates

Test Day: Record actual number of neonates present

YCT Batch: 2016 oct 06, 2016 Oct 12 PKS Batch: 2016 Sept 27 Water Batch: 2016 Oct 06

Culture Date: AM 2016 Oct 10 Analyst(s): NS mo, NB

Date	Oct 11	Oct 12	Oct 13	Oct 14	Oct 15	Oct 16	Oct 17	Oct 18	Oct 18 Track
Time	1051	0930	1030	11:54	11:00	8:37	0944	0952	1728
YCT (µL)	50	50	50	50	50	50	50	50	—
PKS (µL)	150	150	150	150	150	150	150	150	—
Cup #	Brood size								
1	0	0	0	5	13	13	8 0	17	0
2	0	0	0	2	9	12	15 A	0	19
3	0	0	0	6	9	13	0	16	0
4	0	0	0	4	10	15	12 A	17	0
5	0	0	0	3	10	13	19 A	18	0
6	0	0	0	4	10	11	18 A	0	17
7	0	0	0	6	8	14	17 A	8	17
8	0	0	0	5	0	10	12 A	15	0
9	0	0	0	3	10	14	19 A	0	16
10	0	0	0	4	10	10	15 A	0	14
11	0	0	0	√	√√	√√	0	√√√	0
12	0	0	0	√	√√	√√	0	√√√	0
13	0	0	0	√	√√	√√	0	√√√	0
14	0	0	0	√	√√	√√	0	√√√	0
15	0	0	0	√	√√	√√	0	√√√	0
16	0	0	0	√	√√	√√	0	√√√	0
17	0	0	0	√	√√	√√	0	0	√√√
18	0	0	0	0	√	√√ P	0 x	—	—
19	0	0	0	√	√√	√√	√√√	0	√√√
20	0	0	0	√	√	√√	√√√ A	0	√√√
21	0	0	0	√	√√	√√	0	√√√	0
22	0	0	0	√	√√	√√	0	√√√	0
23	0	0	0	√	√√	√√	0	√√√	0
24	0	0	0	√	√√	√√	0	√√√	0
25	0	0	0	√	√√	√√	0	√√√	0
26	0	0	0	√	√√	√√	0	√√√	0
27	0	0	0	√	√√	√√	√√√	0	√√√
28	0	0	0	0	√√	√√	0 x	—	—
29	0	0	0	√	√√	√√	√√ x	—	—
30	0	0	0	√	√√	√√	0	√√√	0
31	0	0	0	√	√√	√√	0	√√√	0
32	0	0	0	√	√√	√√	0	√√√	0
33	0	0	0	√	√√	√√	0	√√√	0
34	0	0	0	√	√√	√√	0	√√√	0
35	0	0	0	√	√√	√ P	0	√√√	0
# Missing/Lost	0	0	0	0	0	0	0	0	0
# Dead	0	0	0	0	0	0	3	0	0
Analyst	NS	NS	NS	mo	NB	mo	NS	NS	NS
Time	1058	0936	1135	12:05	11:09	8:49	0955	1001	1732

*** See next page for Environment Canada and US EPA requirements.***

On test day, select appropriate neonates (i.e.>8 neonates in a brood) and indicate in the brood size box which test they will be used for by placing a letter according to this legend:

A - Oct 17	D -
B - NC	E -
C -	F -

Blue-NS 2016 Oct 17

Clearing Records for Young Produced by Each Brood Organism Used in a Test

Culture Date: ABDNIL Oct 10 Analyst(s): NS, mo, NB

Cup #	Brood size								
Date	Oct11	Oct12	Oct13	Oct14	Oct15	Oct16	Oct17	Oct18	1732 Oct18
Time	1059	0936	1036	12:05	11:09	8:49	0955	1001	1732 @
36	0	0	0	√	√√	√√	0	√√	0
37	0	0	0	√	√√	√√	0	√√	0
38	0	0	4	0	√√	√√	0	√√	0
39	0	0	0	√	√√	√√	√√	0	√√
40	0	0	0	√	√√	√√	√√ A	0	√√
41	0	0	0	√	√√	√√	0	√√	0
42	0	0	0	√	√√	√√	0	√√	1
43	0	0	0	√	√√	√√	0	√√	0
44	0	0	0	√	√√	√√	0	√√	0
45	0	0	0	√	√√	√√	0	√√	0
46	0	0	0	√	√	√√	0	√√	0
47	0	0	0	√	√√	√√	√√	0	√√
48	0	0	4	0	√√	√√	√√	0	√√
49	0	0	0	√	√√	√√	0	0	√√
50	0	0	0	√	√√	√√	0	0	√√
51	0	0	0	√	√√	√√	0	√√	0
52	0	0	0	√	√√	√√	0	√√	0
53	0	0	0	√	√√	√√	√√	0	√√
54	0	0	0	√	√√	√√	0	√√	0
55	0	0	0	√	√√	√√	0	√√	0
56	0	0	0	√	√	√√	0	√√	0
57	0	0	0	√	√√	√√	√√	0	√√
58	0	0	2	√	0	√√	√√	√√	0
59	0	0	0	√	√√	√√	√√	0	√√
60	0	0	0	√	√√	√√	0	√√	0
61	0	0	0	√	√√	√√	0	√√	0
62	0	0	0	√	√√	√√	0	√√ x	—
63	0	0	0	√	√√	√√	0	√√	0
64	0	0	0	√	√√	√√	0	√√	0
65	0	0	0	√	√√	√√	0	√√	0
66	0	0	0	√	√√	√√	0	√√	0
67	0	0	0	√	√√	√√	√√	0	√√
68	0	0	4	√	0	√√	√√	√√	0
69	0	0	0	0	√√	√√	√√	0	√√
70	0	0	0	√	√√	√√	√√	0	√√
# Missing/Lost	0	0	0	0	0	0	0	0	0
# Dead	0	0	0	0	0	0	0	1	0
Analyst	NS	NS	NS	mo	NB	mo	NS	NS	NS
Time	1104	0942	1042	12:12	11:14	8:56	1003	1010	1736

Blue: NS on 16 Oct 18

Environment Canada: At least 8 young must be produced by each brood organism in their third or subsequent broods, and in the brood to be used in a test.
Neonates used in tests must be < 24 hours old and within 12 hours of each other.

US EPA : Neonates used in tests must be < 24 hours old and within 8 hours of each other.
Neonates used in tests must be taken from adults that have had at least 8 or more young in the brood to be used in a test, and in their third or subsequent broods.

Example:

Cup #	Brood size				
Date	2008Jan22	2008Jan23	2008Jan23	2008Jan24	A - Rx #1
Time	10:10am	8:25am	8:15pm	8:00am	B - Client # 123
1	√	√	√√	12 A	
2	√	√	√√	14 B	

Clearing Records for Young Produced by Each Brood Organism Used in a Test

Check once (√) if 2-7 neonates present (1 neonate ≠ a brood)
Check twice (√√) if ≥8 neonates
Check thrice (√√√) if ≥16 neonates
Test Day: Record actual number of neonates present

YCT Batch: 2016 Oct 12 PKS Batch: 2016 Water Batch: 2016 oct 12

Culture Date: AB 2016 oct 10 Analyst(s): NS, JC, MT

Date	Track. Oct 18	clear Oct 19	clear Oct 20	Track Oct 20	Oct 20	Oct 21			
Time	21:30	0910	10:40	18:21	21:30	0910			
YCT (µL)	—	50	50	n/a	N/A	50			
PKS (µL)	—	150	150	n/a	N/A	150			
Cup #	Mixford	Brood size							
1	18 A	0	√√√ 17	0	0	√√ 12			
2	0 (A)	0	√√√ 16	0	0	16			
3	0	0	√√ 18	0	0	0			
4	16 A	0	√√ 13	0	0	0			
5	17 A	0	√√ 14	0	0	0			
6	0 (A)	0	√√√ 16	0	0	15			
7	0 (A)	0	11	0	0	13			
8	0	0	20	0	0	10X			
9	0	0	17	0	0	16			
10	0	0	14	0	0	17			
11	19 √√√ A	0	√√√	0	0	√√			
12	20 √√√ A	0	√√√	0	0	X			
13	19 √√√ A	0	√√√	0	0	0			
14	0 (A)	0	5 Injured by dot removed						
15	15 √√ A	0	0X						
16	16 √√√ A	0	√√√	0	0	0			
17	0	0	√√	0	0	√√			
18									
19	0	0	√X						
20	0	0	√√√	0	0	√√			
21	√√√ (A)(B)	0 0	√√X						
22	16 √√√ A	0	√√	0	0	0			
23	15 √√√ B	0	√√	0	0	√√			
24	19 √√ B	0	√√	0	0	0			
25	17 √√√ B	0	√√	0	0	√√			
26	15 √√√ B	0	√√√	0	0	0			
27	0	0	√√√	0	0	√√			
28									
29									
30	15 √√√ B	0	√√√	0	0	√√			
31	16 √√√ B	0	√√√	0	0	0			
32	16 √√√ B	0	√√√	0	0	√√			
33	16 √√ B	0	√√√	0	0	√√			
34	13 √√ B	0	√√√	0	0	0			
35	√	0	√√	0	0	0			
# Missing/Lost	0	1	0	0	0	0			
# Dead	0	0	3	0	0	2			
Analyst	JC	NS	SR	MT	JC	SR			
Time	21:34	0920	10:49	18:22	21:32	09:17			

*** See next page for Environment Canada and US EPA requirements.***

On test day, select appropriate neonates (i.e.>8 neonates in a brood) and indicate in the brood size box which test they will be used for by placing a letter according to this legend:

A - Jane	D -
B - LG	E -
C - TS	F -

(A) WENS 2016 Oct 19

Clearing Records for Young Produced by Each Brood Organism Used in a Test

Culture Date: AB 2016 Oct 10 — Analyst(s): JC MT

Cup #	Brood size								
Date	Oct 18	Oct 19	Oct 20	Oct 20	Oct 20	Oct 21			
Time	21:34	09:20	10:50	18:22	21:32	09:19			
36	10 /// B	0	√√	0	0	0			
37	@ /// B C	0	√√	0	0	0			
38	0	0	√√	0	0	0√√			
39	0	0	√X						
40	0	0	√P	0x					
41	0	0	√√	0	0	√			
42	0	0	√√	0	0	√√			
43	√	0	√	0	0	√			
44	18 √√ C	0	√√	0	0	0			
45	17 √√ C	0	√	0	0				
46	12 √ C	0	X						
47	0	0	√	(B)0	0	√√			
48	0	0	√	0	0	√			
49	0	0	√	0	0	√			
50	0	0	√√	0	0	√√			
51	16 √√ C	0	√√	0	0	√			
52	17 √√ C	0	√√	0	0	√			
53	0	0	√√	0	0	√			
54	16 √ C	0	√√	0	0	0x			
55	16 √√ C	0	√√	0	0	0			
56	18 √ C	0	√√	0	0	0			
57	0	0	√√	0	0	√√			
58	0	0	√√	0	0	√√			
59	0	0	√√	0	0	√			
60	√	0	√	0	0	√√			
61	16 √√ C	0	√	0	0	√			
62									
63	16 √√ C	0	√	0	0	√			
64	16 √√ C	0	√√	0	0	0			
65	√√	0	√√	0	0	√			
66	√√	0	√√	0	0	0			
67	0	0	√√	0	0	√√			
68	0	0	√√	0	0	√			
69	0	0	√√	0	0	√			
70	0	0	√√	0x	0	0			
# Missing/Lost	0	0	0	0	0	0			
# Dead	0	0	2	2	0	1			
Analyst	JC	NS	SR	MT	JC	SR			
Time	21:37	09:29	11:00	18:25	21:34	09:24			

(A) WE AB 2016 Oct 19

(B) WE MT 2016 Oct 20

(C) WE SR 2016 Oct 20

Environment Canada: At least 8 young must be produced by each brood organism in their third or subsequent broods, and in the brood to be used in a test.
Neonates used in tests must be < 24 hours old and within 12 hours of each other.

US EPA : Neonates used in tests must be < 24 hours old and within 8 hours of each other.
Neonates used in tests must be taken from adults that have had at least 8 or more young in the brood to be used in a test, and in their third or subsequent broods.

Example:

Cup #	Brood size			
Date	2008Jan22	2008Jan23	2008Jan23	2008Jan24
Time	10:10am	8:25am	8:15pm	8:00am
1	√	√	√√	12 A
2	√	√	√√	14 B

A - Rx #1
B - Client # 123

Maxxam
A Bureau Veritas Group Company

RESULTS OF RAINBOW TROUT SINGLE CONCENTRATION-100%

Success Through Science®

Client : 9239 QUINSAM COAL CORPORATION, Campbell River Job Number: B6A5191

Client Project Name & Number: - TOXICITY SAMPLES

Test Result:

96 hrs Mortality % 0 Statistical Method: Visual

Sample Name : WC

Description:	yellow, clear			Sample Number:	QC6147-01
Sample Collected:	Nov 22, 2016 03:00 PM	Sampling Method :	Grab	Site Collection:	N/A
Sample Collected By:	N/A	Volume Received:	20 x 1LP	Temp.Upon Arrival: 9 °C	Storage: 2-6°C
Sample Received:	Nov 23, 2016 11:35 AM	pH:	8.0	Dissolved Oxygen:	11.0 mg/L
Analysis Start :	Nov 24, 2016 12:14 PM	Temperature :	14 °C	Sample Conductance:	996 µS/cm

Concentration	Temperature (°C)	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	pH	pH	Conductivity (uS/cm)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)
% vol/vol	Initial	96 hrs	Initial	96 hrs	Initial	96 hrs	Initial	96 hrs	96 hrs	96 hrs
0	14	15	10.1	10.0	7.2	6.9	36	0	0	0
100	14	15	10.7	10.0	8.1	8.3	994	0	0	0

Comments : All fish appeared and behaved normally during the test.

Culture/Control/Dilution Water Burnaby Municipal Dechlorinated Water

Hardness: 18 mg/L $CaCO_3$ Other parameters available on request.

Test Conditions Test concentration : 0,100 (% vol/vol)

Organisms per Vessel :	10	Test Temperature :	15 ± 1 °C	Solution Depth :	>15 cm
Total # of Organisms Used :	20	Pre-aeration Time :	120 min.	Rate of Aeration	6.5±1 mL/min/L
Test Volume :	18 L	Vessel Volume :	20L	Test pH Adjusted:	No
Loading Density :	0.4 g/L	Photoperiod :	16:8 (light: dark)		

Test Organism : Rainbow Trout *(Oncorhynchus mykiss)* Source : Lyndon Fish Hatcheries Inc.

Culture Temperature :	15 ± 2 °C	Weight (Mean) +- SD :	0.68 ± 0.17 g	Length (Mean) +- SD :	4.34 ± 0.28 cm
Culture Water Renewal :	≥ 1L/min/kg fish	Weight (Range) :	0.50 – 0.98 g	Length (Range) :	4.00 – 4.80 cm
Culture Photoperiod :	16:8 (light: dark)			% Mortality within 7 days :	0%
Feeding rate and frequency :	daily: 1-5% biomass of trout.			Acclimation Time:	>14 days

Reference chemical: Zinc Test Date: Nov 23, 2016

Test Endpoint 96 hrs LC50 (95% confidence interval) : 0.12 (0.09, 0.16)mg/L Statistical Method : Probit

Historical Mean LC50 (warning limits) : 0.11 (0.05, 0.23) mg/L Concentration : 0,0.04,0.08,0.16,0.32,0.64 mg/L

Test Method Maxxam's BBY2SOP-00004 is based on the latest versions of EPS 1/RM/9, EPS 1/RM/13, and EPS 1/RM/50.

Method Deviations : None.

Note: The results contained in this report refer only to the testing of the sample submitted. This report may not be reproduced, except in its entirety, without the written approval of the laboratory.

Analyst : Marie-Eve O'Toole

Verified By : Kimberly Tamaki, Scientist, Ecotoxicology Date: Dec 06, 2016 12:21 PM

APPENDIX IV Phytoplankton and Zooplankton Analytical Results for Lakes, 2016

1-Chlorophyll *a* table 2013-2016
2-Stantec reports for 2016
3-Fraser Environmental Reports for 2016

Table 4-1. Chlorophyll a Results for Lake Sites. 2013–2016

Year	Lake	Chlorophyll "a" (µg/L)		
		Spring	Summer	Fall
2016	No Name	0.5	0.95	1.14
	Long	1.51	0.93	1.05
	Middle Quinsam	1	0.58	1.14
	Lower Quinsam	1.04	0.97	1.02
2015	No Name	0.59	0.96	1.25
	Long	1.41	0.58	1.17
	Middle Quinsam	0.87	1.06	1.16
	Lower Quinsam	2.68	0.98	1.62
2014	No Name	2.46	1.84	1.56
	Long	2.11	1	1.68
	Middle Quinsam	1.59	0.96	2
	Lower Quinsam	1.32	0.86	2.67
2013	No Name	1.12	0.5	0.5
	Long	1.2	0.5	1.19
	Middle Quinsam	1.29	1.09	1.09
	Lower Quinsam	0.91	0.82	NS

Table 4-2. Summary Statistics for chlorophyll a results at Lake Sites. 2013–2013

Lake	n	Minimum	Maximum	Mean	Median	Standard Deviation
No Name	12	0.5	2.46	1.11	1.04	0.60
Long	12	0.5	2.11	1.19	1.18	0.45
Middle Quinsam	12	0.58	2.04	1.15	1.09	0.36
Lower Quinsam	11	0.82	2.68	1.35	1.02	0.69

Stantec Consulting Ltd.
500-4730 Kingsway, Burnaby BC V5H 0C6

August 3, 2016
File: 123210406

Attention: Morgan Melnychuk
Maxxam Analytics Laboratory
4606 Canada Way
Burnaby, BC V5G 1K5

Dear Morgan,

Reference: Quinsam Lakes Phytoplankton, April 2016
(Sample Reference OL3788-02R,NNL1-13APR16-R, OL3857-03R\LLM1-13APR16-M, OL5700-04R\MQL1-14APR16-M, OL5653-04R\LQL1-14APR16-M)
(Job Numbers B627771, B627788, B628152, B628146)

INTRODUCTION

Quinsam Coal Ltd. collects water samples from the Quinsam Lakes system during the growing season. Permit requirements were amended for 2014 to include surface water sampling (1.0 m depth) three times a year (spring, late summer, fall overturn). Four lakes are now sampled: Long, Middle Quinsam, No Name, and Lower Quinsam lakes. From 1994 through 2012, the requirement was for sampling at 1, 4 and 9 m in April through September for Long Lake and Middle Quinsam Lake, with No Name Lake added to the program in June 2012 and Lower Quinsam Lake added in 2013. The 2013 program was similar to that for 2014, but with collection of samples at 0.5 m as well as 1 m depth. This long term record is included in Appendix A.

Samples are submitted to Stantec Consulting Ltd. for phytoplankton taxonomic analysis, as part of ongoing monitoring requirements of the Ministry of Environment. Some months, an additional sample is taken as a field replicate for quality assurance/quality control (QA/QC). This brief report provides information about samples collected in April 2016.

METHODS

Sub-samples (27 mL) of preserved lake water were settled and examined at 100 X, 400 X and 1,000 X magnifications using a Zeiss inverted microscope. Counting effort is defined as at least 100 organisms of the predominant species at 400 X, up to 200 fields at 1,000 X and a half or whole sub-sample at 100 X.

Reference: Quinsam Lakes Phytoplankton, April 2016
(Sample Reference OL3788-02R\NNL1-13APR16-R, OL3857-03R\LLM1-13APR16-M, OL5700-04R\MQL1-14APR16-M, OL5653-04R\LQL1-14APR16-M)
(Job Numbers B627771, B627788, B628152, B628146)

RESULTS

Abundance

Abundance data for 1993 to 2015 are summarized in Appendix A and detailed taxonomic results for April 2016 are presented in Appendix B.

Total abundance in the April 2016 samples is shown in Table 1. Total abundance was 1,500 cells/mL for Long Lake, 1,100 cells/mL for Middle Quinsam Lake, 1,100 cells/mL for No Name Lake, 970 cells/mL for No Name Lake replicate, and 1,500 cells/mL for Lower Quinsam Lake.

Table 1 Phytoplankton Abundance (cells/mL) in Quinsam Lake System, April 2016

Lake	Month	Abundance (cells/mL) at 1 m depth			
		Total	< 5 µm (1,000 X)	5 to 25 µm (400 X)	> 25 µm (100 X)
Long	April	1,500	1,300	240	5.5
Middle Quinsam	April	1,100	882	240	2.8
No Name	April	1,100	864	240	1.8
No Name (replicate)	April	970	792	180	1.8
Lower Quinsam	April	1,500	1,200	260	5.4

Species Composition

Species composition data for April 2016 are contained in Appendix B. The most abundant phytoplankton in all four lakes were the very small (≤ 5 µm) chrysoflagellates (*Ochromonas* spp. and *Chromulina* spp.). Although these ultra-nanoplankton species were very abundant numerically, they usually contribute little to algal biomass.

The most abundant of the larger algae were as follows:

- In Long Lake, larger *Ochromonas* spp. were predominant and cryptophytes *Cryptomonas* spp. and *Rhodomonas minuta* were common.
- In Middle Quinsam Lake, larger *Ochromonas* spp. were predominant and *Rhodomonas minuta* and the chrysophyte *Dinobryon* sp. were common.
- In No Name Lake and No Name Lake replicate, *Rhodomonas minuta and Ochromonas* spp. were predominant and *Cryptomonas* spp. were common.

Reference: Quinsam Lakes Phytoplankton, April 2016
(Sample Reference OL3788-02R\NNL1-13APR16-R, OL3857-03R\LLM1-13APR16-M, OL5700-04R\MQL1-14APR16-M, OL5653-04R\LQL1-14APR16-M)
(Job Numbers B627771, B627788, B628152, B628146)

- In Lower Quinsam Lake, larger *Ochromonas* spp. were predominant *Rhodomonas minuta* was common.

Comparison of Replicate Samples

Two replicates were collected from 1 m depth in No Name Lake. Percent difference in the duplicate samples was calculated. A difference of up to 10% can be expected for a total cell count of 400 organisms, for repeat sampling from the same bottle; higher percent difference can be expected when separate grabs are used for the replicates, as was done here.

For No Name Lake, species composition in the two samples was similar; however, abundance differed. Total abundance was 1,000 cells/mL in one sample and 970 cells/mL in the other, a difference of ± 13%. Sample reproducibility was marginally greater than expected for replicate samples. The percentage difference can be mostly attributed to a higher number of small *Ochromonas* spp. and *Rhodomonas minuta* in No Name Lake compared to the No Name Lake replicate.

CLOSURE

We trust this information meets your present requirements. Should you have any questions or require additional information, please contact the undersigned.

Respectfully,

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Appendix A Historical Abundance Data: Quinsam Lakes System, 1993–2015
Appendix B Species Composition Data: April 2016

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APPENDIX B

Species Composition Data: April 2016

Quinsam Lake Phytoplankton - 15 April 2016
Long Lake 1 m (OL3857-03, Job B627788)
27 ml sample settled

Total Cells Counted **426**
Total Cells Per mL **1,500**

	Number Counted	Cells per mL
1000X magnification - 50 fields		
CHRYSOPHYCEAE		
Ochromonas/Chromulina spp. (2-3 um)	37	666
Ochromonas/Chromulina spp. (4-5 um)	16	288
Ochromonas/Chromulina spp. (6-7 um)	4	72
Chrysochromulina parva	4	72
Pseudokephyrion sp.	10	180
TOTAL	**71**	**1,278**
400X magnification - 2 strips		
CHRYSOPHYCEAE		
Chrysococcus sp.	1	1
Dinobryon spp. (cells)	15	13
Mallomonas spp.	2	2
Ochromonas spp. (8-10 um)	162	138
Ochromonas spp. (12-15 um)	2	2
BACILLARIOPHYCEAE		
Achnanthes sp.	1	1
Cyclotella glomerata (cells + cols)	1	1
Cyclotella ocellata/stelligera	1	1
Melosira italica (filaments)	1	1
CHLOROPHYCEAE		
Cosmarium sp.	1	1
Crucigenia sp. (cols)	1	1
Nephrocytium sp. (cells)	3	3
Tetraedron sp.	1	1
DINOPHYCEAE		
Gymnodinium sp.	3	3
Peridinium sp.	3	3
CRYPTOPHYCEAE		
Cryptomonas spp.	29	25
Rhodomonas minuta	58	49
CYANOPHYCEAE		
Dactylococcopsis acicularis (cells + cols)	1	1
TOTAL	**286**	**243**
100X magnification - half sample		
CHRYSOPHYCEAE		
Dinobryon sociale (5 col, 13 cells)	13	1.0
BACILLARIOPHYCEAE		
Synedra sp. (small)	3	0.2
Synedra radians	40	3.2
Synedra ulna	3	0.2
CHLOROPHYCEAE		
Botryococcus braunii (colonies)	1	0.1
Elakatothrix gelatinosa (colonies)	2	0.2
Mougeotia sp. (1 filament, 5 cells)	5	0.4
DINOPHYCEAE		
Gymnodinium helveticum	1	0.1
Peridinium cinctum	1	0.1
TOTAL	**69**	**5.5**

Quinsam Lake Phytoplankton - 14 April 2016
Middle Quinsam Lake 1 m (OL5700-04) Job B628152
27 ml sample settled

Total Cells Counted	**403**
Total Cells Per mL	**1,100**

	Number Counted	Cells per mL
1000X magnification - 50 fields		
CHRYSOPHYCEAE		
Ochromonas/Chromulina spp. (2-3 um)	18	324
Ochromonas/Chromulina spp. (4-5 um)	18	324
Ochromonas/Chromulina spp. (6-7 um)	2	36
Pseduokephyrion sp.	10	180
Chrysochromulina parva	1	18
TOTAL	**49**	**882**
400X magnification - 2 strips		
CHRYSOPHYCEAE		
Chrysolikos sp.	3	3
Dinobryon sp. (cells)	35	30
Mallomonas spp.	4	3
Ochromonas spp. (8-10 um)	161	137
Ochromonas spp. (12-15 um)	2	2
BACILLARIOPHYCEAE		
Cyclotella ocellata/stelligera	3	3
Melosira italica (filaments)	2	2
CHLOROPHYCEAE		
Botryococcus sp. (cells)	1	1
Gloeocystis sp. (cells+cols)	2	2
Oocystis sp. (cells + cols)	2	2
Tetraedron minimum	2	2
CRYPTOPHYCEAE		
Cryptomonas spp.	11	9
Rhodomonas minuta	51	43
CYANOPHYCEAE		
Chroococcus sp. (cells + colonies)	4	3
TOTAL	**283**	**241**
100X magnification - whole sample		
CHRYSOPHYCEAE		
Dinobryon bavaricum (17 cols, 17 cells)	17	0.7
BACILLARIOPHYCEAE		
Synedra radians	16	0.6
Tabellaria fenestrata (5 cols, 28 cells)	28	1.1
CHLOROPHYCEAE		
Quadrigula chodatii (cols)	4	0.2
Mougeotia sp. (3 fil, 6 cells)	6	0.2
Staurastrum sp.	1	0.0
TOTAL	**71**	**2.8**

Quinsam Lake Phytoplankton - 13 April 2016
No Name Lake 1 m (OL3783-02) Job B627771
27 ml sample settled

Total Cells Counted	**371**
Total Cells Per mL	**1,100**

	Number Counted	Cells per mL
1000X magnification - 50 fields		
CHRYSOPHYCEAE		
Ochromonas/Chromulina spp. (2-3 um)	25	450
Ochromonas/Chromulina spp. (4-5 um)	19	342
Ochromonas/Chromulina spp. (6-7 um)	1	18
Pseduokephyrion sp.	3	54
TOTAL	**48**	**864**
400X magnification - 2 strips		
CHRYSOPHYCEAE		
Dinobryon sp. (cells)	11	9
Mallomonas sp.	14	12
Ochromonas spp. (8-10 um)	84	71
Ochromonas spp. (12-15 um)	2	2
BACILLARIOPHYCEAE		
Achnanthes sp.	4	3
Cyclotella glomerata (cells + colonies)	9	8
Cymbella minuta	1	1
Melosira italica (cells + fils)	6	5
Navicula spp. (20-50 um)	2	2
CHLOROPHYCEAE		
Bambusina sp.	2	2
Crucigenia sp. (colonies)	3	3
Gloeocystis sp. (cells + cols)	2	2
Nephrocytium sp. (cells)	7	6
Oocystis sp. (cells + cols)	4	3
Tetraedron sp.	1	1
DiNOPHYCEAE		
Peridinium sp.	2	2
CRYPTOPHYCEAE		
Cryptomonas spp.	20	17
Rhodomonas minuta	102	87
CYANOPHYCEAE		
Dactylococcopsis acicularis (cols)	2	2
TOTAL	**278**	**236**
100X magnification - whole sample		
CHRYSOPHYCEAE		
Dinobryon bavaricum (1 col, 1 cell)	1	0.0
BACILLARIOPHYCEAE		
Eunotia spp.	2	0.1
Synedra radians	14	0.6
Synedra ulna	4	0.2
Tabellaria fenestrata (3 cols, 15 cells)	15	0.6
CHLOROPHYCEAE		
Elakatothrix gelatinosa (cols)	3	0.1
Mougeotia sp. (1 filament, 3 cells)	3	0.1
DINOPHYCEAE		
Peridinium cinctum	2	0.1
CYANOPHYCEAE		
Oscillatoria sp. (1 filament)	1	0.0
TOTAL	**45**	**1.8**

Quinsam Lake Phytoplankton - 13 April 2016
No Name Lake 1 m (OL3788-02) Job B627771 - field duplicate
27 ml sample settled

Total Cells Counted	**400**
Total Cells Per mL	**970**

	Number Counted	Cells per mL
1000X magnification - 50 fields		
CHRYSOPHYCEAE		
Ochromonas/Chromulina spp. (2-3 um)	23	414
Ochromonas/Chromulina spp. (4-5 um)	18	324
Ochromonas/Chromulina spp. (6-7 um)	1	18
Pseduokephyrion sp.	2	36
TOTAL	**44**	**792**
400X magnification - 3 strips		
CHRYSOPHYCEAE		
Dinobryon sp. (cells)	2	1
Mallomonas sp.	9	5
Ochromonas spp. (8-10 um)	94	53
BACILLARIOPHYCEAE		
Achnanthes sp.	3	2
Cyclotella glomerata (cells + cols)	8	5
Melosira italica (cells + fils)	5	3
CHLOROPHYCEAE		
Crucigenia sp. (col)	4	2
Dictyosphaerium pulchellum (cols)	2	1
Nephrocytium sp. (cells)	10	6
Oocystis sp. (colonies + cells)	2	1
Tetraedron sp.	1	1
DINOPHYCEAE		
Peridinium sp.	1	1
CRYPTOPHYCEAE		
Cryptomonas spp.	36	20
Rhodomonas minuta	129	73
CYANOPHYCEAE		
Dactylococcopsis acicularis (cols)	5	3
TOTAL	**311**	**176**
100X magnification - whole sample		
CHRYSOPHYCEAE		
Dinobryon bavaricum (5 cols, 7 cells)	7	0.3
Dinobryon sociale (4 cols, 21 cells)	21	0.8
BACILLARIOPHYCEAE		
Navicula spp.	2	0.1
Synedra radians	7	0.3
Synedra ulna	1	0.04
Tabellaria fenestrata (4 cols, 5 cells)	5	0.2
CHLOROPHYCEAE		
Elekatothrix gelatinosa (cols)	1	0.04
Staurastrum sp.	1	0.04
TOTAL	**45**	**1.8**

Quinsam Lake Phytoplankton - 14 April 2016
Lower Quinsam Lake 1 m (OL5653-04) Job B28146
27 ml sample settled

Total Cells Counted **446**
Total Cells Per mL **1,500**

	Number Counted	Cells per mL
1000X magnification - 50 fields		
CHRYSOPHYCEAE		
Ochromonas/Chromulina spp. (2-3 um)	34	612
Ochromonas/Chromulina spp. (4-5 um)	28	504
Ochromonas/Chromulina spp. (6-7 um)	3	54
Chrysochromulina parva	1	18
Chrysolikos sp.	1	18
Pseudokephyrion sp.	1	18
TOTAL	**68**	**1,224**
400X magnification - two strips		
CHRYSOPHYCEAE		
Dinobryon sp. (cells)	4	3
Mallomonas spp.	1	1
Ochromonas spp. (8-10 um)	176	150
BACILLARIOPHYCEAE		
Cyclotella glomerata (cols + cells)	1	1
Cyclotella ocellata/stelligera	1	1
Melosira italica (fil)	3	3
CHLOROPHYCEAE		
Crucigenia sp. (cols)	1	1
Nephrocytium sp. (cells)	1	1
Oocystis sp. (cols + cells)	1	1
Scenedesmus sp.(cols)	1	1
DINOPHYCEAE		
Peridinium sp.	1	1
CRYPTOPHYCEAE		
Cryptomonas spp.	12	10
Rhodomonas minuta	107	91
TOTAL	**310**	**264**
100X magnification - half sample		
CHRYSOPHYCEAE		
Dinobryon bavaricum (4 cols, 4 cells)	4	0.3
Dinobryon cylindricum (6 col, 6 cells)	6	0.5
Dinobryon sociale (8 cols, 25 cells)	25	2.0
BACILLARIOPHYCEAE		
Asterionella formosa (1 col, 8 cells)	8	0.6
Navicula sp. (>50 um)	2	0.2
Synedra radians	21	1.7
CHLOROPHYCEAE		
Botryococcus braunii (cols)	2	0.2
TOTAL	**68**	**5.4**

Stantec Consulting Ltd.
500-4730 Kingsway, Burnaby BC V5H 0C6

November 4, 2016
File: 123210406

Attention: Morgan Melnychuk
Maxxam Analytics Laboratory
4606 Canada Way
Burnaby, BC V5G 1K5

Dear Morgan,

Reference: Quinsam Lakes Phytoplankton, August 2016
(Sample Reference PF7848-04, PF7972-04, PF7967-04, PF7971-04, PF7822-04)
(Job Numbers B667173, B667190, B667199, B667166)

INTRODUCTION

Quinsam Coal Ltd. collects water samples from the Quinsam Lakes system during the growing season. Permit requirements were amended for 2014 to include surface water sampling (1.0 m depth) three times a year (spring, late summer, fall overturn). Four lakes are now sampled: Long, Middle Quinsam, No Name, and Lower Quinsam lakes. From 1994 through 2012, the requirement was for sampling at 1, 4, and 9 m in April through September for Long Lake and Middle Quinsam Lake, with No Name Lake added to the program in June 2012 and Lower Quinsam Lake added in 2013. The 2013 program was similar to that for 2014 through 2016, but with collection of samples at 0.5 m as well as 1 m depth. This long term record is included in Appendix A.

Samples are submitted to Stantec Consulting Ltd. for phytoplankton taxonomic analysis, as part of ongoing monitoring requirements of the Ministry of Environment. Some months, an additional sample is taken as a field replicate for quality assurance/quality control (QA/QC). This brief report provides information about samples collected in August 2016.

METHODS

Sub-samples (27 mL) of preserved lake water were settled and examined at 100 X, 400 X and 1,000 X magnifications using a Zeiss inverted microscope. Counting effort is defined as at least 100 organisms of the predominant species at 400 X, up to 200 fields at 1,000 X and a half or whole sub-sample at 100 X.

RESULTS

Abundance

Abundance data for 1993 to 2015 are summarized in Appendix A and detailed taxonomic results for August 2016 are presented in Appendix B.

Reference: Quinsam Lakes Phytoplankton, August 2016
(Sample Reference PF7848-04, OL5700-04, PF7967-04, PF7971-04, PF7822-04)
(Job Numbers B667173, B628152, B667199, B667166)

Total abundance in the April and August 2016 samples is shown in Table 1. Total abundance was 1,200 cells/mL for Long Lake, 930 cells/mL for Middle Quinsam Lake, 1,800 cells/mL for No Name Lake, 1,900 cells/mL for No Name Lake replicate, and 2,400 cells/mL for Lower Quinsam Lake.

Table 1 Phytoplankton Abundance (cells/mL) in Quinsam Lake System, August 2016

Lake	Month	Abundance (cells/mL) at 1 m depth			
		Total	< 5 µm (1,000 X)	5 to 25 µm (400 X)	> 25 µm (100 X)
Long	April	1,500	1,300	240	5.5
Middle Quinsam		1,100	882	240	2.8
No Name		1,100	864	240	1.8
No Name (replicate)		970	792	180	1.8
Lower Quinsam		1,500	1,200	260	5.4
Long	August	1,200	990	140	22
Middle Quinsam		930	810	116	1.5
No Name		1,800	1,200	500	42
No Name (replicate)		1,900	1,280	595	46
Lower Quinsam		2,400	1,850	578	1.4

Species Composition

Species composition data for August 2016 are contained in Appendix B. The most abundant phytoplankton in all four lakes were the very small (≤ 5 µm) chrysoflagellates (*Ochromonas* spp. and *Chromulina* spp.). Although these ultra-nanoplankton species were very abundant numerically, they usually contribute little to algal biomass.

The most abundant of the larger algae were as follows:

- In Long Lake, larger *Ochromonas* spp. were predominant and the cryptophyte *Rhodomonas minuta*, and chrysophyte *Dinobryon cylindricum* were common.
- In Middle Quinsam Lake, larger *Ochromonas* spp. were predominant and *Cryptomonas* spp. were common.
- In No Name Lake and No Name Lake replicate, *Merismopedia* sp. was predominant and *Dinobryon cylindricum*, *Rhodomonas minuta, Cryptomonas* spp., *and Ochromonas* spp. were common.

Reference: Quinsam Lakes Phytoplankton, August 2016
(Sample Reference PF7848-04, OL5700-04, PF7967-04, PF7971-04, PF7822-04)
(Job Numbers B667173, B628152, B667199, B667166)

- In Lower Quinsam Lake, larger *Ochromonas* spp. were predominant and *Melosira italica* was common.

Comparison of Replicate Samples

Two replicates were collected from 1 m depth in No Name Lake. Percent difference in the duplicate samples was calculated. A difference of up to 10% can be expected for a total cell count of 400 organisms, for repeat sampling from the same bottle; higher percent difference can be expected when separate grabs are used for the replicates, as was done here.

For No Name Lake, species composition and abundance in the two samples were similar. Total abundance was 1,800 cells/mL in one sample and 1,900 cells/mL in the other; this difference of ± 5% indicates good inter-sample reproducibility.

CLOSURE

We trust this information meets your present requirements. Should you have any questions or require additional information, please contact the undersigned.

Respectfully,

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Appendix A Historical Abundance Data: Quinsam Lakes System, 1993–2015
Appendix B Species Composition Data: August 2016

APPENDIX B

Species Composition Data: August 2016

Quinsam Lake Phytoplankton - 9 August 2016
Long Lake 1 m (PF7848-04, Job B667173)
27 ml sample settled

Total Cells Counted	**634**
Total Cells Per mL	**1,200**

	Number Counted	Cells per mL
1000X magnification - 50 fields		
CHRYSOPHYCEAE		
Ochromonas/Chromulina spp. (2-3 um)	40	720
Ochromonas/Chromulina spp. (4-5 um)	9	162
Ochromonas/Chromulina spp. (6-7 um)	2	36
Chrysochromulina parva	1	18
Pseudokephyrion sp.	3	54
TOTAL	**55**	**990**
400X magnification - 3 strips		
CHRYSOPHYCEAE		
Mallomonas spp.	3	2
Ochromonas spp. (8-10 um)	117	66
BACILLARIOPHYCEAE		
Cyclotella ocellata/stelligera	1	1
Melosira italica (filaments)	7	4
CHLOROPHYCEAE		
Gloeocystis sp. (cells + cols)	6	3
Dictyosphaerium pulchellum (cols)	12	7
Nephrocytium sp. (cells)	23	13
Oocystis sp. (cells + cols)	9	5
Scenedesmus sp. (cols)	1	1
Schroederia setigera	4	2
Tetraedron sp.	2	1
CRYPTOPHYCEAE		
Cryptomonas spp.	13	7
Rhodomonas minuta	42	24
CYANOPHYCEAE		
Aphanocapsa sp. (cols)	2	1
Dactylococcopsis acicularis (cells + cols)	5	3
TOTAL	**247**	**140**
100X magnification - half sample		
CHRYSOPHYCEAE		
Dinobryon cylindricum (182 col, 26413 cells)	264	21.1
BACILLARIOPHYCEAE		
Rhopalodia gibba	1	0.1
CHLOROPHYCEAE		
Botryococcus braunii (colonies)	1	0.1
Closteriopsis sp.	1	0.1
Mougeotia sp. (1 fil, 2 cells)	2	0.2
Staurastrum sp.	1	0.1
DINOPHYCEAE		
Ceratium hirudinella	1	0.1
CYANOPHYCEAE		
Chroococcus sp. (cols)	5	0.4
TOTAL	**276**	**22.1**

Quinsam Lake Phytoplankton - 9 August 2016
Middle Quinsam Lake 1 m (PF7972-04) Job B667190
27 ml sample settled

Total Cells Counted	**295**
Total Cells Per mL	**930**

	Number Counted	Cells per mL
1000X magnification - 50 fields		
CHRYSOPHYCEAE		
Ochromonas/Chromulina spp. (2-3 um)	27	486
Ochromonas/Chromulina spp. (4-5 um)	12	216
Ochromonas/Chromulina spp. (6-7 um)	4	72
CHLOROPHYCEAE		
Oocystis sp. (5 x 3 um)	2	36
TOTAL	**45**	**810**
400X magnification - 3 strips		
CHRYSOPHYCEAE		
Dinobryon sp. (cyst)	1	1
Dinobryon sp. (cells)	4	2
Mallomonas spp.	7	4
Ochromonas spp. (8-10 um)	96	54
CHLOROPHYCEAE		
Botryococcus sp. (cells)	2	1
Cosmarium sp.	1	1
Crucigenia sp. (cols)	2	1
Dictyosphaerium pulchellum (cols)	13	7
Gloeocystis sp. (cells+cols)	8	5
Nephrocytium sp. (cells)	16	9
Oocystis sp. (cells + cols)	2	1
Schroederia setigera	4	2
DINOPHYCEAE		
Peridinium sp.	1	1
CRYPTOPHYCEAE		
Cryptomonas spp.	34	19
Rhodomonas minuta	14	8
CYANOPHYCEAE		
Dactylococcopsis acicularis (cells + cols)	7	4
TOTAL	**212**	**120**
100X magnification - whole sample		
CHRYSOPHYCEAE		
Dinobryon bavaricum (6 cols, 6 cells)	6	0.2
Dinobryon cylindricum (6 cols, 10 cells)	10	0.4
BACILLARIOPHYCEAE		
Synedra radians	3	0.1
CHLOROPHYCEAE		
Botryococcus braunii (cols)	1	0.04
Staurastrum sp.	1	0.04
DINOPHYCEAE		
Ceratium hirudinella	5	0.2
Peridinium sp. (large)	1	0.04
CYANOPHYCEAE		
Anabaena cf. planctonica (fil)	2	0.1
Chroococcus sp. (cols)	3	0.1
Coelosphaerium sp. (cols)	3	0.1
Oscillatoria sp. (fils)	2	0.1
UNIDENTIFIED FLAGELLATE	1	0.04
TOTAL	**38**	**1.5**

Quinsam Lake Phytoplankton - 9 August 2016
No Name Lake 1 m (PF7967-04) Job B667199
27 ml sample settled

Total Cells Counted	**889**
Total Cells Per mL	**1,800**

	Number Counted	Cells per mL
1000X magnification - 50 fields		
CHRYSOPHYCEAE		
Ochromonas/Chromulina spp. (2-3 um)	39	702
Ochromonas/Chromulina spp. (4-5 um)	16	288
Ochromonas/Chromulina spp. (6-7 um)	3	54
unidentified flagellate (5x3 um)	10	180
TOTAL	**68**	**1,224**
400X magnification - 1 strip		
CHRYSOPHYCEAE		
Diceras chodati	1	2
Dinobryon sp.	1	2
Mallomonas sp.	6	10
Ochromonas spp. (8-10 um)	37	63
BACILLARIOPHYCEAE		0
Melosira italica (cells + fils)	11	19
CHLOROPHYCEAE		0
Gloeocystis sp. (cells + cols)	1	2
Oocystis sp. (cells + cols)	2	3
Schroederia setigera	2	3
Tetraedron sp.	1	2
EUGLENOPHYCEAE		0
Trachelomonas sp.	1	2
CRYPTOPHYCEAE		0
Cryptomonas spp.	49	83
Rhodomonas minuta	39	66
CYANOPHYCEAE		0
Aphanocapsa sp. (cols)	4	7
Dactylococcopsis acicularis (cols)	1	2
Mereismopedia sp. (cols of 16 cells)	136	231
TOTAL	**292**	**496**
100X magnification - half sample		
CHRYSOPHYCEAE		
Dinobryon cylindricum (190 col, 506 cell)	506	40.5
CHLOROPHYCEAE		
Mougeotia sp. (1 filament, 3 cells)	3	0.2
Quadrigula chodatii (cols)	1	0.1
CYANOPHYCEAE		
Anabaena flos-aquae (fil)	16	1.3
Chroococcus sp. (cols)	2	0.2
Coelosphaerium kuetzingiana (cols)	1	0.1
TOTAL	**529**	**42.3**

Quinsam Lake Phytoplankton - 9 August 2016
No Name Lake 1 m (PF7971-04) Job B667199
27 ml sample settled

Total Cells Counted	**991**
Total Cells Per mL	**1,900**

	Number Counted	Cells per mL
1000X magnification - 50 fields		
CHRYSOPHYCEAE		
Ochromonas/Chromulina spp. (2-3 um)	42	756
Ochromonas/Chromulina spp. (4-5 um)	18	324
Ochromonas/Chromulina spp. (6-7 um)	1	18
Chrysochromulina parva	1	18
Pseudokephyrion sp.	1	18
unidentified flagellate (5x3 um)	8	144
TOTAL	**71**	**1,278**
400X magnification - 1 strip		
CHRYSOPHYCEAE		
Diceras chodati	4	7
Dinobryon sp.	2	3
Mallomonas sp.	4	7
Ochromonas spp. (8-10 um)	67	114
BACILLARIOPHYCEAE		
Melosira italica (cells + fils)	10	17
CHLOROPHYCEAE		
Nephrocytium sp. (cells)	1	2
Oocystis sp. (cells + cols)	1	2
Scenedesmus sp. (cols)	1	2
DINOPHYCEAE		
Peridinium sp.	2	3
CRYPTOPHYCEAE		
Cryptomonas spp.	64	109
Rhodomonas minuta	64	109
CYANOPHYCEAE		
Aphanocapsa sp. (cols)	13	22
Mereismopedia sp. (cols of 16 cells)	117	199
TOTAL	**350**	**595**
100X magnification - half sample		
CHRYSOPHYCEAE		
Dinobryon cylindricum (496 col, 543 cells)	543	43.4
BACILLARIOPHYCEAE		
Eunotia pectinalis var. minor	1	0.1
Synedra radians	1	0.1
CHLOROPHYCEAE		
Botryococcus braunii (cols)	2	0.2
Quadrigula chodatii (cols)	2	0.2
Staurastrum sp.	1	0.1
CYANOPHYCEAE		
Anabaena flos-aquae (fil)	10	0.8
Chroococcus sp. (cols)	5	0.4
Coelosphaerium kuetzingiana (cols)	5	0.4
TOTAL	**570**	**45.6**

Quinsam Lake Phytoplankton - 9 August 2016
Lower Quinsam Lake 1 m (PF7822-04) Job B667166
27 ml sample settled

Total Cells Counted **460**
Total Cells Per mL **2,400**

	Number Counted	Cells per mL
1000X magnification - 50 fields		
CHRYSOPHYCEAE		
Ochromonas/Chromulina spp. (2-3 um)	79	1422
Ochromonas/Chromulina spp. (4-5 um)	14	252
Ochromonas/Chromulina spp. (6-7 um)	4	72
Chrysochromulina parva	3	54
CHLOROPHYCEAE		0
Oocystis sp. (5 x 3 um, cells)	3	54
TOTAL	**103**	**1,854**
400X magnification - 1 strip		
CHRYSOPHYCEAE		
Diceras chodatii	3	5
Dinobryon sp. (cells)	4	7
Mallomonas spp.	3	5
Ochromonas spp. (8-10 um)	94	160
BACILLARIOPHYCEAE		
Cyclotella glomerata (cols + cells)	13	22
Cyclotella ocellata/stelligera	7	12
Melosira italica (fil) - small form	47	80
CHLOROPHYCEAE		
Crucigenia sp. (cols)	13	22
Dictyosphaerium pulchellum (cols)	2	3
Gloeocystis sp. (cells + cols)	1	2
Nephrocytium sp. (cells)	26	44
Oocystis sp. (cols + cells)	2	3
Scenedesmus sp.(cols)	29	49
CRYPTOPHYCEAE		
Cryptomonas spp.	37	63
Rhodomonas minuta	26	44
EUGLENOPHYCEAE		
Trachelomonas sp.	1	2
CYANOPHYCEAE		
Chroococcus sp. (cells)	20	34
Dactylococcopsis acicularis (cells + cols)	12	20
TOTAL	**340**	**578**
100X magnification - half sample		
CHRYSOPHYCEAE		
Dinobryon cylindricum (11 col, 11 cells)	11	0.9
BACILLARIOPHYCEAE		
Cyclotella bodanica	1	0.1
Synedra radians	1	0.1
CHLOROPHYCEAE		
Botryococcus braunii (cols)	3	0.2
Quadrigula sp. (cols)	1	0.1
Staurastrum sp.	1	0.1
CYANOPHYCEAE		
Anabaena flos-aquae (filaments)	5	0.4
Aphanocapsa sp.		
Chroococcus sp. (cols)	2	0.2
Coelosphaerium kuetzingiana	12	1.0
Gomphosphaeria lacustris	2	0.2
UNIDENTIFIED FLAGELLATE	11	0.9
TOTAL	**17**	**1.4**

Stantec Consulting Ltd.
500-4730 Kingsway, Burnaby BC V5H 0C6

February 8, 2017
File: 123210406

Attention: Morgan Melnychuk and Veronica De Guzman
Maxxam Analytics Laboratory
4606 Canada Way
Burnaby, BC V5G 1K5

Dear Morgan and Veronica,

Reference: Quinsam Lakes Phytoplankton, November 2016
(Sample Reference PY6430-04, PY6183-04, PY6421-04, PY6189-04)
(Job Numbers B698936, B698887, B698933, B698889)

INTRODUCTION

Quinsam Coal Ltd. collects water samples from the Quinsam Lakes system during the growing season. Permit requirements were amended for 2014 to include surface water sampling (1.0 m depth) three times a year (spring, late summer, fall overturn). Four lakes are now sampled: Long, Middle Quinsam, No Name, and Lower Quinsam lakes. From 1994 through 2012, the requirement was for sampling at depths of 1, 4, and 9 m in April through September for Long Lake and Middle Quinsam Lake, with similar sampling requirements at No Name Lake added to the program in June 2012. Beginning in April 2013, Lower Quinsam Lake was added to the sampling program; however, samples were gathered only from depths of 0.5 m and 1.0 m in all four lakes. Sampling continued in all four lakes from 2014 through 2016 with samples being taken from a 1 m depth only. The long term record of sampling is included in Appendix A.

Samples are submitted to Stantec Consulting Ltd. for phytoplankton taxonomic analysis, as part of ongoing monitoring requirements of the Ministry of Environment. Some months, an additional sample is taken as a field replicate for quality assurance/quality control (QA/QC). This brief report provides information about samples collected in November 2016.

METHODS

Sub-samples (27 mL) of preserved lake water were settled and examined at 100 X, 400 X, and 1,000 X magnifications using a Zeiss inverted microscope. Counting effort is defined as at least 100 organisms of the predominant species at 400 X, up to 200 microscope fields at 1,000 X, and a half or whole sub-sample at 100 X.

RESULTS

Abundance

Abundance data for 1993 to 2015 are summarized in Appendix A and detailed taxonomic results for November 2016 are presented in Appendix B.

Reference: Quinsam Lakes Phytoplankton, November2016
(Sample Reference PY6430-04, PY6183-04, PY6421-04, PY6189-04)
(Job Numbers B698936, B698887, B698933, B698889)

Total abundance in the April, August, and November 2016 samples is shown in Table 1. In November, total abundance ranged from 250 cells/mL (Lower Quinsam Lake) to 640 cells/mL (Long Lake).

Some of the samples contained larger amounts of detritus than usual. The sample from Lower Quinsam Lake contained large amounts of fine silt, possibly obscuring algal cells. The sample from Middle Quinsam Lake contained some coarser detritus (fibers of plant material) and the sample from Long Lake contained smaller amounts of coarse detritus.

Table 1 Phytoplankton Abundance (cells/mL) in Quinsam Lake System, 2016

Lake	Month	Abundance (cells/mL) at 1 m depth			
		Total	< 5 µm (1,000 X)	5 to 25 µm (400 X)	> 25 µm (100 X)
Long	April	1,500	1,300	240	5.5
Middle Quinsam		1,100	882	240	2.8
No Name		1,100	864	240	1.8
No Name (replicate)		970	792	180	1.8
Lower Quinsam		1,500	1,200	260	5.4
Long	August	1,200	990	140	22
Middle Quinsam		930	810	116	1.5
No Name		1,800	1,200	500	42
No Name (replicate)		1,900	1,280	595	46
Lower Quinsam		2,400	1,850	578	1.4
Long	November	780	640	140	0.5
Middle Quinsam		610	520	90	3.0
No Name		650	600	50	0.4
Lower Quinsam		300	250	50	0

Reference: Quinsam Lakes Phytoplankton, November 2016
(ample Reference PY6430-04, PY6183-04, PY6421-04, PY6189-04)
(Job Numbers B698936, B698887, B698933, B698889)

Species Composition

Species composition data for November 2016 are contained in Appendix B. The most abundant phytoplankton in all four lakes were the very small (≤ 5 µm) chrysoflagellates (*Ochromonas* spp. and *Chromulina* spp.). Although these ultra-nanoplankton species were very abundant numerically, they usually contribute little to total algal biomass.

The most abundant of the larger algae were as follows:

- In Long Lake, the cryptophyte *Rhodomonas minuta* was predominant and Cryptomonas and larger *Ochromonas* spp. were common.
- In Middle Quinsam Lake, *Rhodomonas minuta* and larger *Ochromonas* spp. were predominant.
- In No Name Lake *Rhodomonas minuta* and larger *Ochromonas* spp. were predominant.
- In Lower Quinsam Lake, larger *Ochromonas* spp. were predominant and *Rhodomonas minuta* and *Cryptomonas* spp. were common.

CLOSURE

We trust this information meets your present requirements. Should you have any questions or require additional information, please contact the undersigned.

Respectfully,

STANTEC CONSULTING LTD.

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Appendix A Historical Abundance Data: Quinsam Lakes System, 1993–2015
Appendix B Species Composition Data: November 2016

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APPENDIX B

Species Composition Data: November 2016

Quinsam Lake Phytoplankton - 3 November 2016
Long Lake 1 m (PY6430, Job B698936)
27 ml sample settled

Total Cells Counted	**254**
Total Cells Per mL	**780**

A LITTLE DETRITUS VISIBLE

	Number Counted	Cells per mL
1,000X magnification - 100 fields		
CHRYSOPHYCEAE		
Ochromonas/Chromulina spp. (2-3 um)	52	468
Ochromonas/Chromulina spp. (4-5 um)	14	126
Ochromonas/Chromulina spp. (6-7 um)	1	9
Pseudokephyrion sp.	4	36
TOTAL	**71**	**639**
400X magnification - 2 strips		
CHRYSOPHYCEAE		
Mallomonas spp.	4	3
Ochromonas spp. (8-10 um)	36	31
BACILLARIOPHYCEAE		0
Melosira italica (filaments)	3	3
CHLOROPHYCEAE		0
Nephrocytium sp. (cells)	2	2
Scenedesmus sp. (cols)	1	1
CRYPTOPHYCEAE		0
Cryptomonas spp.	27	23
Rhodomonas minuta	93	79
TOTAL	**166**	**141**
100X magnification - whole sample		
BACILLARIOPHYCEAE		0.0
Synedra radians	12	0.5
Tabellaria fenestrata (1 col, 4 cells)	4	
CHLOROPHYCEAE		0.0
Quadrigula chodatii (cols)	1	0.0
TOTAL	**17**	**0.5**

Quinsam Lake Phytoplankton - 3 November 2016
Middle Quinsam Lake 1 m (PY6183-04) Job B698887
27 ml sample settled

Total Cells Counted	**345**
Total Cells Per mL	**610**

SAMPLE CONTAINED COARSE FILAMENTOUS DETRITUS

	Number Counted	Cells per mL
1,000X magnification - 100 fields		
CHRYSOPHYCEAE		
Ochromonas/Chromulina spp. (2-3 um)	44	396
Ochromonas/Chromulina spp. (4-5 um)	12	108
Ochromonas/Chromulina spp. (6-7 um)	1	9
Pseudokephyrion sp.	1	9
TOTAL	**58**	**522**
400X magnification - 4 strips		
CHRYSOPHYCEAE		
Dinobryon sp. (cyst)	1	0.4
Dinobryon sp. (cells)	5	2
Mallomonas spp.	2	1
Ochromonas spp. (8-10 um)	93	40
BACILLARIOPHYCEAE		
Melosira italica (filaments)	1	0.4
CHLOROPHYCEAE		
Oocystis sp. (cells + cols)	4	2
CRYPTOPHYCEAE		
Cryptomonas spp.	16	7
Rhodomonas minuta	89	38
TOTAL	**211**	**90**
100X magnification - whole sample		
BACILLARIOPHYCEAE		
Asterionella formosa (9 cols, 47 cells)	47	1.9
Cyclotella bodanica	1	0.04
Synedra radians	14	0.6
Tabellaria fenestrata (3 col, 7 cells)	7	0.3
CHLOROPHYCEAE		
Botryococcus braunii (cols)	2	0.1
Mougeotia sp. (2 fil, 3 cells)	3	0.1
CYANOPHYCEAE		
Chroococcus sp. (cols)	2	0.1
TOTAL	**76**	**3.0**

Quinsam Lake Phytoplankton - 3 November 2016
No Name Lake 1 m (PY6421-04) Job B698933
27 ml sample settled

Total Cells Counted	**193**
Total Cells Per mL	**650**

	Number Counted	Cells per mL
1,000X magnification - 100 fields		
CHRYSOPHYCEAE		
Ochromonas/Chromulina spp. (2-3 um)	42	378
Ochromonas/Chromulina spp. (4-5 um)	20	180
Ochromonas/Chromulina spp. (6-7 um)	4	36
Pseudokephyrion sp.	1	9
TOTAL	**67**	**603**
400X magnification - 4 strips		
CHRYSOPHYCEAE		
Mallomonas sp.	2	1
Ochromonas spp. (8-10 um)	49	21
BACILLARIOPHYCEAE		
Melosira italica (cells + fils)	14	6
CHLOROPHYCEAE		
Gloeocystis sp. (cells + cols)	1	0.4
CRYPTOPHYCEAE		
Cryptomonas spp.	19	8
Rhodomonas minuta	30	13
TOTAL	**115**	**49**
100X magnification - whole sample		
BACILLARIOPHYCEAE		
Synedra radians	5	0.2
Tabellaria fenestrata (1 col, 4 cells)	4	0.2
CYANOPHYCEAE		
Anabaena flos-aquae (fil)	1	0.04
Chroococcus sp. (cols)	1	0.04
TOTAL	**11**	**0.4**

Quinsam Lake Phytoplankton - 3 November 2016
Lower Quinsam Lake 1 m (PY6189-04) Job B698889
27 ml sample settled

Total Cells Counted	**139**
Total Cells Per mL	**300**

SAMPLE CONTAINTED A LARGE AMOUNT OF FINE SILT WITH SOME FIBERS

	Number Counted	Cells per mL
1,000X magnification - 100 fields		
CHRYSOPHYCEAE		
Ochromonas/Chromulina spp. (2-3 um)	4	36
Ochromonas/Chromulina spp. (4-5 um)	14	126
Ochromonas/Chromulina spp. (6-7 um)	10	90
TOTAL	**28**	**252**
400X magnification - 4 strips		
CHRYSOPHYCEAE		
Ochromonas spp. (8-10 um)	70	30
CHLOROPHYCEAE		
Gloeocystis sp. (cells + cols)	1	0.4
CRYPTOPHYCEAE		
Cryptomonas spp.	18	8
Rhodomonas minuta	20	9
CYANOPHYCEAE		
Dactylococcopsis acicularis (cells + cols)	2	1
TOTAL	**111**	**47**
100X magnification - whole sample		
NOTHING VISIBLE		

APPENDIX A

Historical Abundance Data: Quinsam Lakes System, 1993–2015

Table A1-1: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 1993 and 1994

Date	Sampling Site	Total Abundance	< 5mm (1000X)	5 to 25 mm (400X)	> 25 μm (100X)
1993 October	LLM1	2,300	1,800	530	
	LLM3	3,000	2,400	550	
	LLMB	610	420	190	
1994 May	LL1R	10,000	8,800	1,200	
	LL3R	5,000	3,800	1,200	
	LL9R	4,000	3,200	800	
1994 June	LL0	1,400	1,200	250	
	LL1	1,000	790	220	
	LL4	1,500	1,200	320	
	LL9	2,500	1,900	580	
	LLB	830	440	390	
1994 July	LL1	2,100	1,900	180	
	LL4	1900	1700	250	
	LL9	1,500	1,100	400	
1994 August	LL1	1,700	1,400	290	
	LL4	1,000	850	200	
	LL9	900	780	150	
1994 September	LL1	900	620	250	
	LL4	2,300	2,000	260	
	LL9	2,100	1,700	350	

Table A1-2: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 1995

Date	Sampling Site	Total Abundance	< 5μm (1000X)	5 to 25 μm (400X)	> 25 μm (100X)
1995 April	LL1	3,100	2,700	340	
	LL4	3,300	2,900	350	
	LL9	1,300	1,100	280	
1995 May	LL1	5,400	4,900	570	
	LL4	4,800	4,100	700	
	LL9	1,500	1,000	500	
1995 June	LL1	2,100	1,800	300	
	LL4	2,600	2,100	500	
	LL9	7,400	6,600	850	
1995 July	LL1	2,000	1,700	300	
	LL4	1,900	1,650	350	
	LL9	1,500	1,200	300	
1995 August	LL1	1,100	960	180	
	LL4	1,300	1,100	240	
	LL9	1,900	1,700	210	
1995 September	LL1	2,900	2,800	170	
	LL4	3,400	3,100	330	
	LL9	1,900	1,600	280	

Table A1-3: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 1996

Date	Sampling Site	Total Abundance	< 5μm (1000X)	5 to 25 μm (400X)	> 25 μm (100X)
1996 April	LL1	4,600	4,200	340	
	LL4	6,000	5,600	380	
	LL9	1,100	960	160	
1996 May	LL1	2,200	1,600	600	31
	LL4	2,200	1,700	540	16
	LL9	1,700	1,400	290	26
1996 June	LL1	2,100	1,600	440	4
	LL4	1,600	1,300	340	2
	LL9	1,600	1,100	500	9
1996 July	LL1	2,400	2,300	140	1
	LL4	3,200	3,000	200	3
	LL9	No sample			
1996 August	LL1	2,100	1,900	160	1
	LL4	2,200	1,800	390	37
	LL9	1,700	1,500	200	10
1996 September	LL1	1,900	1,600	230	82
	LL4	2,200	1,800	300	145
	LL9	2,100	1,800	220	38
1996 April	MQ1	No sample			
	MQ4	No sample			
	MQ9	No sample			
1996 May	MQ1	2,000	1,700	230	11
	MQ4	1,100	930	180	7
	MQ9	2,200	1,800	430	1
1996 June	MQ1	2,700	2,500	150	3
	MQ4	2,600	2,400	210	7
	MQ9	1,200	1,000	190	1
1996 July	MQ1	2,400	2,100	335	24
	MQ4	1,900	1,400	380	130
	MQ9	1,200	860	320	29
1996 August	MQ1	2,800	2,500	280	17
	MQ4	1,800	1,500	310	18
	MQ9	2,300	1,900	390	21
1996 September	MQ1	1,700	1,300	270	5
	MQ4	900	560	350	0.6
	MQ9	1,200	1,100	190	0.7

Table A1-4: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 1997

Date	Sampling Site	Total Abundance	< 5μm (1000X)	5 to 25 μm (400X)	> 25 μm (100X)
1997 early May	LL1	3,200	2,800	340	12
	LL4	4,300	4,000	300	32
	LL9	1,700	1,600	140	5
1997 late May[1]	LL1	3,000	2,600	370	61
	LL4	4,900	4,200	620	100
	LL9	4,700	4,000	730	44
1997 June[2]	LL1	1,500	1,100	340	2
	LL4	1,200	1,000	240	1
	LL9	3,900	2,700	1,200	50
1997 July	LL1	2,400	2,300	110	0
	LL4	1,700	1,500	170	0.1
	LL9	480	390	80	2
1997 August	LL1	1,900	1,700	230	0.2
	LL4	880	740	140	0.6
	LL9	1,000	870	93	1.4
1997 September	LL1	1,000	870	140	0.6
	LL4	2,000	1,800	270	0.3
	LL9	700	490	210	0.8
1997 early May	MQ1	1,700	1,400	270	2
	MQ4	1,600	1,400	240	2
	MQ9	2,500	2,300	240	2
1997 late May	MQ1	1,200	1,000	150	0.4
	MQ4	1,600	1,300	280	1
	MQ9	1,200	1,000	190	0.2
1997 June	MQ1	1,900	1,700	140	1
	MQ4	2,500	2,400	130	1
	MQ9	1,400	1,200	200	1
1997 July	MQ1	2,400	2,300	130	0.3
	MQ4	1,500	1,400	110	0.1
	MQ9	890	640	260	0.6
1997 August	MQ1	2,100	1,900	220	0.8
	MQ4	1,500	1,300	190	1.4
	MQ9	1,000	760	240	1.6
1997 September	MQ1	800	640	170	1.3
	MQ4	900	620	280	6.4
	MQ9	650	370	280	1.5

1. recalculated counting *Synedra radians* at 400X rather than 100X
2. recalculated counting *Synedra radians* at 400X rather than 100X & *Cyclotella glomerata* at 1000X rather than 400X

Table A1-5: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 1998

Date	Sampling Site	Total Abundance	< 5μm (1000X)	5 to 25 μm (400X)	> 25 μm (100X)
1998 April	LL1	2,800	2,600	210	12
	LL4	4,100	3,700	390	12
	LL9	1,600	1,100	500	10
1998 May[1]	LL1	2,000	1,500	430	76
	LL4	1,600	1,100	480	85
	LL9	2,100	1,500	630	20
1998 June	LL1	5,700	5,600	140	0.3
	LL4	7,100	6,900	210	0.3
	LL9	3,300	1,700	1,600	4
1998 July	LL1	1,200	1,100	130	10
	LL4	740	560	170	8
	LL9	760	130	630	5
1998 August	LL1	1,900	1,700	190	2
	LL4	2,200	2,000	230	2
	LL9	1,900	1,600	220	5
1998 September	LL1	5,000	4,900	130	2
	LL4	3,500	3,300	150	2
	LL9	2,200	2,000	220	5
1998 April	MQ1	2,200	1,900	250	3
	MQ4	1,900	1,600	260	3
	MQ9	3,100	2,700	460	2
1998 May	MQ1	2,500	2,300	210	1
	MQ4	2,600	2,400	180	2
	MQ9	2,100	1,700	480	0.4
1998 June	MQ1	1,900	1,700	180	1
	MQ4	1,600	1,400	200	1
	MQ9	1,300	1,000	310	0.4
1998 July	MQ1	1,500	1,400	120	19
	MQ4	1,800	1,600	150	35
	MQ9	1,300	1,100	190	25
1998 August	MQ1	1,900	1,700	250	12
	MQ4	1,300	950	350	10
	MQ9	1,400	890	490	12
1998 September	MQ1	2,000	1,800	200	11
	MQ4	2,700	2,500	220	7
	MQ9	2,100	1,900	230	10

1. recalculated for counting *Synedra radians* at 400X rather than 100X

Table A1-6: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 1999

Date	Sampling Site	Total Abundance	< 5μm (1000X)	5 to 25 μm (400X)	> 25 μm (100X)
1999	LL1	3,800	3,500	310	9
April	LL4	6,800	6,200	560	17
	LL9	3,000	2,600	410	10
1999	LL1	No sample			
May	LL4	No sample			
	LL9	No sample			
1999	LL1	1,100	910	150	2
early July	LL4	1,400	1,200	150	1
	LL9	1,300	1,200	100	1
1999	LL1	1,100	870	200	1
late July	LL4	2,000	1,800	280	1
	LL9	1,000	860	130	1
1999	LL1	2,700	2,500	180	2
August	LL4	2,800	2,600	170	6
	LL9	3,000	2,800	170	4
1999	LL1	3,700	3,500	230	12
September	LL4	5,000	4,700	290	17
	LL9	4,000	3,700	290	3
1999	MQ1	2,300	1,600	220	430
April	MQ4	2,200	1,800	200	230
	MQ9	2,700	1,900	600	190
1999	MQ1	No sample			
May	MQ4	No sample			
	MQ9	No sample			
1999	MQ1	790	700	90	0.4
early July	MQ4	770	620	150	0.5
	MQ9	1,100	1,000	130	0.3
1999	MQ1	2,700	2,600	110	0.2
late July	MQ4	2,100	1,900	220	0.8
	MQ9	620	420	190	0.3
1999	MQ1	2,100	2,000	140	6
August	MQ4	1,100	980	110	4
	MQ9	1,100	1,000	120	9
1999	MQ1	1,300	1,100	190	14
September	MQ4	1,500	1,300	190	9
	MQ9	760	540	210	10

Table A1-7: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 2000

Date	Sampling Site	Total Abundance	< 5μm (1000X)	5 to 25 μm (400X)	> 25 μm (100X)
2000 April	LL1	2,100	1,600	450	33
	LL4	2,500	1,800	700	68
	LL9	1,300	590	740	6.8
2000 May	LL1	3,300	2,800	530	17
	LL4	3,000	2,600	320	15
	LL9	2,000	1,500	490	15
2000 June	LL1	2,900	2,500	390	9.1
	LL4	2,900	2,400	400	19
	LL9	6,400	5,700	730	19
2000 July	LL1	1,600	1,400	130	2.1
	LL4	1,400	1,200	250	1.6
	LL9	1,200	990	250	3.6
2000 August	LL1	1,800	1,600	170	12
	LL4	1,100	940	190	8.2
	LL9	1,500	1,400	130	1.9
2000 September	LL1	2,200	1,900	360	11
	LL4	2,000	1,800	200	9.2
	LL9	1,300	1,100	200	7.2
2000 April	MQ1	1,800	1,300	450	5.9
	MQ4	1,700	1,300	420	1.6
	MQ9	1,500	1,200	280	1.7
2000 May	MQ1	1,800	1,500	290	3
	MQ4	1,600	1,300	290	4.4
	MQ9	1,900	1,600	270	7.6
2000 June	MQ1	2,100	1,900	250	1.4
	MQ4	2,400	2,200	200	2.1
	MQ9	1,800	1,500	380	1.1
2000 July	MQ1	1,300	1,100	210	7.4
	MQ4	2,100	1,800	250	9.6
	MQ9	2,100	1,300	800	22
2000 August	MQ1	1,500	1,200	290	5.8
	MQ4	2,200	1,900	310	7.2
	MQ9	2,400	1,900	500	7.5
2000 September	MQ1	1,800	1,600	200	14
	MQ4	2,100	1,900	250	14
	MQ9	2,000	1,700	220	28

Table A1-8: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 2001

Date	Sampling Site	Total Abundance	< 5μm (1000X)	5 to 25 μm (400X)	> 25 μm (100X)
2001 April	LL1	3,300	2,600	670	19
	LL4	4,400	3,900	830	13
	LL9	1,400	860	490	5
2001 May	LL1	7,700	6,200	1,100	310
	LL4	11,000	10,000	980	100
	LL9	4,600	3,600	670	22
2001 June	LL1	7,800	6,600	1,000	170
	LL4	6,800	5,100	1,500	210
	LL9	3,000	2,400	680	25
2001 July	LL1	3,300	3,100	170	1
	LL4	3,200	3,000	180	1
	LL9	1,600	1,400	160	2
2001 August	LL1	1,300	1,100	180	1
	LL4	1,700	1,500	200	2
	LL9	720	540	170	1
2001 September	LL1	8,200	8,000	270	13
	LL4	8,800	8,600	260	13
	LL9	4,800	4,600	190	1
2001 April	MQ1	3,600	3,200	400	10
	MQ4	3,500	3,200	310	11
	MQ9	5,700	4,900	830	24
2001 May	MQ1	1,900	1,500	360	17
	MQ4	1,800	1,400	370	14
	MQ9	3,800	3,200	600	13
2001 June	MQ1	2,200	1,900	240	2
	MQ4	3,700	3,400	310	2
	MQ9	4,000	3,600	390	4
2001 July	MQ1	2,500	2,300	230	8
	MQ4	2,700	2,400	260	6
	MQ9	1,500	1,200	240	8
2001 August	MQ1	1,800	1,600	190	17
	MQ4	1,900	1,700	180	15
	MQ9	1,800	1,600	160	16
2001 September	MQ1	1,900	1,700	180	24
	MQ4	3,200	2,900	230	37
	MQ9	1,800	1,600	190	43

Table A1-9: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 2002

Date	Sampling Site	Total Abundance	< 5μm (1000X)	5 to 25 μm (400X)	> 25 μm (100X)
2002 April	LL1	5,600	5,100	460	57
	LL4	5,600	5,100	490	40
	LL9	1,300	1,100	220	12
2002 May	LL1	2,600	1,900	710	29
	LL4	2,700	2,000	690	41
	LL9	1,800	1,300	460	37
2002 June	LL1	5,800	5,300	340	140
	LL4	9,200	8,600	450	96
	LL9	3,700	3,000	620	27
2002 July	LL1	2,900	2,700	180	0.3
	LL4	2,400	2,200	160	0.6
	LL9	3,900	3,300	560	41.2
2002 August	LL1	2,900	2,800	140	7.2
	LL4	2,300	2,200	150	3.2
	LL9	1,500	1,400	130	0.6
2002 September	LL1	3,900	3,700	220	27
	LL4	3,500	3,200	260	31
	LL9	2,500	2,300	210	2.2
2002 April	MQ1	2,000	1,700	360	8.2
	MQ4	1,900	1,600	300	3.6
	MQ9	1,500	1,200	260	4
2002 May	MQ1	1,400	1,100	270	1.1
	MQ4	1,400	1,200	230	1.7
	MQ9	1,400	1,100	330	1.4
2002 June	MQ1	1,000	940	110	1
	MQ4	800	680	120	0.3
	MQ9	60	50	7	0
2002 July	MQ1	1,700	1,300	330	50
	MQ4	1,500	1,100	360	34
	MQ9	940	700	240	5.5
2002 August[1]	MQ1	1,400	1,200	140	42
	MQ4	1,200	940	180	76
	MQ9	2,600	200	300	275
2002 September	MQ1	1,400	1,200	160	33
	MQ4	2,100	1,900	220	28
	MQ9	1,100	920	160	28

1. recalculated for counting *Cyclotella bodanica* at 400X rather than 100X

Table A1-10: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 2003

Date	Sampling Site	Total Abundance	< 5μm (1000X)	5 to 25 μm (400X)	> 25 μm (100X)
2003 April	LL1	4,800	4,200	560	36
	LL4	3,600	2,900	640	8.6
	LL9	640	450	190	6.9
2003 May	LL1	4,200	3,500	620	25
	LL4	4,600	3,800	800	23
	LL9	1,400	1,100	280	16
2003 June	LL1	2,300	1,600	630	37
	LL4	6,800	6,100	600	43
	LL9	4,500	3,800	680	42
2003 July	LL1	1,600	1,400	240	1
	LL4	2,400	2,100	270	0.5
	LL9	2,900	2,700	250	9.8
2003 August	LL1	2,000	1,800	240	0.8
	LL4	2,200	1,900	250	0.5
	LL9	1,900	1,600	260	0.6
2003 September	LL1	2,600	2,400	290	0.2
	LL4	3,700	3,400	340	1.8
	LL9	1,900	1,600	250	1.9
2003 April	MQ1	3,500	2,900	570	28
	MQ4	3,000	2,400	510	17
	MQ9	2,000	1,600	310	17
2003 May	MQ1	2,900	2,400	350	99
	MQ4	3,000	2,400	480	43
	MQ9	3,000	2,500	560	16
2003 June	MQ1	1,300	1,100	180	6
	MQ4	1,900	1,500	420	21
	MQ9	3,000	2,700	350	16
2003 July	MQ1	2,700	2,600	170	0.5
	MQ4	2,000	1,600	380	1.5
	MQ9	1,400	1,100	240	79
2003 August	MQ1	1,300	1,000	280	43
	MQ4	1,500	1,200	240	44
	MQ9	3,500	2,500	620	338
2003 September	MQ1	2,100	1,900	260	6.5
	MQ4	2,300	2,000	290	23
	MQ9	Not available			

Table A1-11: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 2004

Date	Sampling Site	Total Abundance	< 5μm (1000X)	5 to 25 μm (400X)	> 25 μm (100X)
2004 April	LL1	5,300	4,100	1,200	20
	LL4	3,500	2,600	860	13
	LL9	3,300	2,600	730	9.1
2004 May	LL1	8,000	7,100	860	34
	LL4	6,600	5,300	1,200	36
	LL9	2,800	2,000	770	22
2004 June	LL1	2,900	2,600	270	3.1
	LL4	2,900	2,600	310	5
	LL9	4,900	4,100	730	39
2004 July	LL1	1,600	1,300	280	2.7
	LL4	1,200	1,100	170	2.2
	LL9	1,700	1,400	270	1
2004 August	LL1	1,300	960	350	18
	LL4	1,400	1,000	300	38
	LL9	1,700	1,600	110	27
2004 September	LL1	3,800	3,400	370	27
	LL4	4,300	3,900	350	25
	LL4 - duplicate	3,100	2,800	320	19
	LL9	3,000	2,700	280	12
2004 April	MQ1	1,500	1,120	400	2.2
	MQ4	1,400	1,030	370	5.2
	MQ9	1,500	1,200	340	4.2
2004 May	MQ1	2,300	2,000	310	2.4
	MQ4	1,500	1,200	300	3.6
	MQ9	2,600	2,100	470	2.4
2004 June	MQ1	1,900	1,700	190	34
	MQ4	3,000	2,700	250	48
	MQ9	2,200	1,900	210	123
2004 July[1]	MQ1	1,200	960	260	6.2
	MQ4	1,700	1,400	260	9.9
	MQ9	1,300	840	340	82
2004 August[2]	MQ1	2,900	2,600	260	53
	MQ4	3,800	3,500	250	51
	MQ4 - duplicate	2,500	2,200	210	53
	MQ9	3,900	3,600	260	44
2004 September	MQ1	2,300	1,700	550	25
	MQ4	2,100	1,600	420	26
	MQ9	2,500	2,000	520	19

1. MQ9 recalculated for counting *Cyclotella bodanica* at 400X rather than 100X
2. MQ1, MQ4, MQ9 recalculated for counting *Elakatothrix gelatinosa* colonies at 400X rather than 100X

Table A1-12: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 2005

Date	Sampling Site	Total Abundance	< 5μm (1000X)	5 to 25 μm (400X)	> 25 μm (100X)
2005 April	LL1	2,700	2,100	550	24
	LL4	3,500	2,800	610	29
	LL9	670	460	200	8.5
2005 May	LL1	7,200	6,600	670	55
	LL4	5,700	4,900	850	20
	LL9	1,300	850	440	20
2005 June	LL1	2,700	2,400	300	2.4*
	LL4	2,800	2,500	330	8.3*
	LL9	990	850	130	8.9
2005 July	LL1	1,200	800	400	44*
	LL4	1,700	1,200	460	33*
	LL9	692	540	150	3.5*
2005 August	LL1	1,400	1,100	290	26
	LL4	1,100	810	220	64
	LL9	2,400	1,900	360	73
2005 September	LL1	1,400	1,100	170	170
	LL4	2,300	1,900	220	170
	LL9	1,800	1,200	590	31*
2005 April	MQ1	1,400	1,100	370	8.8
	MQ4	1,900	1,500	400	3.6
	MQ9	1,700	1,300	400	6.6
2005 May	MQ1	1,300	1,000	300	3.4
	MQ4	1,500	1,200	330	3.2
	MQ9	1,300	1,000	340	3.7
2005 June	MQ1	1,700	1,600	150	4.6
	MQ4	1,000	710	270	2.1
	MQ9	1,100	900	200	1.1
2005 July[1]	MQ1	1,100	860	220	14.6
	MQ4	1,100	920	200	11.2
	MQ9	1,400	700	170	489
2005 August[2]	MQ1	1,100	950	170	0.5
	MQ4	1,900	1,600	250	7.1
	MQ9	2,100	1,700	330	89*
2005 September	MQ1	870	710	140	10.7
	MQ4	1,200	1,100	170	20.2
	MQ9	1,400	1,100	180	146

* = Cyclotella bodanica counted at 400X rather than 100X

Table A1-13: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 2006

Date	Sampling Site	Total Abundance	< 5μm (1000X)	5 to 25 μm (400X)	> 25 μm (100X)
2006 April	LL1	1,800	1,100	610	1.9*
	LL4	3,200	2,700	520	14.7
	LL9	690	550	135	2.2
2006 May	LL1	2,600	2,000	620	19.7
	LL4	4,900	4,200	640	12.9
	LL9	540	380	160	4.8
2006 June	LL1	860	610	200	39.5
	LL4	2,000	1,800	190	22.2
	LL4 (rep)	1,100	940	190	23.2
	LL9	1,700	1,400	220	17.7
2006 July	LL1	1,300	1,100	160	54.8
	LL4	2,700	2,200	370	165
	LL9	1,700	1,300	350	19.1
2006 August	LL1	2,700	2,500	200	14.3
	LL4	2,600	2,300	220	34.6
	LL9	2,800	2,300	470	23.8
2006 September	LL1	3,800	3,600	160	0.4
	LL4	1,300	1,200	120	2
	LL9	1,800	1,700	130	3.6
2006 April	MQ1	2,200	16,00	240	9.4
	MQ4	2,400	1,900	550	8.6
	MQ9	1,600	1,400	180	8.2
2006 May	MQ1	1,700	1,500	240	10.8
	MQ4	1,700	1,400	320	7.4
	MQ4 (rep)	2,100	1,800	310	11.8
	MQ9	1,900	1,600	280	4.1
2006 June	MQ1	1,900	1,800	130	0.9
	MQ4	1,400	1,200	200	4.4
	MQ9	950	840	110	0.6
2006 July	MQ1	1,100	870	220	42.8
	MQ4	2,000	1,700	260	16.6
	MQ9	2,300	2,100	180	18.8*
2006 August	MQ1	1,500	1,200	280	6.5
	MQ4	2,100	1,800	290	13.3
	MQ9	1,300	880	400	17.0*
2006 September	MQ1	2,500	2,300	200	1.9
	MQ4	2,100	1,800	260	11.8
	MQ9	3,400	2,400	970	1.8*

* *Cyclotella bodanica* (diatom) counted at 400X rather than 100X

Table A1-14: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 2007

Date	Sampling Site	Total Abundance	< 5μm (1000X)	5 to 25 μm (400X)
2007 April	LL1	3,100	2,800	240
	LL4	3,000	2,200	620
	LL9	1,200	910	240
2007 May	LL1	2,600	2,000	540
	LL4	3,300	2,600	670
	LL9	1,300	890	430
2007 June	LL1	2,100	1,600	420
	LL4	2,500	2,000	520
	LL9	1,100	750	300
2007 July	LL1	2,300	2,000	240
	LL4	2,400	2,100	270
	LL9	3,100	3,000	180
2007 August	LL1	1,100	900	240
	LL4	2,300	2,100	150
	LL4 (rep)	2,600	2,400	150
	LL9	570	480	90
2007 September	LL1	2,500	2,200	280
	LL4	1,700	1,400	240
	LL9	420	350	68
2007 April	MQ1	1,700	1,500	230
	MQ4	1,900	1,602	300
	MQ9	1,100	900	200
2007 May	MQ1	1,500	1,300	250
	MQ4	1,800	1,500	320
	MQ9	2,600	2,300	310
2007 June	MQ1	1,500	1,200	300
	MQ4	1,800	1,600	200
	MQ9	1,500	1,200	290
2007 July	MQ1	1,500	1,100	220
	MQ4	1,900	1,500	440*
	MQ9	1,000	860	150
	MQ9 (rep)	1,600	1,400	150
2007 August	MQ1	2,300	2,100	200
	MQ4	1,100	970	160
	MQ9	710	590	120
2007 September	MQ1	1,400	1,100	270
	MQ4	1,500	1,200	290
	MQ9	1,000	690	300

Table A1-15: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 2008

Date	Sampling Site	Total Abundance	< 5μm (1000X)	5 to 25 μm (400X)	> 25 μm (100X)
2008 April	LL1	2,500	2,070	360	30
	LL4	3,100	2,500	540	50
	LL9	1,300	1,030	240	20
2008 May	LL1	3,100	2,840	220	20
	LL4	5,300	4,820	430	25
	LL9	1,300	1,030	260	20
2008 June	LL1	1,000	880	110	1
	LL4	960	730	220	8
	LL9 (rep)	1,500	1,060	380*	16*
	LL9	1,200	780	380*	7*
2008 July	LL1	1,000	970	80	1
	LL4	1,400	1,300	110	17
	LL9	2,000	1,500	370	110
2008 August	LL1	1,100	1,000	50	1
	LL4	1,400	1,300	50	11
	LL9	1,100	1,060	40	9
2008 September	LL1	2,100	1,730	420**	2**
	LL4	2,300	1,780	490**	3**
	LL9	2,900	2,250	690**	6**
2008 April	MQ1	2,100	1,850	200	1
	MQ4	1,700	1,530	200	3
	MQ9	2,800	2410	400	4
2008 May	MQ1	1,000	870	130	1
	MQ4	1,700	1460	230	2
	MQ9	1,200	1,000	180	2
2008 June	MQ1	840	700	140	0.4
	MQ4	1,300	1,040	240	1
	MQ9	870	580	280	0.5
2008 July	MQ1	620	520	90	8
	MQ4	500	370	130	8
	MQ9	870	680	180	0.5
	MQ9 (rep)	1,000	760	260	9
2008 August	MQ1	750	660	100	1
	MQ4	980	860	110	6
	MQ9	1,300	990	290	5
2008 September	MQ1	1,500	1,310	160	14
	MQ4	1,100	980	150	3
	MQ9	2,800	2,680	130	10

* *Synedra radians* (diatom) counted at 400X rather than 100X, due to high numbers

** *Asterionella formosa* (diatom) counted at 400X rather than 100X, due to high numbers

Table A1-16: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 2009

Date	Sampling Site	Total Abundance	< 5 µm (1000X)	5 to 25 µm (400X)	> 25 µm (100X)
2009 April	LL1	780	480	300	6
	LL4	1,600	1,220	340	4
	LL9	90	60	30	1
2009 May	LL1	6,000	5,150	820	19
	LL4	4,900	4,100	760	10
	LL9	430	290	140	5
2009 June	LL1	1,700	1,370	370	5
	LL4	1,400	1,030	360	12
	LL9	680	340	330	6
2009 July	LL1	2,100	1,900	270	3
	LL4	2,700	2,400	330	4
	LL9	700	340	350	4
2009 August	LL1	3,100	2,900	170	3
	LL4	2,400	2,200	190	15
	LL9	1,700	1,300	370	10
2009 September	LL1	3,700	3,500	220	5
	LL4	2,300	2,100	180	3
	LL9	1,100	950	170	1
2009 April	MQ1	1,400	1,130	250	33
	MQ4	1,300	1,170	160	12
	MQ9	2,300	2,730	520	13
2009 May	MQ1	1,700	1,440	260	3
	MQ4	2,100	1,750	340	5
	MQ9	3,800	3,060	720	18
2009 June	MQ1	1,500	1,360	160	0.1
	MQ4	1,100	990	150	0.2
	MQ9	1,100	940	200	0.8
2009 July	MQ1	1,000	790	190	4
	MQ4	1,300	1,100	220	8
	MQ9	1,200	940	240	5
2009 August	MQ1	610	450	160	0.3
	MQ4	1,300	1,170	170	3
	MQ9	1,600	1,200	390	0.4
2009 September	MQ1	830	670	160	5
	MQ4	1,200	970	170	6
	MQ9	1,400	1,200	240	1

Table A1-17: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 2010

Date	Sampling Site	Total Abundance	< 5 µm (1,000X)	5 to 25 µm (400X)	> 25 µm (100X)
2010 April	LL1	630	490	140	1.6
	LL4	1,900	1,500	390	3
	LL9	170	100	70	0.4
2010 May	LL1	1,200	940	270	13.4
	LL4	4,500	3,800	650	17
	LL9	530	390	140	0.9
2010 June	LL1	2,400	1,900	500	5.2
	LL4	3,600	3,000	610	11
	LL9	1,500	1,100	400	10.6
2010 July	LL1	2,100	1,900	170	8.7
	LL1 (rep)	1,900	1,700	180	5
	LL4	3,000	2,800	250	2
	LL9	1,900	1,700	210*	0
2010 August	LL1	1,200	990	180	1.5
	LL4	1,600	1,400	190	1
	LL4 (rep)	1,600	1,400	180	2
	LL9	1,800	1,600	170	0
2010 September	LL1	2,100	1,800	260	15.1
	LL4	4,400	4,200	200	5
	LL9	1,200	1,100	130	0.4
2010 April	MQ1	1,700	1,600	100	0.4
	MQ4	1,200	1,100	120	1
	MQ9	800	710	90	2.4
2010 May	MQ1	1,100	990	120	0.9
	MQ4	1,100	960	150	1
	MQ9	1,600	1,330	240	2.9
2010 June	MQ1	2,000	1,700	270	0.9
	MQ4	1,400	1,100	240	1
	MQ9	1,000	850	200	1.1
2010 July	MQ1	1,800	1,500	250	8.7
	MQ1 (rep)	1,400	1,300	170	6
	MQ4	1,500	1,300	180	10
	MQ9	1,600	1,400	180	4
2010 August	MQ1	1,400	1,200	140	7.2
	MQ4	1,000	870	160	5
	MQ4 (rep)	1,100	900	150	5
	MQ9	1,200	1,000	150	8
2010 September	MQ1	1,300	1,000	260	1.3
	MQ4	1,300	1,040	220	3
	MQ9	1,100	900	190	1.7

Table A1-18: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 2011

Date	Sampling Site	Total Abundance	< 5 µm (1,000X)	5 to 25 µm (400X)	> 25 µm (100X)
2011 April	LL1	1,700	1,400	220	52
	LL4	3,900	3,260	540	80
	LL9	2,200	1,820	340	9
2011 May	LL1	3,600	2,880	720	6
	LL1 (rep)	3,500	2,790	690	6
	LL4	4,900	4,160	700	6
	LL9	1,300	900	350	5
2011 June	LL1	2,100	1,750	330	36
	LL4	2,300	2,050	290	3
	LL9	1,500	1,060	450	4
2011 July	LL1	1,400	1,150	270	3
	LL4	1,800	1,440	350	1
	LL4 (rep)	1,900	1,600	300	0.1
	LL9	1,900	1,550	320	2
2011 August	LL1	2,900	2,500	360	15
	LL4	1,800	1,400	320	27
	LL9	1,500	1,200	280	0.9
2011 September	LL1	1,300	940	380	2.2
	LL4	1,800	1,500	380	0.4
	LL9	960	770	190	0.3
2011 April	MQ1	1,600	1,370	270	7
	MQ4	1,400	1,160	270	6
	MQ9	1,900	1,400	490	3
2011 May	MQ1	1,200	1,050	190	2
	MQ1 (rep)	1,200	1,040	170	3
	MQ4	1,800	1,370	410	4
	MQ9	1,600	670	920	4
2011 June	MQ1	2,000	1,840	150	1
	MQ4	1,500	1,300	200	1
	MQ9	1,700	1,200	520	10
2011 July	MQ1	2,200	2,100	110	0.4
	MQ4	1,600	1,330	230	3
	MQ9	1,000	770	200	1
	MQ9(rep)	1,100	860	200	1
2011 August	MQ1	1,400	1,200	210	4
	MQ4	3,300	3,000	280	0.6
	MQ9	1,200	1,000	200	0.1
2011 September	MQ1	2,300	2,100	190	17.2
	MQ4	2,600	2,400	190	0.2
	MQ9	1,600	1,400	240	9.6

Table A1-19: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 2012

Date	Sampling Site	Total Abundance	< 5 µm (1,000X)	5 to 25 µm (400X)	> 25 µm (100X)
2012 April	LL1	2,300	1,980	330	5
	LL4	3,200	2,570	590	6
	LL9	1,000	800	190	6
2012 May	LL1	3,000	2,470	470	15
	LL4	2,200	1,640	600	7
	LL9	2,300	2,050	280	7
2012 June	LL1	1,400	1,080	310	3
	LL4	1,700	1,400	320	2
	LL9	980	810	170	2
	LL9 (rep)	1,200	1,020	140	1
2012 July	LL1	1,600	1,390	170	3
	LL4	Sample lost in transit (broken bottle)			
	LL9	880	730	150	2
2012 August	LL1	970	740	210	19
	LL1 (rep)	940	760	170	14
	LL4	1,300	990	250	35
	LL9	380	250	130	0.5
2012 September	LL1	Sample unpreserved – no analysis done			
	LL4	2,800	2,350	480	1
	LL9	Sample unpreserved – no analysis done			
2012 April	MQ1	2,200	2,010	200	3
	MQ4	1,700	1,440	220	3
	MQ9	1,600	1,420	180	5
2012 May	MQ1	1,100	990	140	1
	MQ4	830	680	140	0
	MQ9	1,200	1,000	150	0.2
2012 June	MQ1	2,100	1,920	170	0.4
	MQ4	890	740	150	0.3
	MQ9	1,100	910	200	0.4
	MQ9 (rep)	1,100	920	200	0.5
2012 July	MQ1	1,300	1,210	100	0.4
	MQ4	1,100	1,010	90	10
	MQ9	740	640	100	1
2012 August	MQ1	1,030	860	180	0.8
	MQ1 (rep)	920	720	200	0.2
	MQ4	810	660	140	10
	MQ9	430	340	90	1.6
2012 September	MQ1	900	730	170	0.5
	MQ4	760	650	115	2
	MQ9	580	430	160	0.5
2012 June	NNL1	1,600	1,240	320	0.5
	NNL4	1,000	670	370	0.2
	NNL9	840	700	140	1
	NNL9 (rep)	880	730	160	0.8
2012 July	NNL1	1,300	1,000	260	1.2
	NNL4	1,700	1,390	310	1
	NNL9	820	540	280	0.2
2012 August	NNL1	810	660	150	1.6
	NNL1 (rep)	790	590	200	1
	NNL4	1,800	1,350	440	0.8
	NNL9	730	530	195	0.04
2012 September	NNL1	1,530	1,170	360	1.2
	NNL4	1,260	970	290	2
	NNL9	1,740	1530	220	0.2

Table A1-20: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes System, 2013

Sampling Site	Date	Depth	Total Abundance	< 5 µm (1,000X)	5 to 25 µm (400X)	> 25 µm (100X)
Long Lake	April 2013	0.5 m	2,300	1,750	530	10
		1 m	3,000	2,470	570	15
	August 2013	0.5 m	1,300	880	455	2
		1.0 m	1,700	1,170	470	15
	October 2013	0.5 m	1,500	1,150	340	12
		1.0 m	1,900	1440	400	14
Middle Quinsam Lake	April 2013	0.5 m	1,350	1,080	270	2
		1.0 m	1,400	1,150	250	2
	August 2013	0.5 m	1,300	1,045	235	7
		1.0 m	1,300	1,010	325	6
		1.0 m (rep)	1,200	990	230	9
	October 2013	0.5 m	1,800	1,440	350	2
		1.0 m	1,900	1,570	290	2
		1.0 m (rep)	1,600	1,310	300	3
No Name Lake	April 2013	0.5 m	1,300	900	370	45
		1.0 m	1,600	1,150	380	36
	August 2013	0.5 m	1,200	880	440	5
		1.0 m	1,500	1,060	455	6
		1.0 m (rep)	1,700	1,315	470	8
	October 2013	0.5 m	1,800	1,310	460	1
		1.0 m	1,600	1,060	540	1
Lower Quinsam Lake	April 2013	0.5 m	1,800	1,420	406	2
		1 m	950	700	245	2
	August 2013	0.5 m	960	810	150	2
		1.0 m	620	460	160	3
	October 2013	0.5 m	1,300	1,040	200	12
		1.0 m	1,300	1,060	230	4

Table A1-21: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes

Sampling Site	Date	Depth	Total Abundance	< 5 µm (1,000X)	5 to 25 µm (400X)	> 25 µm (100X)
Long Lake	April 2014	1 m	3,100	2,665	330	86.6
	July 2014	1 m	1,700	1,170	490	0.9
	October 2014	1 m	1,500	1,200	290	18.6
Middle Quinsam Lake	April 2014	1 m	1,000	840	155	11.4
		1 m replicate	590	480	100	11.7
	July 2014	1 m	3,200	2,950	240	0.5
	October 2014	1 m	1,700	1,400	310	3.2
No Name Lake	April 2014	1 m	1,600	1,260	290	83
	July 2014	1 m	1,300	970	310	2.5
		1 m replicate	1,200	830	250	3.1
	October 2014	1 m	1,600	1,400	200	1.7
		1 m replicate	1,500	1,200	230	2.2
Lower Quinsam Lake	April 2014	1 m	1,600	1,400	225	7.6
	July 2014	1 m	1,200	1,010	210	1.8
	October 2014	1 m	2,400	2,000	350	66

Table A1-22: Phytoplankton Abundance (cells/mL) in the Quinsam Lakes

Lake	Date	Depth	Total Abundance	< 5 µm (1,000X)	5 to 25 µm (400X)	> 25 µm (100X)
Long	April	1 m	3,700	3,300	400	15
	July	1 m	1,300	1,030	260	6.6
	October	1 m	2,100	1,800	230	14.6
Middle Quinsam	April	1 m	1,600	1,300	300	2.4
	July	1 m	2,900	1,060	1,850	2.8
	October	1 m	1,150	920	230	0.3
No Name	April	1 m	1,200	870	350	1.1
	July	1 m	880	610	260	6.6
	October	1 m	1,350	1,000	300	4.3
	October replicate	1 m	1,200	920	280	4.5
Lower Quinsam	April	1 m	2,200	1,800	350	28
	April replicate	1 m	2,300	1,800	520	18
	July	1 m	3,200	580	2,630	3.3
	October	1 m	1,500	1,100	330	71

Table 3-1

Taxa and Abundance of Zooplankton Samples - Spring
Prepared by FRASER ENVIRONMENTAL SERVICES

taxa and abundance of zooplankton samples
level of id. : lowest/lowest

Spring 2016

Site Name		**LQL**	**NNL**	**LLM**	**MQL**
FES Sample Number		**160093**	**160094**	**160095**	**160096**
Sampling Date(s)		**April 14, 2016**	**April 13, 2016**	**April 13, 2016**	**April 14, 2016**
units = total organisms/sample					
	stage				
Sub-class : Copepoda					
Order : Cyclopoida					
Diacyclops thomasi	adult	35	52	137	40
UID	copepodid	8	72	127	16
Order : Calanoida					
Family : Diaptomidae					
Hesperodiaptomus kenai	adult		13		2
Skistodiaptomus oregonensis	adult		21	1	
UID	copepodid	2	5		
UID Calanoida / Cyclopoida	nauplii	58	232	88	25
Order : Cladocera					
Bosmina longirostris	adult	23	21	10	2
Ceriodpahnia dubia	adult			6	
Daphnia longiremis	adult			18	
Daphnia rosea	adult	10	21	39	18
Daphnia sp.	juvenile	5	10	10	
Holopedium gibberum	adult		36		
Leptodora kindtii	adult		3		
Polyphemus pediculus	adult				2
Phylum : Rotifera					
Kellicottia longispina		88	31	78	30
Keratella cochlearis		48	46	3,113	74
Keratella quadrata		2	5		2
Polyarthra sp.			41	29	
UID			52		2
Benthic					
Group : Hydracarina	larvae		5		
TOTAL		279	666	3,656	213

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

Table 3-2

Taxa and Abundance of Zooplankton Samples- Summer
Prepared by FRASER ENVIRONMENTAL SERVICES

taxa and abundance of zooplankton samples
level of id. : lowest/lowest

Summer 2016

Site Name		**LLM**	**LQL**	**NNL**	**MQL**
FES Sample Number		**160131**	**160132**	**160133**	**160134**
Sampling Date(s)		**August 17, 2016**	**August 17, 2016**	**August 17, 2016**	**August 17, 2016**
units = total organisms/sample	stage				
Sub-class : Copepoda					
Order : Cyclopoida					
Diacyclops thomasi	adult	84	122	35	45
UID	copepodid	59	343	72	11
Order : Calanoida					
Family : Diaptomidae					
Hesperodiaptomus kenai	adult		12	24	
Skistodiaptomus oregonensis	adult	287	147	156	305
UID	copepodid	12	61	11	11
UID Calanoida / Cyclopoida	nauplii	526	306	938	101
Order : Cladocera					
Bosmina longirostris	adult	96	64	35	
Ceriodpahnia dubia	adult	490			
Daphnia longiremis	adult	168		12	
Daphnia rosea	adult	478	698	397	497
Daphnia sp.	juvenile	143	73	12	169
Daphnia sp.	ephippium	10			
Diaphanosoma brachyurum	adult	347	722	84	56
Holopedium gibberum	adult			24	
Polyphemus pediculus	adult	23	12		
Sida crystallina	adult	23			
Phylum : Rotifera					
Kellicottia longispina		48	49	72	
Keratella cochlearis		347	86		22
Testudinella sp.		10			
UID					22
Benthic					
Group : Hydracarina	larvae			11	
Order : Diptera					
Chaoborus sp.	larvae	12	12		11
TOTAL		**3163.0**	**2707.0**	**1883.0**	**1250.0**

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

Table 3-3

Taxa and Abundance of Zooplankton Samples - Fall
Prepared by FRASER ENVIRONMENTAL SERVICES

taxa and abundance of zooplankton samples
level of id. : lowest/lowest

Fall 2016

Site Name		LQL	NNL	LLM	MQL
FES Sample Number		**160245**	**160246**	**160247**	**160248**
Sampling Date(s)		**Nov. 22, 2016**	**Nov. 22, 2016**	**Nov. 22, 2016**	**Nov. 22, 2016**
units = total organisms/sample					
	stage				
Sub-class : Copepoda					
Order : Cyclopoida					
Diacyclops thomasi	adult	2	8	33	19
UID	copepodid		2	14	2
Order : Calanoida					
Family : Diaptomidae					
Skistodiaptomus oregonensis	adult		22	11	2
UID Calanoida / Cyclopoida	nauplii		186	429	9
Order : Cladocera					
Alonopsis sp.	adult				2
Bosmina longirostris	adult		2		
Daphnia longiremis	adult			49	
Daphnia rosea	adult	2	2		4
Holopedium gibberum	adult		2		
Phylum : Rotifera					
Asplanchna sp.		2			
Kellicottia longispina		2	36	5	22
Keratella cochlearis		18	13	27	4
Keratella quadrata			3	5	2
Trichotria sp.		2	3		
UID		2	9		2
Benthic					
Order : Amphipoda	larvae				2
Order : Diptera					
Family : Chironomidae	larvae				2
Nematoda	larvae				2
TOTAL		**30.0**	**288.0**	**573.0**	**74.0**

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

Appendix V-I
Methods and QA/QC Report
for Benthic Invertebrate Taxonomy

Methods and QC Report 2016

Project ID: Quinsam Benthics 2016

Client: Quinsam Coal Corporation.

Prepared by:
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Table of Contents

Sample Reception 2
Sample Sorting 4
Sorting Quality Control - Sorting Efficiency 6
Sorting Quality Control - Sub-Sampling QC 7
Taxonomic Effort 9
Taxonomic QC 9
Error Summary 10
Error Rationale 10
References 11
Taxonomic Keys 12

Sample Reception

On October 17, 2016, Cordillera Consulting received 76 samples from Quinsam Coal Corporation. When samples arrived to Cordillera Consulting, exterior packaging was initially inspected for damage or wet spots that would have indicated damage to the interior containers.

Next, samples were logged into a proprietary software database (INSTAR1) where the clients assigned sample name was recorded along with a Cordillera Consulting (CC) number for cross-reference. Each sample was checked to ensure that all sites and replicates recorded on field sheets or packing lists were delivered intact and with adequate preservative. Any missing, mislabelled or extra samples were reported to the client immediately to confirm the total numbers and correct names on the sample jars. The client representative was notified of the arrival of the shipment and provided a sample inventory once intake was completed.
See table below for sample inventory:

Table 1: Summary of sample information including Cordillera Consulting (CC) number

Site	Sample	CC#	Date	Size	# of Jars
NNL	NNInlet1	CC171352	9/27/2016	200µM	3
NNL	NNInlet2	CC171353	9/27/2016	200µM	4
NNL	NNInlet3	CC171354	9/27/2016	200µM	3
NNL	NNLDeep1	CC171355	9/27/2016	200µM	1
NNL	NNLDeep2	CC171356	9/27/2016	200µM	1
NNL	NNLDeep3	CC171357	9/27/2016	200µM	1
NNL	NNLSeep1	CC171358	9/22/2016	200µM	1
NNL	NNLSeep2	CC171359	9/22/2016	200µM	1
NNL	NNLSeep3	CC171360	9/22/2016	200µM	1

NNL	NNLSeep4	CC171361	9/22/2016	200µM	1
NNL	NNLSeep5	CC171362	9/22/2016	200µM	1
NNO	NNO1	CC171363	9/22/2016	200µM	1
NNO	NNO2	CC171364	9/22/2016	200µM	2
NNO	NNO3	CC171365	9/22/2016	200µM	2
LL	LLINlet1	CC171366	9/28/2016	200µM	2
LL	LLINlet2	CC171367	9/28/2016	200µM	2
LL	LLINlet3	CC171368	9/28/2016	200µM	2
LL	LLDeep1	CC171369	9/28/2016	200µM	1
LL	LLDeep2	CC171370	9/28/2016	200µM	1
LL	LLDeep3	CC171371	9/28/2016	200µM	1
LL	LLSeep1	CC171372	9/28/2016	200µM	1
LL	LLSeep2	CC171373	9/28/2016	200µM	1
LL	LLSeep3	CC171374	9/28/2016	200µM	1
LL	LLSeep4	CC171375	9/28/2016	200µM	2
LL	LLSeep5	CC171376	9/28/2016	200µM	1
LL	LLSeep6	CC171377	9/28/2016	200µM	1
LL	LLOut1	CC171378	9/28/2016	200µM	1
LL	LLOut2	CC171379	9/28/2016	200µM	1
LL	LLOut3	CC171380	9/28/2016	200µM	1
LQL	LQLInlet1	CC171381	10/3/2016	200µM	2
LQL	LQLInlet2	CC171382	10/3/2016	200µM	2
LQL	LQLInlet3	CC171383	10/3/2016	200µM	2
LQL	LQL1	CC171384	10/3/2016	200µM	1
LQL	LQL2	CC171385	10/3/2016	200µM	1
LQL	LQL3	CC171386	10/3/2016	200µM	1
LQL	LQL4	CC171387	10/3/2016	200µM	1
LQL	LQL5	CC171388	10/3/2016	200µM	1
LQL	LQLD1	CC171389	10/3/2016	200µM	1
LQL	LQLD2	CC171390	10/3/2016	200µM	1
LQL	LQLD3	CC171391	10/3/2016	200µM	1
LQL	LQLO1	CC171392	10/3/2016	200µM	1
LQL	LQLO2	CC171393	10/3/2016	200µM	1
LQL	LQLO3	CC171394	10/3/2016	200µM	1
MQL	MQInlet1	CC171395	9/21/2016	200µM	2
MQL	MQInlet2	CC171396	9/21/2016	200µM	2
MQL	MQInlet3	CC171397	9/21/2016	200µM	2
MQL	MQLSeep1	CC171398	9/21/2016	200µM	2
MQL	MQLSeep2	CC171399	9/21/2016	200µM	1
MQL	MQLSeep3	CC171400	9/21/2016	200µM	1
MQL	MQLSeep4	CC171401	9/21/2016	200µM	1
MQL	MQLSeep5	CC171402	9/21/2016	200µM	1
MQL	MQLDeep1	CC171403	9/21/2016	200µM	1
MQL	MQLDeep2	CC171404	9/21/2016	200µM	1
MQL	MQLDeep3	CC171405	9/21/2016	200µM	1
MQL	MQLOut1	CC171406	9/21/2016	200µM	2
MQL	MQLOut2	CC171407	9/21/2016	200µM	2
MQL	MQLOut3	CC171408	9/21/2016	200µM	2
GNL	GNL1	CC171409	10/4/2016	200µM	1
GNL	GNL2	CC171410	10/4/2016	200µM	1
GNL	GNL3	CC171411	10/4/2016	200µM	1

GNL	GNL4	CC171412	10/4/2016	200µM	1
GNL	GNL5	CC171413	10/4/2016	200µM	1
CABIN	QWA-01	CC171414	9/14/2016	400µM	1
CABIN	QRD-02	CC171415	9/15/2016	400µM	1
CABIN	7SQ-03	CC171416	9/16/2016	400µM	1
LW	LWO1	CC171417	10/5/2016	200µM	3
LW	LWO2	CC171418	10/5/2016	200µM	1
LW	LWO3	CC171419	10/5/2016	200µM	2
LW	LWO4	CC171420	9/13/2016	200µM	2
LW	LWO5	CC171421	9/13/2016	200µM	2
LW	LWM1	CC171422	10/5/2016	200µM	1
LW	LWM2	CC171423	10/5/2016	200µM	1
LW	LWM3	CC171424	10/5/2016	200µM	1
LW	LWI1	CC171425	10/5/2016	200µM	1
LW	LWI2	CC171426	10/5/2016	200µM	1
LW	LWI3	CC171427	10/5/2016	200µM	1

Sample Sorting

- Using a gridded Petri dish, fine forceps and a low power stereo-microscope (Olympus, Nikon, Leica) the sorting technicians removed the invertebrates and sorted them into family/orders.

- Subsampling for lake samples was conducted with the use of a Plankton divider.
- Sorting Technicians continued subsampling until a count of 300 organisms was reached, where possible.
- In cases where the debris was heavy, to save sorting time, samples were fractioned down to 1/16 (6.25%); 1/8 (12.5%); or ¼ (25%), and only that portion was examined.

- CABIN samples were subsampled with the use of a Marchant Box
- When using the Marchant box, cells were extracted at the same time in the order indicated by a random number table. If the 300th organism was found part way into sorting a cell then the balance of that cell was sorted. If the organism count had not reached 300 by the 50th cell then the entire sample was sorted.

- The sorting technician kept a running tally of total numbers excluding organisms from Porifera, Nemata, Platyhelminthes, Ostracoda, Copepoda, Cladocera and terrestrial drop-ins such as aphids. These organisms were marked for their presence (given a value of 1) only and left in the sample. They were not included towards the 300-organism subsample count.
- Where specimens are broken or damaged, only heads were counted.
- The total fraction sorted and the number of organisms removed were recorded manually on a bench sheet and then recorded into INSTAR1
- Organisms were stored in vials containing 80% ethanol and an interior label indicating the site names, date of sampling, site code numbers and portion

subsampled. This information was also recorded on the laboratory bench sheet and on INSTAR1.

- The sorted portion of the debris was preserved and labeled separately from the unsorted portion and was tested for sorting efficiency (Sorting Quality Control – Sorting Efficiency). The unsorted portion was also labeled and preserved in separate jars.

Percent sub-sampled and total countable invertebrates pulled from the samples were summarized in the table below.

Table 2: Percent sub-sample and invertebrate count for each sample

Sample	Date	CC#	200 micron fraction		400 micron fraction	
			% Sampled	# Invertebrates	% Sampled	# Invertebrates
NNInlet1	27-Sep-16	CC171352	6.25%	147		
NNInlet2	27-Sep-16	CC171353	6.25%	127		
NNInlet3	27-Sep-16	CC171354	6.25%	357		
NNLDeep1	27-Sep-16	CC171355	100%	174		
NNLDeep2	27-Sep-16	CC171356	100%	297		
NNLDeep3	27-Sep-16	CC171357	100%	202		
NNLSeep1	22-Sep-16	CC171358	100%	335		
NNLSeep2	22-Sep-16	CC171359	100%	310		
NNLSeep3	22-Sep-16	CC171360	25%	157		
NNLSeep4	22-Sep-16	CC171361	100%	274		
NNLSeep5	22-Sep-16	CC171362	100%	353		
NNO1	22-Sep-16	CC171363	25%	295		
NNO2	22-Sep-16	CC171364	25%	140		
NNO3	22-Sep-16	CC171365	25%	107		
LLINlet1	28-Sep-16	CC171366	25%	844		
LLINlet2	28-Sep-16	CC171367	25%	475		
LLINlet3	28-Sep-16	CC171368	25%	774		
LLDeep1	28-Sep-16	CC171369	100%	102		
LLDeep2	28-Sep-16	CC171370	100%	43		
LLDeep3	28-Sep-16	CC171371	100%	84		
LLSeep1	28-Sep-16	CC171372	100%	26		
LLSeep2	28-Sep-16	CC171373	25%	33		
LLSeep3	28-Sep-16	CC171374	50%	49		
LLSeep4	28-Sep-16	CC171375	50%	48		
LLSeep5	28-Sep-16	CC171376	50%	160		
LLSeep6	28-Sep-16	CC171377	50%	60		
LLOut1	28-Sep-16	CC171378	25%	253		
LLOut2	28-Sep-16	CC171379	25%	243		
LLOut3	28-Sep-16	CC171380	25%	466		
LQLInlet1	03-Oct-16	CC171381	25%	347		
LQLInlet2	03-Oct-16	CC171382	25%	98		
LQLInlet3	03-Oct-16	CC171383	25%	29		
LQL1	03-Oct-16	CC171384	100%	177		
LQL2	03-Oct-16	CC171385	100%	163		
LQL3	03-Oct-16	CC171386	50%	69		

LQL4	03-Oct-16	CC171387	100%	152		
LQL5	03-Oct-16	CC171388	100%	199		
LQLD1	03-Oct-16	CC171389	100%	119		
LQLD2	03-Oct-16	CC171390	100%	157		
LQLD3	03-Oct-16	CC171391	100%	156		
LQLO1	03-Oct-16	CC171392	25%	301		
LQLO2	03-Oct-16	CC171393	25%	200		
LQLO3	03-Oct-16	CC171394	25%	112		
MQInlet1	21-Sep-16	CC171395	6.25%	473		
MQInlet2	21-Sep-16	CC171396	6.25%	182		
MQInlet3	21-Sep-16	CC171397	6.25%	303		
MQLSeep1	21-Sep-16	CC171398	12.5%	73		
MQLSeep2	21-Sep-16	CC171399	25%	32		
MQLSeep3	21-Sep-16	CC171400	12.5%	235		
MQLSeep4	21-Sep-16	CC171401	25%	241		
MQLSeep5	21-Sep-16	CC171402	25%	137		
MQLDeep1	21-Sep-16	CC171403	100%	85		
MQLDeep2	21-Sep-16	CC171404	100%	53		
MQLDeep3	21-Sep-16	CC171405	100%	59		
MQLOut1	21-Sep-16	CC171406	25%	700		
MQLOut2	21-Sep-16	CC171407	8%	354		
MQLOut3	21-Sep-16	CC171408	12.5%	351		
GNL1	04-Oct-16	CC171409	100%	117		
GNL2	04-Oct-16	CC171410	100%	158		
GNL3	04-Oct-16	CC171411	100%	340		
GNL4	04-Oct-16	CC171412	100%	122		
GNL5	04-Oct-16	CC171413	100%	85		
QWA-01	14-Sep-16	CC171414			20%	305
QRD-02	15-Sep-16	CC171415			50%	399
7SQ-03	16-Sep-16	CC171416			100%	338
LWO1	05-Oct-16	CC171417	25%	45		
LWO2	05-Oct-16	CC171418	25%	19		
LWO3	05-Oct-16	CC171419	25%	17		
LWO4	13-Sep-16	CC171420	25%	103		
LWO5	13-Sep-16	CC171421	25%	121		
LWM1	05-Oct-16	CC171422	50%	86		
LWM2	05-Oct-16	CC171423	25%	54		
LWM3	05-Oct-16	CC171424	100%	160		
LWI1	05-Oct-16	CC171425	25%	54		
LWI2	05-Oct-16	CC171426	50%	101		
LWI3	05-Oct-16	CC171427	25%	32		

Sorting Quality Control - Sorting Efficiency

As a part of Cordillera's laboratory policy, all projects undergo sorting efficiency checks.

- As sorting progresses, 10% of samples were randomly chosen by senior members of the sorting team for resorting.
- All sorters working on a project had at least 1 sample resorted by another sorter.
- An efficiency of 90 % was expected (95% for CABIN samples).

- If 90/95% efficiency was not met, samples from that sorter were resorted.
- To calculated sorting efficiency the following formula was used:

$$\frac{\#OrganismsMissed}{TotalOrganismsFound} * 100 = \%OM$$

Table 3: Summary of sorting efficiency

CC #	Number of Organisms Recovered (initial sort)	Number of Organisms in Re-sort	Percent Recovery
CC171358	335	25	93%
CC171380	466	0	100%
CC171386	69	7	90%
CC171391	156	0	100%
CC171409	117	10	91%
CC171413	85	4	95%
CC171414	305	0	100%
CC171415	399	0	100%
		Average Recovery	96%

Sorting Quality Control - Sub-Sampling QC

Certain Provincial and Mining projects require additional sorting checks in the form of sub-sampling QC, (Environmental Effects Monitoring (EEM) protocol). This ensured that any fraction of the total sample that was examined was actually an accurate representation of the number of total organisms. Organisms from the additional sub-samples were not identified; rather total organism count only was compared.

Sub-Sampling efficiency was measured on 10% of the number of sub-sampled samples in the project.

Sub-Sampling efficiency was performed by fractioning the entire sample into sub-sample percentages. On each sub-sampled portion, a total organism count was recorded and compared to the rest of the sub-samples. In order to pass, all fractions were required to be within 20% of total organism count.

Example: If 300 organisms are found in 10% of the sample, the sorter will continue to sample in 10% fractions until the entire sample is separated. They will then count the total number of organisms in each of the 10 fractions of 10% and compare the organism count.

When divergence is >20% the sorting manager examines for the source of the problem and takes steps to correct it.

Table 4: Summary of Sub Sample efficiency

Station ID		Organisms in Subsample																				Actual Total	Precision Error		Accuracy Error	
CC#	Sample Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		Min (%)	Max (%)	Min (%)	Max (%)
171411	GNL3	79	90	98	93																	360	3.23	19.39	0.00	12.22
171389	LQLD1	70	61																			131	12.86	12.86	6.87	6.87
171384	LQL1	84	86																			170	2.33	2.33	1.18	1.18
171388	LQL5	100	88																			188	12.00	12.00	6.38	6.38
171415	QRD-02	391	396																			787	1.26	1.26	0.64	0.64
171414	QWA-01	307	300	331	328	319																1585	0.91	9.37	0.63	5.36

* Sample 171411 has higher precision error due to the small amount of organisms in the sampl

Taxonomic Effort

The next procedure was the identification to genus-species level where possible of all the organisms in the sample.

- Identifications were made at the genus/species level for all insect organisms found including Chironomidae (Based on CABIN protocol).
- Non-insect organisms (except those not included in CABIN count) were identified to genus/species where possible and to a minimum of family level with intact and mature specimens.
- The Standard Taxonomic Effort lists compiled by the CABIN manual[1], SAFIT[2] , and PNAMP[3] were used as a guide line for what level of identification to achieve where the condition and maturity of the organism enabled.
- Organisms from the same families/order were kept in separate vials with 80% ethanol and an interior label of printed laser paper.
- Chironomidae was identified to genus/species level where possible and was aided by slide mounts. CMC-10 was used to clear and mount the slide.
- Oligochaetes was identified to family/genus level with the aid of slide mounts. CMC-10 was used to clear and mount the slide.
- Other Annelida (leeches, polychaetes) were identified to the family/genus/species level with undamaged, mature specimens.
- Mollusca was identified to family and genus/species where possible
- Decapoda, Amphipoda and Isopoda were identified at family/genus/species level where possible.
- Bryozoans and Nemata remained at the phylum level
- Hydrachnidae and Cnidaria were identified at the family/genus level where possible.
- When requested, reference collections were made containing at least one individual from each taxa listed. Organisms represented will have been identified to the lowest practical level. .

Taxonomic QC

The taxonomists for this project were certified by the Society of Freshwater Science (SFS) Taxonomic Certification Program at level 2 which is the required certification for CABIN projects:

Sue Salter: Group 1 General Arthropods (West); Group 2 EPT (East/West); Group 3 Chironomidae (East/West); Group 4 Oligochaeta

Scott Finlayson: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae (East/West); Group 4 Oligochaeta

Adam Bliss: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae

Rita Avery: Group 1 General Arthropods (East/West); Group 2 EPT (East/West)

Taxonomic QC was performed in house by someone other than the original taxonomist.

- Quality control protocol involved complete, blind re-identification and re-enumeration of at least 10% of samples by a second SFS-certified taxonomist.
- Samples for taxonomic quality control were randomly selected and quality control procedures were conducted as the project progresses through the laboratories.

- The second (QC) taxonomist will calculate and record four types of errors:
    1. Misidentification error
    2. Enumeration error
    3. Questionable taxonomic resolution error
    4. Insufficient taxonomic resolution error

The QC coordinator then calculates the following estimates of taxonomic precision.

1. The percent total identification error rate is calculated as:

$$\frac{Sum\ of\ incorrect\ identifications}{total\ organisms\ counted\ in\ audit} * (100)$$

The average total identification error rate of audited samples did not exceed 5%. All samples that exceed a 5% error rate were re-evaluated to determine whether repeated errors or patterns in error contributed.

2. The percent difference in enumeration (PDE) to quantify the consistency of specimen counts.

$$PDE = \frac{|n_1 - n_2|}{n_1 + n_2} x100$$

3. The percent taxonomic disagreement (PTD) to quantify the shared precision between two sets of identifications.

$$PTD = \left(1 - \left[\frac{a}{N}\right]\right) x100$$

4. Bray Curtis dissimilarity Index to quantify the differences in identifications.

$$BC_{ij} = 1 - \frac{2C_{ij}}{S_j + S_i}$$

Error Summary

All samples report errors within the acceptable limits for CABIN Laboratory methods (less than 5% error).

Table 4: Summary of taxonomic error following QC

Site	Taxa Identified	% Error	PDE	PTD	Bray - Curtis Dissimilarity index
Site - CABIN, Sample - QRD-02, CC# - CC171415,	399	0.00	0.00	0.00	0.00

Error Rationale

Site - CABIN, Sample - QRD-02, CC# - CC171415, Percent sampled = 50%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Neoleptophlebia	3	3						
Haploperla	1	1						
Fallceon	6	6						
Baetis tricaudatus group	12	12						
Tubificinae without hair chaetae	5	5						
Gastropoda	1	1						
Tubifex	3	3						
Pisidiidae	1	1						
Hemerodromia	2	2						
Pericoma/Telmatoscopus	1	1						
Baetidae	3	3						
Tipulidae	12	12						
Hexatoma	4	4						
Rhithrogena	3	3						
Leptophlebiidae	39	39						
Ephemerellidae	11	11						
Heptageniidae	90	90						
Baetis	81	81						
Orthocladius complex	1	1						
Pentaneura	2	2						
Lumbriculus	43	43						
Torrenticola	1	1						
Sperchon	1	1						
Hydropsyche	2	2						
Lepidostoma	1	1						
Calineuria californica	1	1						
Glossosomatidae	1	1						
Chloroperlidae	10	10						
Sweltsa	9	9						
Nemouridae	2	2						
Elmidae	11	11						
Heterlimnius	1	1						
Heterlimnius	22	22						
Diptera	1	1						
Probezzia	3	3						
Chironomidae	2	2						
Eukiefferiella	1	1						
Tanytarsus	1	1						
Rheotanytarsus	4	4						
Stempellinella	1	1						
Total:	**399**	**399**						
					0	**0**	**0**	
% Total Misidentification Rate =	misidentifications / total number			x100 =	0.00	**Pass**		

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[2] Southwest Association of Freshwater Invertebrate Taxonomists. (2015). www.safit.org

[3] Pacific Northwest Aquatic Monitoring Partnership (Accessed 2015). www.pnamp.org

Taxonomic Keys

Below is a reference list of taxonomic keys utilized by taxonomists at Cordillera Consulting. Cordillera taxonomists routinely seek out new literature to ensure the most accurate identification keys are being utilized. This is not reflective of the exhaustive list of resources that we use for identification. A more complete list of taxonomic resources can be found at Southwest Association of Freshwater Invertebrate Taxonomists. (2015).
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Methods and QC Report 2016

Project ID: Quinsam Benthics 2016 – April Samples
Client: Quinsam Coal Corporation

Prepared by:
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Table of Contents

Sample Reception 2
Sample Sorting 3
Sorting Note: 4
Sorting Quality Control - Sorting Efficiency 5
Sorting Quality Control - Sub-Sampling QC 5
Taxonomic Effort 5
Taxonomy Staff 6
References 6
Taxonomic Keys 6

Sample Reception

Cordillera Consulting received 16 additional benthic samples from Quinsam Coal Corporation, following initial analysis of the 2016 samples. When samples arrived to Cordillera Consulting, exterior packaging was initially inspected for damage or wet spots that would have indicated damage to the interior containers.

Next, samples were logged into a proprietary software database (INSTAR1) where the clients assigned sample name was recorded along with a Cordillera Consulting (CC) number for cross-reference. Each sample was checked to ensure that all sites and replicates recorded on field sheets or packing lists were delivered intact and with adequate preservative. Any missing, mislabelled or extra samples were reported to the client immediately to confirm the total numbers and correct names on the sample jars. The client representative was notified of the arrival of the shipment and provided a sample inventory once intake was completed.
See table below for sample inventory:

Table 1: Summary of sample information including Cordillera Consulting (CC) number

Site	Sample	CC#	Date	Size	# of Jars
April Delivery	NNLinlet4	CC172224	9/27/2016	200µM	3
April Delivery	NNLinlet5	CC172225	9/27/2016	200µM	2
April Delivery	NNO4	CC172226	9/22/2016	200µM	3
April Delivery	NNO5	CC172227	9/22/2016	200µM	3
April Delivery	LLinlet4	CC172228	9/28/2016	200µM	2
April Delivery	LLInlet5	CC172229	9/28/2016	200µM	2
April Delivery	LLOut4	CC172230	9/28/2016	200µM	1
April Delivery	LLOut5	CC172231	9/28/2016	200µM	1
April Delivery	MQLInlet4	CC172232	9/21/2016	200µM	2
April Delivery	MQLInlet5	CC172233	9/21/2016	200µM	2
April Delivery	MQLOut4	CC172234	9/21/2016	200µM	1
April Delivery	MQLOut5	CC172235	9/21/2016	200µM	2
April Delivery	LQLInlet4	CC172236	10/3/2016	200µM	2
April Delivery	LQLInlet5	CC172237	10/3/2016	200µM	2
April Delivery	LQLO4	CC172238	10/3/2016	200µM	1
April Delivery	LQL05	CC172239	10/3/2016	200µM	1

Sample Sorting

- Using a gridded Petri dish, fine forceps and a low power stereo-microscope (Olympus, Nikon, Leica) the sorting technicians removed the invertebrates and sorted them into family/orders.
- The sorting technician kept a running tally of total numbers excluding organisms from Porifera, Nemata, Platyhelminthes, Ostracoda, Copepoda, Cladocera and terrestrial drop-ins such as aphids. These organisms were marked for their presence (given a value of 1) only and left in the sample. They were not included towards the 300-organism subsample count.
- Where specimens are broken or damaged, only heads were counted.
- Subsampling for lake samples was conducted with the use of a Plankton divider.
- Sorting Technicians continued subsampling until a count of 300 organisms was reached, where possible.
- In cases where the debris was heavy, to save sorting time, samples were fractioned down to 1/16 (6.25%); 1/8 (12.5%); or ¼ (25%), and only that portion was examined.
- The total number of cells sorted and the number of organisms removed were recorded manually on a bench sheet and then recorded into INSTAR1
- Organisms were stored in vials containing 80% ethanol and an interior label indicating the site names, date of sampling, site code numbers and portion subsampled. This information was also recorded on the laboratory bench sheet and on INSTAR1.
- The sorted portion of the debris was preserved and labeled separately from the unsorted portion and was tested for sorting efficiency (Sorting Quality Control – Sorting Efficiency). The unsorted portion was also labeled and preserved in separate jars.

Percent sub-sampled and total countable invertebrates pulled from the samples were summarized in the table below.

Table 2: Percent sub-sample and invertebrate count for each sample

Sample	Date	CC#	200 micron fraction	
			% Sampled	# Invertebrates
NNLinlet4	27-Sep-16	CC172224	6.25%	285
NNLinlet5	27-Sep-16	CC172225	6.25%	338
NNO4	22-Sep-16	CC172226	25%	667
NNO5	22-Sep-16	CC172227	25%	796
LLinlet4	28-Sep-16	CC172228	6.25%	260
LLInlet5	28-Sep-16	CC172229	6.25%	344
LLOut4	28-Sep-16	CC172230	25%	319
LLOut5	28-Sep-16	CC172231	25%	630
MQLInlet4	21-Sep-16	CC172232	6.25%	472
MQLInlet5	21-Sep-16	CC172233	6.25%	495
MQLOut4	21-Sep-16	CC172234	12.5%	500
MQLOut5	21-Sep-16	CC172235	12.5%	316
LQLInlet4	03-Oct-16	CC172236	12.5%	139
LQLInlet5	03-Oct-16	CC172237	12.5%	268
LQLO4	03-Oct-16	CC172238	25%	281
LQL05	03-Oct-16	CC172239	25%	385

Sorting Note:

Previous samples submitted from the same sites had differing counts, which caused trouble with statistical analysis of the data. From our end we would like our client to know that in looking into discrepancies in the number of organisms found between replicates we found no correlation as to the sorting technician that performed the counts and the low or high enumeration. We also did not see a correlation between the amount of debris (number of jars of debris) and the high and low numbers. Shown below.

Sample	**200 micron fraction**		
	% Sampled	**# Invertebrates**	**# Jars**
NNInlet1	6.25%	147	3
NNInlet2	6.25%	127	4
NNInlet3	6.25%	357	3
NNLinlet4	6.25%	285	3
NNLinlet5	6.25%	338	2
NNO1	25%	295	1
NNO2	25%	140	2
NNO3	25%	107	2
NNO4	25%	667	3
NNO5	25%	796	3
LLINlet1	25%	844	2
LLINlet2	25%	475	2
LLINlet3	25%	774	2
LLinlet4	6.25%	260	2
LLInlet5	6.25%	344	2
LLOut1	25%	253	1
LLOut2	25%	243	1
LLOut3	25%	466	1
LLOut4	25%	319	1
LLOut5	25%	630	1
MQInlet1	6.25%	473	2
MQInlet2	6.25%	182	2
MQInlet3	6.25%	303	2
MQLInlet4	6.25%	472	2
MQLInlet5	6.25%	495	2
MQLOut1	25%	700	2
MQLOut2	8%	354	2
MQLOut3	12.5%	351	2
MQLOut4	12.5%	500	1
MQLOut5	12.5%	316	2
LQLInlet1	25%	347	2
LQLInlet2	25%	98	2
LQLInlet3	25%	29	2
LQLInlet4	12.5%	139	2
LQLInlet5	12.5%	268	2
LQLO1	25%	301	1
LQLO2	25%	200	1
LQLO3	25%	112	1
LQLO4	25%	281	1
LQL05	25%	385	1

Sorting Quality Control - Sorting Efficiency

As a part of Cordillera's laboratory policy, all projects undergo sorting efficiency checks.

- As sorting progresses, 10% of samples were randomly chosen by senior members of the sorting team for resorting.
- All sorters working on a project had at least 1 sample resorted by another sorter.
- An efficiency of 90 % was expected (95% for CABIN samples).
- If 90/95% efficiency was not met, samples from that sorter were resorted.
- To calculated sorting efficiency the following formula was used:

$$\frac{\#OrganismsMissed}{TotalOrganismsFound} * 100 = \%OM$$

Table 3: Summary of sorting efficiency

CC #	Number of Organisms Recovered (initial sort)	Number of Organisms in Re-sort	Percent Recovery
CC172229	344	3	99%
		Average Recovery	99%

Sorting Quality Control - Sub-Sampling QC

All sample washing, preparation and subsampling was performed by the same sorting technician on the same day using the same piece of equipment. All measures were taken to ensure accuracy in the subsampling. Along with the previous samples submitted for this project, a number of samples were examined for sub-sampling efficiency and were passed successfully using our sub-sampling equipment and methodology. To save time and cost, no further samples were tested for sub-sample accuracy. Further analysis can be done at the request of the client if necessary.

Taxonomic Effort

The next procedure was the identification to genus-species level where possible of all the organisms in the sample.

- Identifications were made at the genus/species level for all insect organisms found including Chironomidae (Based on CABIN protocol).
- Non-insect organisms (except those not included in CABIN count) were identified to genus/species where possible and to a minimum of family level with intact and mature specimens.
- The Standard Taxonomic Effort lists compiled by the CABIN manual[1], SAFIT[2] , and PNAMP[3] were used as a guide line for what level of identification to achieve where the condition and maturity of the organism enabled.
- Organisms from the same families/order were kept in separate vials with 80% ethanol and an interior label of printed laser paper.
- Chironomidae was identified to genus/species level where possible and was aided by slide mounts. CMC-10 was used to clear and mount the slide.

- Oligochaetes was identified to family/genus level with the aid of slide mounts. CMC-10 was used to clear and mount the slide.
- Other Annelida (leeches, polychaetes) were identified to the family/genus/species level with undamaged, mature specimens.
- Mollusca was identified to family and genus/species where possible
- Decapoda, Amphipoda and Isopoda were identified at family/genus/species level where possible.
- Bryozoans and Nemata remained at the phylum level
- Hydrachnidae and Cnidaria were identified at the family/genus level where possible.
- When requested, reference collections were made containing at least one individual from each taxa listed. Organisms represented will have been identified to the lowest practical level.
- Reference collection specimens were stored in 55 mm glass vials with screw-cap lids with polyseal inserts (museum quality). They were labeled with taxa name, site code, date identified and taxonomist name. The same information was applied to labels on the slide mounts.

Taxonomy Staff

The taxonomists for this project were certified by the Society of Freshwater Science (SFS) Taxonomic Certification Program at level 2 which is the required certification for CABIN projects:

Scott Finlayson: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae (East/West); Group 4 Oligochaeta

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[3] Pacific Northwest Aquatic Monitoring Partnership (Accessed 2015). www.pnamp.org

Taxonomic Keys

Below is a reference list of taxonomic keys utilized by taxonomists at Cordillera Consulting. Cordillera taxonomists routinely seek out new literature to ensure the most accurate identification keys are being utilized. This is not reflective of the exhaustive list of resources that we use for identification. A more complete list of taxonomic resources can be found at Southwest Association of Freshwater Invertebrate Taxonomists. (2015). http://www.safit.org/Docs/SAFIT_Taxonomic_Literature_Database_1_March_2011.enl

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Appendix V-II
Benthic Invertebrate
Taxonomy Raw Data

Table 6-2. Benthic Invertebrate Taxonomy Raw Data.

Cordillera Consulting

Project: Quinsam Benthics 2016

Quinsam Coal Corp, Kathleen Russell
Taxonomist: Sue Salter
suesalter@cordilleraconsulting.ca
250-494-7553

Site:	NNL	NNL	NNL	April Delivery	April Delivery	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNO	NNO	NNO
Sample:	NNInlet1	NNInlet2	NNInlet3	NNLinlet4	NNLinlet5	NNLDeep1	NNLDeep2	NNLDeep3	NNLSeep1	NNLSeep2	NNLSeep3	NNLSeep4	NNLSeep5	NNO1	NNO2	NNO3
Sample Collection Date:	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16
CC#:	CC171352	CC171353	CC171354	CC172224	CC172225	CC171355	CC171356	CC171357	CC171358	CC171359	CC171360	CC171361	CC171362	CC171363	CC171364	CC171365
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	6.25	6.25	6.25	6.25	6.25	100	100	100	100	100	25	100	100	25	25	25
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Collembola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Entomobryidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sminthuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Baetidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acentrella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis tricaudatus group	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Callibaetis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centroptilum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fallceon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Procloeon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Caenidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Caenis	4	1	18	19	28	0	0	0	0	4	6	0	0	66	78	50
| Family: Ephemerellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhithrogena	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Leptophlebiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoleptophlebia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	NNL	NNL	NNL	April Delivery	April Delivery	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNO	NNO	NNO
Sample:	NNInlet1	NNInlet2	NNInlet3	NNLinlet4	NNLinlet5	NNLDeep1	NNLDeep2	NNLDeep3	NNLSeep1	NNLSeep2	NNLSeep3	NNLSeep4	NNLSeep5	NNO1	NNO2	NNO3
Sample Collection Date:	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16
CC#:	CC171352	CC171353	CC171354	CC172224	CC172225	CC171355	CC171356	CC171357	CC171358	CC171359	CC171360	CC171361	CC171362	CC171363	CC171364	CC171365
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	6.25	6.25	6.25	6.25	6.25	100	100	100	100	100	25	100	100	25	25	25
| Order: Plecoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Capniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haploperla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweltsa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Nemouridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemoura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zapada cinctipes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calineuria californica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Taeniopterygidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taenionema	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trichoptera	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydroptilidae	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agraylea	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Oxyethira	0	0	0	2	5	0	0	0	0	0	0	0	0	2	0	0
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Leptoceridae	1	1	10	0	0	0	0	0	0	0	0	0	0	0	0	1
Oecetis	0	0	1	4	7	0	0	0	0	2	3	4	2	1	1	0
Triaenodes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Limnephilus	0	0	0	0	0	1	1	0	2	0	0	0	0	0	0	0
| Family: Molannidae	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Philopotamidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dolophilodes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wormaldia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Phryganeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agrypnia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ptilostomis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Polycentropodidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Polycentropus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	NNL	NNL	NNL	April Delivery	April Delivery	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNO	NNO	NNO
Sample:	NNInlet1	NNInlet2	NNInlet3	NNLinlet4	NNLinlet5	NNLDeep1	NNLDeep2	NNLDeep3	NNLSeep1	NNLSeep2	NNLSeep3	NNLSeep4	NNLSeep5	NNO1	NNO2	NNO3
Sample Collection Date:	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16
CC#:	CC171352	CC171353	CC171354	CC172224	CC172225	CC171355	CC171356	CC171357	CC171358	CC171359	CC171360	CC171361	CC171362	CC171363	CC171364	CC171365
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	6.25	6.25	6.25	6.25	6.25	100	100	100	100	100	25	100	100	25	25	25
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heterlimnius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Haliplidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haliplus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peltodytes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	1	0	5	0	3	0	0	0	3	10	4	1	0	2	0	1
Atrichopogon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bezzia/ Palpomyia	1	1	1	2	1	0	1	0	0	2	0	0	1	1	0	0
Culicoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dasyhelea	0	0	1	0	1	0	0	0	0	0	0	0	0	2	0	0
Mallochohelea	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Probezzia	0	0	1	0	0	1	1	0	17	31	5	1	2	6	1	0
| Family: Chaoboridae	0	0	0	0	0	8	13	7	1	0	0	0	0	0	0	0
Chaoborus	0	0	0	0	0	4	8	25	0	0	0	0	0	0	0	0
| Family: Chironomidae	0	0	0	0	0	13	10	5	2	1	1	0	1	0	0	0
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Chironomus	0	6	4	1	2	23	42	57	0	0	0	0	0	0	0	0
Cladopelma	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Cryptochironomus	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Cryptotendipes	2	2	15	11	3	0	0	0	0	0	0	0	0	0	0	0
Dicrotendipes	0	0	21	9	11	0	0	0	0	0	0	0	0	35	1	2
Endochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glyptotendipes	27	28	0	0	0	0	0	0	0	0	0	0	0	1	9	2
Lauterborniella agrayloides	0	0	7	3	4	0	0	0	0	0	0	0	0	11	0	0
Microchironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes pedellus group	0	0	0	0	0	0	0	0	5	6	1	1	6	0	0	0
Nilothauma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pagastiella	2	1	30	24	23	0	0	0	19	41	22	7	6	39	7	10
Parachironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paracladopelma	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Paralauterborniella nigrohalterale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phaenopsectra	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Polypedilum	3	4	54	57	77	0	1	1	5	0	0	0	0	2	0	0
Saetheria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stenochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	NNL	NNL	NNL	April Delivery	April Delivery	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNO	NNO	NNO
Sample:	NNInlet1	NNInlet2	NNInlet3	NNLinlet4	NNLinlet5	NNLDeep1	NNLDeep2	NNLDeep3	NNLSeep1	NNLSeep2	NNLSeep3	NNLSeep4	NNLSeep5	NNO1	NNO2	NNO3
Sample Collection Date:	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16
CC#:	CC171352	CC171353	CC171354	CC172224	CC172225	CC171355	CC171356	CC171357	CC171358	CC171359	CC171360	CC171361	CC171362	CC171363	CC171364	CC171365
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	6.25	6.25	6.25	6.25	6.25	100	100	100	100	100	25	100	100	25	25	25
Stictochironomus	0	0	0	0	0	34	83	43	0	0	0	10	0	5	2	0
Tribelos	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xenochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Pseudochironomini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudochironomus	0	1	2	1	3	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	0	0	12	7	6	0	0	0	0	0	0	8	0	0	0	0
Cladotanytarsus	0	0	14	6	18	0	0	0	8	6	3	0	0	0	0	0
Micropsectra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheotanytarsus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stempellinella	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0
Tanytarsus	24	8	20	14	20	0	0	0	41	29	10	60	102	14	7	7
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Protanypus	0	0	0	0	0	8	9	10	7	0	0	8	8	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potthastia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potthastia longimana group	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brillia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cricotopus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heterotrissocladius	0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0
Limnophyes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metriocnemus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladiinae RAI 004 (Like Helen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius complex	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Parakiefferiella	3	2	8	4	10	1	0	0	65	47	27	85	95	1	0	0
Psectrocladius	11	9	28	19	24	0	0	0	0	1	0	0	0	23	2	1
Pseudorthocladius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheocricotopus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemanniella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tvetenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zalutschia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ablabesmyia	10	4	11	0	0	0	0	0	0	3	1	0	0	12	3	4
Clinotanypus	0	1	0	0	0	0	0	0	0	6	1	0	0	2	1	2
Guttipelopia guttipennis	0	1	0	1	1	0	0	0	0	0	0	0	0	1	0	1
Labrundinia	0	0	0	2	1	0	0	0	0	0	0	0	0	1	2	1
Nilotanypus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	NNL	NNL	NNL	April Delivery	April Delivery	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNO	NNO	NNO
Sample:	NNInlet1	NNInlet2	NNInlet3	NNLinlet4	NNLinlet5	NNLDeep1	NNLDeep2	NNLDeep3	NNLSeep1	NNLSeep2	NNLSeep3	NNLSeep4	NNLSeep5	NNO1	NNO2	NNO3
Sample Collection Date:	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16
CC#:	CC171352	CC171353	CC171354	CC172224	CC172225	CC171355	CC171356	CC171357	CC171358	CC171359	CC171360	CC171361	CC171362	CC171363	CC171364	CC171365
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	6.25	6.25	6.25	6.25	6.25	100	100	100	100	100	25	100	100	25	25	25
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentaneura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	0	21	27	25	0	1	0	0	0	0	0	0	0	0	0
| Tribe: Procladiini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Procladius	28	23	25	34	29	0	0	0	10	65	31	1	3	25	4	7
| Tribe: Tanypodini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanypus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Dolichopodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Empididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemerodromia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Simuliidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Simulium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Tabanidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tabanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexatoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnophila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

| Order: Lepidoptera	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
| Order: Megaloptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Corydalidae	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
| Family: Sialidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sialis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

| Order: Odonata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Calopterygidae	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0
| Family: Coenagrionidae	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Coenagrion/Enallagma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Corduliidae	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
Cordulia shurtleffii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epitheca	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
| Family: Gomphidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiogomphus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Libellulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Libellula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	NNL	NNL	NNL	April Delivery	April Delivery	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNO	NNO	NNO
Sample:	NNInlet1	NNInlet2	NNInlet3	NNLinlet4	NNLinlet5	NNLDeep1	NNLDeep2	NNLDeep3	NNLSeep1	NNLSeep2	NNLSeep3	NNLSeep4	NNLSeep5	NNO1	NNO2	NNO3
Sample Collection Date:	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16
CC#:	CC171352	CC171353	CC171354	CC172224	CC172225	CC171355	CC171356	CC171357	CC171358	CC171359	CC171360	CC171361	CC171362	CC171363	CC171364	CC171365
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	6.25	6.25	6.25	6.25	6.25	100	100	100	100	100	25	100	100	25	25	25
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	2	0	0	0	0	3	0	0	0	1	2	0	0
| Family: Arrenuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arrenurus	0	0	0	0	0	0	0	0	16	0	1	8	25	1	0	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Feltriidae	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Halacaridae	0	0	1	0	0	0	0	0	0	0	4	0	0	5	2	0
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Albertathyas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atractides	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Hygrobates	0	0	0	0	0	0	0	0	1	0	1	2	10	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnesiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnesia	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
| Family: Limnocharidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnochares	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Mideidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Midea	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
| Family: Mideopsidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mideopsis	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
| Family: Oxidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxus	0	0	0	0	0	0	0	0	2	1	2	0	1	0	0	0
| Family: Pionidae	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Piona	0	0	0	0	0	0	0	0	1	0	0	10	2	0	0	0
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	0	0	0	0	0	0	0	0	5	1	2	2	1	0	0	0
Sperchonopsis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Torrenticola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Unionicolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neumania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unionicola	0	0	0	0	0	0	0	0	0	0	0	0	3	3	1	0
Suborder: Prostigmata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Athienemanniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	NNL	NNL	NNL	April Delivery	April Delivery	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNO	NNO	NNO
Sample:	NNInlet1	NNInlet2	NNInlet3	NNLinlet4	NNLinlet5	NNLDeep1	NNLDeep2	NNLDeep3	NNLSeep1	NNLSeep2	NNLSeep3	NNLSeep4	NNLSeep5	NNO1	NNO2	NNO3
Sample Collection Date:	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16
CC#:	CC171352	CC171353	CC171354	CC172224	CC172225	CC171355	CC171356	CC171357	CC171358	CC171359	CC171360	CC171361	CC171362	CC171363	CC171364	CC171365
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	6.25	6.25	6.25	6.25	6.25	100	100	100	100	100	25	100	100	25	25	25
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	2	2	3	1	1	0	0	0	0	0	0	0	0	3	1	0
| Family: Hydrozetidae	0	0	0	0	0	0	0	0	0	0	15	0	0	3	0	0
| Class: Malacostraca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Amphipoda	0	0	3	5	7	0	0	0	0	0	1	0	0	0	2	6
| Family: Hyalellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hyalella	3	2	5	0	0	0	0	0	0	0	0	0	0	6	2	2
| Order: Decapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Astacidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pacifastacus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Unionoida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Unionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anodonta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	3	7	3	0	0	61	103	45	21	26	5	30	25	1	2	1
Pisidium	0	0	0	2	6	0	18	3	0	6	0	14	0	0	0	0
Sphaerium	0	0	0	0	0	10	0	0	1	3	1	0	3	0	0	0
| Class: Gastropoda	3	0	1	1	6	0	0	0	3	5	1	2	10	0	1	0
| Order: Basommatophora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ancylidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lymnaeidae	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Fossaria	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lymnaea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Physidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Planorbidae	0	10	3	0	0	0	0	0	0	0	3	4	3	0	0	0
Gyraulus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Heterostropha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Valvatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Valvata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	NNL	NNL	NNL	April Delivery	April Delivery	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNO	NNO	NNO
Sample:	NNInlet1	NNInlet2	NNInlet3	NNLinlet4	NNLinlet5	NNLDeep1	NNLDeep2	NNLDeep3	NNLSeep1	NNLSeep2	NNLSeep3	NNLSeep4	NNLSeep5	NNO1	NNO2	NNO3
Sample Collection Date:	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16
CC#:	CC171352	CC171353	CC171354	CC172224	CC172225	CC171355	CC171356	CC171357	CC171358	CC171359	CC171360	CC171361	CC171362	CC171363	CC171364	CC171365
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	6.25	6.25	6.25	6.25	6.25	100	100	100	100	100	25	100	100	25	25	25
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Hirudinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Rhynchobdellida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossiphoniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Helobdella stagnalis	0	0	0	0	0	0	0	0	0	0	0	3	11	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lumbriculus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enchytraeus	0	0	0	10	7	0	0	0	1	0	0	0	0	0	4	0
Mesenchytraeus	4	8	8	0	0	0	0	0	0	5	1	0	0	2	0	0
| Family: Naididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aulodrilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aulodrilus pluriseta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chaetogaster	7	1	0	5	3	0	0	0	0	0	0	0	0	0	0	0
Limnodrilus	0	0	0	0	0	3	2	3	10	0	0	0	0	0	0	0
Nais	0	0	0	0	1	0	0	0	0	0	0	0	0	8	7	0
Pristina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telmatodrilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telmatodrilus vejdovskyi	0	0	0	0	0	0	0	0	4	3	3	9	21	0	0	0
Tubifex	0	0	1	0	0	1	0	2	5	0	0	2	6	1	0	5
| Subfamily: Tubificinae immatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tubificinae with ha	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tubificinae without	0	0	1	0	0	6	0	0	74	0	0	0	0	0	0	0
Phylum: Tardigrada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals:	**147**	**127**	**357**	**285**	**337**	**174**	**297**	**202**	**335**	**310**	**157**	**274**	**353**	**295**	**140**	**107**

Site:	NNL	NNL	NNL	April Delivery	April Delivery	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNL	NNO	NNO	NNO
Sample:	NNInlet1	NNInlet2	NNInlet3	NNLinlet4	NNLinlet5	NNLDeep1	NNLDeep2	NNLDeep3	NNLSeep1	NNLSeep2	NNLSeep3	NNLSeep4	NNLSeep5	NNO1	NNO2	NNO3
Sample Collection Date:	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	27-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16	22-Sep-16
CC#:	CC171352	CC171353	CC171354	CC172224	CC172225	CC171355	CC171356	CC171357	CC171358	CC171359	CC171360	CC171361	CC171362	CC171363	CC171364	CC171365
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	6.25	6.25	6.25	6.25	6.25	100	100	100	100	100	25	100	100	25	25	25

Taxa present but not included:

Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Homoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Aphididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	1	1	0	1	0	1	1	0	0	1	1	0	1	1	1	1
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Nemata	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Totals:	**4**	**3**	**3**	**4**	**3**	**4**	**3**	**3**	**2**	**5**	**4**	**3**	**4**	**4**	**4**	**4**

Table 6-2. Benthic Invertebrate Ta

Cordillera Consulting

Project: Quinsam Benthics 2016

Quinsam Coal Corp, Kathleen Russ
Taxonomist: Sue Salter
suesalter@cordilleraconsulting.ca
250-494-7553

Site:	April Delivery	April Delivery	LL	LL	LL	April Delivery	April Delivery	LL	LL	LL	LL	LL	LL	LL	LL	LL
Sample:	NNO4	NNO5	LLINlet1	LLINlet2	LLINlet3	LLinlet4	LLInlet5	LLDeep1	LLDeep2	LLDeep3	LLSeep1	LLSeep2	LLSeep3	LLSeep4	LLSeep5	LLSeep6
Sample Collection Date:	22-Sep-16	22-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16
CC#:	CC172226	CC172227	CC171366	CC171367	CC171368	CC172228	CC172229	CC171369	CC171370	CC171371	CC171372	CC171373	CC171374	CC171375	CC171376	CC171377
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	6.25	6.25	100	100	100	100	25	50	50	50	50
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Collembola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Entomobryidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sminthuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Baetidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acentrella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis tricaudatus group	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Callibaetis	0	0	2	4	4	0	0	0	0	0	0	0	0	0	0	0
Centroptilum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fallceon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Procloeon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Caenidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caenis	142	259	23	23	16	0	1	0	0	0	0	0	0	0	0	0
| Family: Ephemerellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Rhithrogena	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Leptophlebiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoleptophlebia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	April Delivery	April Delivery	LL	LL	LL	April Delivery	April Delivery	LL	LL	LL	LL	LL	LL	LL	LL	LL
Sample:	NNO4	NNO5	LLINlet1	LLINlet2	LLINlet3	LLinlet4	LLInlet5	LLDeep1	LLDeep2	LLDeep3	LLSeep1	LLSeep2	LLSeep3	LLSeep4	LLSeep5	LLSeep6
Sample Collection Date:	22-Sep-16	22-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16
CC#:	CC172226	CC172227	CC171366	CC171367	CC171368	CC172228	CC172229	CC171369	CC171370	CC171371	CC171372	CC171373	CC171374	CC171375	CC171376	CC171377
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	6.25	6.25	100	100	100	100	25	50	50	50	50
| Order: Plecoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Capniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haploperla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweltsa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Nemouridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemoura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zapada cinctipes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calineuria californica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Taeniopterygidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taenionema	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trichoptera	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydroptilidae	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0
Agraylea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyethira	7	4	0	2	1	0	0	0	0	0	0	0	0	0	0	0
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Leptoceridae	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0
Oecetis	8	15	13	6	0	2	5	0	0	0	0	0	0	0	0	0
Triaenodes	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnephilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Molannidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Philopotamidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dolophilodes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wormaldia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Phryganeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agrypnia	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Ptilostomis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Polycentropodidae	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Polycentropus	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	April Delivery	April Delivery	LL	LL	LL	April Delivery	April Delivery	LL	LL	LL	LL	LL	LL	LL	LL	LL
Sample:	NNO4	NNO5	LLINlet1	LLINlet2	LLINlet3	LLinlet4	LLInlet5	LLDeep1	LLDeep2	LLDeep3	LLSeep1	LLSeep2	LLSeep3	LLSeep4	LLSeep5	LLSeep6
Sample Collection Date:	22-Sep-16	22-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16
CC#:	CC172226	CC172227	CC171366	CC171367	CC171368	CC172228	CC172229	CC171369	CC171370	CC171371	CC171372	CC171373	CC171374	CC171375	CC171376	CC171377
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	6.25	6.25	100	100	100	100	25	50	50	50	50
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heterlimnius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Haliplidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haliplus	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Peltodytes	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	8	0	5	0	7	0	1	0	0	0	0	0	0	0	0	0
Atrichopogon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bezzia/ Palpomyia	6	15	0	0	4	2	0	0	0	0	0	0	0	0	0	0
Culicoides	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0
Dasyhelea	8	24	0	0	1	0	1	0	0	0	0	0	1	0	0	0
Mallochohelea	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Probezzia	0	14	7	6	5	0	0	0	0	1	0	0	0	0	0	0
| Family: Chaoboridae	0	0	0	0	0	0	0	16	6	0	6	10	4	9	4	2
Chaoborus	0	0	0	0	0	0	0	9	17	17	6	0	8	3	3	12
| Family: Chironomidae	0	0	0	0	1	0	0	1	2	0	0	0	1	1	0	0
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomus	0	0	78	8	0	0	0	54	11	34	9	9	20	15	39	31
Cladopelma	0	0	17	1	4	0	0	0	0	0	0	0	0	0	0	0
Cryptochironomus	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Cryptotendipes	9	17	0	0	0	14	25	0	0	0	0	0	0	0	0	0
Dicrotendipes	78	20	204	136	201	75	95	0	0	0	0	0	0	0	0	0
Endochironomus	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Glyptotendipes	0	0	1	0	13	0	0	0	0	0	0	0	0	0	0	0
Lauterborniella agrayloides	16	28	3	0	5	1	1	0	0	0	0	0	0	0	0	0
Microchironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Microtendipes pedellus group	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0
Nilothauma	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Pagastiella	24	45	0	8	2	1	2	0	0	0	0	0	0	0	0	0
Parachironomus	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
Paracladopelma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paralauterborniella nigrohalterale	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Phaenopsectra	0	1	0	0	0	0	0	0	1	2	1	1	5	1	3	0
Polypedilum	46	20	186	62	182	50	47	1	0	0	0	0	0	0	0	0
Saetheria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stenochironomus	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	April Delivery	April Delivery	LL	LL	LL	April Delivery	April Delivery	LL	LL	LL	LL	LL	LL	LL	LL	LL
Sample:	NNO4	NNO5	LLINlet1	LLINlet2	LLINlet3	LLinlet4	LLInlet5	LLDeep1	LLDeep2	LLDeep3	LLSeep1	LLSeep2	LLSeep3	LLSeep4	LLSeep5	LLSeep6
Sample Collection Date:	22-Sep-16	22-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16
CC#:	CC172226	CC172227	CC171366	CC171367	CC171368	CC172228	CC172229	CC171369	CC171370	CC171371	CC171372	CC171373	CC171374	CC171375	CC171376	CC171377
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	6.25	6.25	100	100	100	100	25	50	50	50	50
Stictochironomus	0	0	7	7	15	0	0	0	0	0	0	0	0	0	0	0
Tribelos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xenochironomus	12	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Pseudochironomini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudochironomus	25	10	0	0	0	1	2	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	10	11	0	0	0	6	25	0	0	0	0	0	0	0	0	0
Cladotanytarsus	21	25	0	0	3	3	5	0	0	0	0	0	0	0	0	0
Micropsectra	0	0	0	0	0	0	0	0	3	6	0	0	0	2	3	0
Rheotanytarsus	0	0	0	0	0	3	10	0	0	0	0	0	0	0	0	0
Stempellinella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanytarsus	18	26	113	72	121	36	59	2	0	0	0	0	2	0	4	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Protanypus	0	0	0	0	0	0	0	1	0	1	0	0	1	1	0	2
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potthastia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potthastia longimana group	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brillia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Cricotopus	0	0	16	0	2	2	6	0	0	0	0	0	0	0	0	0
Eukiefferiella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heterotrissocladius	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnophyes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metriocnemus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladiinae RAI 004 (Like Helen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius complex	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
Parakiefferiella	2	8	15	13	16	0	9	1	0	10	0	0	0	0	0	0
Psectrocladius	46	51	6	0	1	6	2	0	0	3	0	0	0	0	0	0
Pseudorthocladius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheocricotopus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemanniella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tvetenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zalutschia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ablabesmyia	7	6	7	6	3	1	0	1	0	1	0	0	1	2	1	0
Clinotanypus	0	1	7	8	8	0	4	0	0	0	0	0	0	0	0	0
Guttipelopia guttipennis	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Labrundinia	6	5	1	1	4	1	3	0	0	0	0	0	0	0	0	0
Nilotanypus	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

Site:	April Delivery	April Delivery	LL	LL	LL	April Delivery	April Delivery	LL	LL	LL	LL	LL	LL	LL	LL	LL
Sample:	NNO4	NNO5	LLINlet1	LLINlet2	LLINlet3	LLinlet4	LLInlet5	LLDeep1	LLDeep2	LLDeep3	LLSeep1	LLSeep2	LLSeep3	LLSeep4	LLSeep5	LLSeep6
Sample Collection Date:	22-Sep-16	22-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16
CC#:	CC172226	CC172227	CC171366	CC171367	CC171368	CC172228	CC172229	CC171369	CC171370	CC171371	CC171372	CC171373	CC171374	CC171375	CC171376	CC171377
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	6.25	6.25	100	100	100	100	25	50	50	50	50
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentaneura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	41	52	0	0	0	7	14	0	0	0	0	0	0	0	0	0
| Tribe: Procladiini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Procladius	71	55	28	41	31	20	16	0	0	0	0	0	0	0	0	0
| Tribe: Tanypodini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanypus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Dolichopodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Empididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemerodromia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Simuliidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Simulium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Tabanidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tabanus	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexatoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnophila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lepidoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Megaloptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Corydalidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sialidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sialis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Odonata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Calopterygidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Coenagrionidae	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Coenagrion/Enallagma	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Corduliidae	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0
Cordulia shurtleffii	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Epitheca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Gomphidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiogomphus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Libellulidae	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Libellula	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	April Delivery	April Delivery	LL	LL	LL	April Delivery	April Delivery	LL	LL	LL	LL	LL	LL	LL	LL	LL
Sample:	NNO4	NNO5	LLINlet1	LLINlet2	LLINlet3	LLinlet4	LLInlet5	LLDeep1	LLDeep2	LLDeep3	LLSeep1	LLSeep2	LLSeep3	LLSeep4	LLSeep5	LLSeep6
Sample Collection Date:	22-Sep-16	22-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16
CC#:	CC172226	CC172227	CC171366	CC171367	CC171368	CC172228	CC172229	CC171369	CC171370	CC171371	CC171372	CC171373	CC171374	CC171375	CC171376	CC171377
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	6.25	6.25	100	100	100	100	25	50	50	50	50
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	3	1	4	1	0	4	0	0	0	0	0	0	0	0	0	0
| Family: Arrenuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arrenurus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Halacaridae	7	3	14	3	10	3	4	0	0	0	0	0	0	0	0	0
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Albertathyas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atractides	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0
Hygrobates	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnesiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnesia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnocharidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnochares	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Mideidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Midea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Mideopsidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mideopsis	0	0	2	5	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Oxidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Piona	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	0	0	1	2	2	1	0	0	0	0	0	0	0	0	0	0
Sperchonopsis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Torrenticola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Unionicolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neumania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unionicola	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Suborder: Prostigmata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Athienemanniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	April Delivery	April Delivery	LL	LL	LL	April Delivery	April Delivery	LL	LL	LL	LL	LL	LL	LL	LL	LL
Sample:	NNO4	NNO5	LLINlet1	LLINlet2	LLINlet3	LLinlet4	LLInlet5	LLDeep1	LLDeep2	LLDeep3	LLSeep1	LLSeep2	LLSeep3	LLSeep4	LLSeep5	LLSeep6
Sample Collection Date:	22-Sep-16	22-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16
CC#:	CC172226	CC172227	CC171366	CC171367	CC171368	CC172228	CC172229	CC171369	CC171370	CC171371	CC171372	CC171373	CC171374	CC171375	CC171376	CC171377
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	6.25	6.25	100	100	100	100	25	50	50	50	50
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydrozetidae	0	0	0	0	0	0	0	5	0	0	0	11	0	0	98	0
| Class: Malacostraca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Amphipoda	10	46	11	2	12	3	0	0	0	0	0	0	0	0	0	0
| Family: Hyalellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hyalella	0	0	14	4	7	0	0	0	0	0	0	0	0	0	0	0
| Order: Decapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Astacidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pacifastacus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Unionoida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Unionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anodonta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	5	0	21	26	45	0	0	0	0	0	0	0	0	0	0	0
Pisidium	4	4	0	0	2	10	13	0	0	0	0	0	0	0	0	0
Sphaerium	0	0	4	4	6	0	0	0	0	0	0	0	0	0	0	0
| Class: Gastropoda	0	0	10	8	5	0	0	0	0	0	0	0	0	0	0	0
| Order: Basommatophora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ancylidae	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lymnaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fossaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lymnaea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Physidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Physella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Planorbidae	4	4	8	3	3	6	3	0	0	0	0	0	0	0	0	0
Gyraulus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Heterostropha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Valvatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Valvata	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0

Site:	April Delivery	April Delivery	LL	LL	LL	April Delivery	April Delivery	LL	LL	LL	LL	LL	LL	LL	LL	LL
Sample:	NNO4	NNO5	LLINlet1	LLINlet2	LLINlet3	LLinlet4	LLInlet5	LLDeep1	LLDeep2	LLDeep3	LLSeep1	LLSeep2	LLSeep3	LLSeep4	LLSeep5	LLSeep6
Sample Collection Date:	22-Sep-16	22-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16
CC#:	CC172226	CC172227	CC171366	CC171367	CC171368	CC172228	CC172229	CC171369	CC171370	CC171371	CC171372	CC171373	CC171374	CC171375	CC171376	CC171377
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	6.25	6.25	100	100	100	100	25	50	50	50	50
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Hirudinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Rhynchobdellida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossiphoniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Helobdella stagnalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lumbriculus	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enchytraeus	7	8	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Mesenchytraeus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Naididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aulodrilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aulodrilus pluriseta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chaetogaster	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnodrilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nais	15	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pristina	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telmatodrilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telmatodrilus vejdovskyi	0	0	0	2	2	0	0	10	0	8	4	1	6	14	5	13
Tubifex	0	0	0	0	4	0	0	0	3	1	0	0	0	0	0	0
| Subfamily: Tubificinae immatu	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
| Subfamily: Tubificinae with ha	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tubificinae without	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Phylum: Tardigrada	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Totals:	**697**	**810**	**844**	**475**	**774**	**266**	**361**	**102**	**43**	**84**	**26**	**33**	**49**	**48**	**160**	**60**

Site:	April Delivery	April Delivery	LL	LL	LL	April Delivery	April Delivery	LL	LL	LL	LL	LL	LL	LL	LL	LL
Sample:	NNO4	NNO5	LLINlet1	LLINlet2	LLINlet3	LLinlet4	LLInlet5	LLDeep1	LLDeep2	LLDeep3	LLSeep1	LLSeep2	LLSeep3	LLSeep4	LLSeep5	LLSeep6
Sample Collection Date:	22-Sep-16	22-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16
CC#:	CC172226	CC172227	CC171366	CC171367	CC171368	CC172228	CC172229	CC171369	CC171370	CC171371	CC171372	CC171373	CC171374	CC171375	CC171376	CC171377
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	6.25	6.25	100	100	100	100	25	50	50	50	50
Taxa present but not included:																
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Homoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Aphididae	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	1	1	1	1	1	0	1	0	0	0	0	0	1	0	0	1
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Nemata	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals:	**6**	**4**	**4**	**4**	**4**	**3**	**4**	**3**	**3**	**3**	**3**	**3**	**4**	**3**	**3**	**4**

Table 6-2. Benthic Invertebrate Ta

Cordillera Consulting

Project: Quinsam Benthics 2016

Quinsam Coal Corp, Kathleen Russ
Taxonomist: Sue Salter
suesalter@cordilleraconsulting.ca
250-494-7553

Site:	LL	LL	LL	April Delivery	April Delivery	LQL	LQL	LQL	April Delivery	April Delivery	LQL	LQL	LQL	LQL	LQL	LQL
Sample:	LLOut1	LLOut2	LLOut3	LLOut4	LLOut5	LQLInlet1	LQLInlet2	LQLInlet3	LQLInlet4	LQLInlet5	LQL1	LQL2	LQL3	LQL4	LQL5	LQLD1
Sample Collection Date:	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16
CC#:	CC171378	CC171379	CC171380	CC172230	CC172231	CC171381	CC171382	CC171383	CC172236	CC172237	CC171384	CC171385	CC171386	CC171387	CC171388	CC171389
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	25	25	25	12.5	12.5	100	100	50	100	100	100
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Collembola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Entomobryidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sminthuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Baetidae	0	0	6	6	13	0	0	0	0	1	0	0	0	0	0	0
Acentrella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis tricaudatus group	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Callibaetis	6	2	3	0	0	1	0	0	0	0	0	0	0	0	0	0
Centroptilum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fallceon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Procloeon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Caenidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caenis	5	26	74	26	17	2	1	0	0	0	0	0	0	0	0	0
| Family: Ephemerellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhithrogena	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Leptophlebiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoleptophlebia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	LL	LL	LL	April Delivery	April Delivery	LQL	LQL	LQL	April Delivery	April Delivery	LQL	LQL	LQL	LQL	LQL	LQL
Sample:	LLOut1	LLOut2	LLOut3	LLOut4	LLOut5	LQLInlet1	LQLInlet2	LQLInlet3	LQLInlet4	LQLInlet5	LQL1	LQL2	LQL3	LQL4	LQL5	LQLD1
Sample Collection Date:	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16
CC#:	CC171378	CC171379	CC171380	CC172230	CC172231	CC171381	CC171382	CC171383	CC172236	CC172237	CC171384	CC171385	CC171386	CC171387	CC171388	CC171389
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	25	25	25	12.5	12.5	100	100	50	100	100	100
| Order: Plecoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Capniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haploperla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweltsa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Nemouridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemoura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zapada cinctipes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calineuria californica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Taeniopterygidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taenionema	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trichoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydroptilidae	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Agraylea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Oxyethira	0	0	1	0	6	0	0	0	0	0	0	0	0	0	0	0
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Leptoceridae	0	0	4	0	0	8	0	1	0	0	0	0	0	0	0	1
Oecetis	0	0	0	2	3	0	1	0	1	2	0	0	0	0	0	0
Triaenodes	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnephilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Molannidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Philopotamidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dolophilodes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wormaldia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Phryganeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agrypnia	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Ptilostomis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Polycentropodidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Polycentropus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	LL	LL	LL	April Delivery	April Delivery	LQL	LQL	LQL	April Delivery	April Delivery	LQL	LQL	LQL	LQL	LQL	LQL
Sample:	LLOut1	LLOut2	LLOut3	LLOut4	LLOut5	LQLInlet1	LQLInlet2	LQLInlet3	LQLInlet4	LQLInlet5	LQL1	LQL2	LQL3	LQL4	LQL5	LQLD1
Sample Collection Date:	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16
CC#:	CC171378	CC171379	CC171380	CC172230	CC172231	CC171381	CC171382	CC171383	CC172236	CC172237	CC171384	CC171385	CC171386	CC171387	CC171388	CC171389
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	25	25	25	12.5	12.5	100	100	50	100	100	100
| Order: Coleoptera	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heterlimnius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Haliplidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haliplus	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Peltodytes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	5	4	0	0	6	6	0	0	12	0	0	0	0	0	0
Atrichopogon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bezzia/ Palpomyia	0	0	0	2	6	0	0	0	0	0	0	0	0	0	0	0
Culicoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dasyhelea	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Mallochohelea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Probezzia	2	2	4	8	7	1	3	0	0	3	0	0	0	0	0	0
| Family: Chaoboridae	0	1	0	0	0	0	0	0	0	0	9	21	2	9	5	34
Chaoborus	0	1	0	0	0	0	0	0	0	0	16	9	13	20	14	23
| Family: Chironomidae	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomus	0	0	0	0	0	1	0	1	51	28	98	93	46	88	113	50
Cladopelma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cryptochironomus	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	1
Cryptotendipes	70	26	22	6	35	47	7	0	3	0	0	0	0	0	0	0
Dicrotendipes	0	10	8	4	95	23	6	0	0	0	0	0	0	0	0	0
Endochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glyptotendipes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lauterborniella agrayloides	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0
Microchironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Microtendipes pedellus group	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nilothauma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pagastiella	0	2	23	0	0	8	3	0	7	20	0	0	0	0	0	0
Parachironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paracladopelma	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Paralauterborniella nigrohalterale	42	29	34	13	35	6	0	0	0	0	2	0	0	0	0	0
Phaenopsectra	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Polypedilum	0	1	0	6	28	50	8	2	12	78	0	1	0	0	0	0
Saetheria	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0
Stenochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	LL	LL	LL	April Delivery	April Delivery	LQL	LQL	LQL	April Delivery	April Delivery	LQL	LQL	LQL	LQL	LQL	LQL
Sample:	LLOut1	LLOut2	LLOut3	LLOut4	LLOut5	LQLInlet1	LQLInlet2	LQLInlet3	LQLInlet4	LQLInlet5	LQL1	LQL2	LQL3	LQL4	LQL5	LQLD1
Sample Collection Date:	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16
CC#:	CC171378	CC171379	CC171380	CC172230	CC172231	CC171381	CC171382	CC171383	CC172236	CC172237	CC171384	CC171385	CC171386	CC171387	CC171388	CC171389
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	25	25	25	12.5	12.5	100	100	50	100	100	100
Stictochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tribelos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xenochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Pseudochironomini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	0	0	10	5	12	5	0	0	5	12	0	0	0	0	0	0
Cladotanytarsus	20	18	75	0	0	32	2	0	0	0	0	0	0	0	0	0
Micropsectra	7	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0
Rheotanytarsus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stempellinella	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Tanytarsus	0	17	15	60	165	0	7	0	16	26	1	0	0	0	0	1
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Protanypus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potthastia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potthastia longimana group	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brillia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Cricotopus	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heterotrissocladius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnophyes	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Metriocnemus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladiinae RAI 004 (Like Helen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius complex	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Parakiefferiella	24	24	72	50	15	5	0	0	0	31	0	0	0	0	0	0
Psectrocladius	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0
Pseudorthocladius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheocricotopus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemanniella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tvetenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zalutschia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ablabesmyia	6	3	12	1	2	1	1	0	0	0	0	0	0	0	0	0
Clinotanypus	0	3	2	3	7	0	0	0	0	0	0	0	0	0	0	0
Guttipelopia guttipennis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Labrundinia	0	0	3	3	3	1	2	0	0	0	0	0	0	0	0	0
Nilotanypus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	LL	LL	LL	April Delivery	April Delivery	LQL	LQL	LQL	April Delivery	April Delivery	LQL	LQL	LQL	LQL	LQL	LQL
Sample:	LLOut1	LLOut2	LLOut3	LLOut4	LLOut5	LQLInlet1	LQLInlet2	LQLInlet3	LQLInlet4	LQLInlet5	LQL1	LQL2	LQL3	LQL4	LQL5	LQLD1
Sample Collection Date:	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16
CC#:	CC171378	CC171379	CC171380	CC172230	CC172231	CC171381	CC171382	CC171383	CC172236	CC172237	CC171384	CC171385	CC171386	CC171387	CC171388	CC171389
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	25	25	25	12.5	12.5	100	100	50	100	100	100
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentaneura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	0	0	6	17	0	0	0	1	4	0	0	0	0	0	1
| Tribe: Procladiini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Procladius	6	2	9	6	26	39	3	2	12	21	0	0	0	0	1	0
| Tribe: Tanypodini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanypus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Dolichopodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Empididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemerodromia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Simuliidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Simulium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Tabanidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tabanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexatoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnophila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lepidoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Megaloptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Corydalidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sialidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sialis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Odonata	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Calopterygidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Coenagrionidae	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0
Coenagrion/Enallagma	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
| Family: Corduliidae	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Cordulia shurtleffii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epitheca	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
| Family: Gomphidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiogomphus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Libellulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Libellula	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0

Site:	LL	LL	LL	April Delivery	April Delivery	LQL	LQL	LQL	April Delivery	April Delivery	LQL	LQL	LQL	LQL	LQL	LQL
Sample:	LLOut1	LLOut2	LLOut3	LLOut4	LLOut5	LQLInlet1	LQLInlet2	LQLInlet3	LQLInlet4	LQLInlet5	LQL1	LQL2	LQL3	LQL4	LQL5	LQLD1
Sample Collection Date:	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16
CC#:	CC171378	CC171379	CC171380	CC172230	CC172231	CC171381	CC171382	CC171383	CC172236	CC172237	CC171384	CC171385	CC171386	CC171387	CC171388	CC171389
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	25	25	25	12.5	12.5	100	100	50	100	100	100
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	10	7	3	0	0	0	2	0	0	0	0	0	0
| Family: Arrenuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arrenurus	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0
| Family: Halacaridae	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Albertathyas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atractides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hygrobates	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
| Family: Limnesiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnesia	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0	0
| Family: Limnocharidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnochares	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
| Family: Mideidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Midea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Mideopsidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mideopsis	1	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0
| Family: Oxidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxus	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0
| Family: Pionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Piona	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Sperchonopsis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Torrenticola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Unionicolidae	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Neumania	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Unionicola	0	0	0	0	5	0	1	0	0	1	0	0	0	0	0	0
Suborder: Prostigmata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Athienemanniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	LL	LL	LL	April Delivery	April Delivery	LQL	LQL	LQL	April Delivery	April Delivery	LQL	LQL	LQL	LQL	LQL	LQL
Sample:	LLOut1	LLOut2	LLOut3	LLOut4	LLOut5	LQLInlet1	LQLInlet2	LQLInlet3	LQLInlet4	LQLInlet5	LQL1	LQL2	LQL3	LQL4	LQL5	LQLD1
Sample Collection Date:	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16
CC#:	CC171378	CC171379	CC171380	CC172230	CC172231	CC171381	CC171382	CC171383	CC172236	CC172237	CC171384	CC171385	CC171386	CC171387	CC171388	CC171389
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	25	25	25	12.5	12.5	100	100	50	100	100	100
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydrozetidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Malacostraca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Amphipoda	0	0	0	1	7	2	0	0	1	1	0	0	0	0	0	0
| Family: Hyalellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hyalella	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
| Order: Decapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Astacidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pacifastacus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Unionoida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Unionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anodonta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	41	0	56	27	45	10	20	5	0	4	0	1	0	1	0	0
Pisidium	14	0	5	50	29	3	2	0	6	8	0	0	0	0	0	0
Sphaerium	0	0	0	0	0	5	0	0	0	0	1	0	0	0	1	0
| Class: Gastropoda	0	0	0	0	0	3	3	3	0	0	0	0	0	0	0	0
| Order: Basommatophora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ancylidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ferrissia	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lymnaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fossaria	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Lymnaea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Physidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Planorbidae	0	0	0	10	0	2	0	1	0	0	0	0	0	0	0	0
Gyraulus	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Heterostropha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Valvatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Valvata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	LL	LL	LL	April Delivery	April Delivery	LQL	LQL	LQL	April Delivery	April Delivery	LQL	LQL	LQL	LQL	LQL	LQL
Sample:	LLOut1	LLOut2	LLOut3	LLOut4	LLOut5	LQLInlet1	LQLInlet2	LQLInlet3	LQLInlet4	LQLInlet5	LQL1	LQL2	LQL3	LQL4	LQL5	LQLD1
Sample Collection Date:	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16
CC#:	CC171378	CC171379	CC171380	CC172230	CC172231	CC171381	CC171382	CC171383	CC172236	CC172237	CC171384	CC171385	CC171386	CC171387	CC171388	CC171389
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	25	25	25	12.5	12.5	100	100	50	100	100	100
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Hirudinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Rhynchobdellida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossiphoniidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Helobdella stagnalis	0	0	0	0	0	0	0	2	1	4	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lumbriculus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enchytraeus	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
Mesenchytraeus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Naididae	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0
Aulodrilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aulodrilus pluriseta	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Chaetogaster	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnodrilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nais	1	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0
Pristina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telmatodrilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telmatodrilus vejdovskyi	0	0	0	0	0	0	0	8	0	0	30	31	7	21	35	2
Tubifex	0	0	0	0	0	4	0	0	0	0	16	7	0	11	22	4
| Subfamily: Tubificinae immatu	0	0	0	0	0	0	0	0	0	0	3	0	0	0	8	0
| Subfamily: Tubificinae with ha	0	0	0	9	2	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tubificinae without	3	5	0	0	8	34	11	0	8	2	0	0	0	0	0	0
Phylum: Tardigrada	3	8	17	3	4	0	0	0	0	0	0	0	0	0	0	0
Totals:	**253**	**243**	**466**	**354**	**639**	**347**	**98**	**29**	**127**	**265**	**177**	**163**	**69**	**152**	**199**	**119**

Site:	LL	LL	LL	April Delivery	April Delivery	LQL	LQL	LQL	April Delivery	April Delivery	LQL	LQL	LQL	LQL	LQL	LQL
Sample:	LLOut1	LLOut2	LLOut3	LLOut4	LLOut5	LQLInlet1	LQLInlet2	LQLInlet3	LQLInlet4	LQLInlet5	LQL1	LQL2	LQL3	LQL4	LQL5	LQLD1
Sample Collection Date:	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	28-Sep-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16
CC#:	CC171378	CC171379	CC171380	CC172230	CC172231	CC171381	CC171382	CC171383	CC172236	CC172237	CC171384	CC171385	CC171386	CC171387	CC171388	CC171389
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	25	25	25	25	25	25	25	25	12.5	12.5	100	100	50	100	100	100

Taxa present but not included:

Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Homoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Aphididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	1	1	1	1	1	1	0	0	1	1	0	0	0	1	1	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Nemata	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Totals:	**4**	**4**	**4**	**4**	**4**	**5**	**3**	**3**	**4**	**4**	**3**	**3**	**0**	**4**	**4**	**0**

Table 6-2. Benthic Invertebrate Ta

Cordillera Consulting

Project: Quinsam Benthics 2016

Quinsam Coal Corp, Kathleen Russ
Taxonomist: Sue Salter
suesalter@cordilleraconsulting.ca
250-494-7553

Site:	LQL	LQL	LQL	LQL	LQL	April Delivery	April Delivery	MQL	MQL	MQL	April Delivery	April Delivery	MQL	MQL	MQL	MQL
Sample:	LQLD2	LQLD3	LQLO1	LQLO2	LQLO3	LQLO4	LQL05	MQInlet1	MQInlet2	MQInlet3	MQLInlet4	MQLInlet5	MQLSeep1	MQLSeep2	MQLSeep3	MQLSeep4
Sample Collection Date:	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16
CC#:	CC171390	CC171391	CC171392	CC171393	CC171394	CC172238	CC172239	CC171395	CC171396	CC171397	CC172232	CC172233	CC171398	CC171399	CC171400	CC171401
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	100	25	25	25	25	25	6.25	6.25	6.25	6.25	6.25	12.5	25	12.5	25
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Collembola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Entomobryidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sminthuridae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Baetidae	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Acentrella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis tricaudatus group	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Callibaetis	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	2
Centroptilum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fallceon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Procloeon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Caenidae	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0	53
Caenis	0	0	0	0	2	6	1	39	26	25	34	38	32	17	105	0
| Family: Ephemerellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhithrogena	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Leptophlebiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoleptophlebia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	LQL	LQL	LQL	LQL	LQL	April Delivery	April Delivery	MQL	MQL	MQL	April Delivery	April Delivery	MQL	MQL	MQL	MQL
Sample:	LQLD2	LQLD3	LQLO1	LQLO2	LQLO3	LQLO4	LQL05	MQInlet1	MQInlet2	MQInlet3	MQLInlet4	MQLInlet5	MQLSeep1	MQLSeep2	MQLSeep3	MQLSeep4
Sample Collection Date:	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16
CC#:	CC171390	CC171391	CC171392	CC171393	CC171394	CC172238	CC172239	CC171395	CC171396	CC171397	CC172232	CC172233	CC171398	CC171399	CC171400	CC171401
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	100	25	25	25	25	25	6.25	6.25	6.25	6.25	6.25	12.5	25	12.5	25
| Order: Plecoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Capniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haploperla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweltsa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Nemouridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemoura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zapada cinctipes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calineuria californica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Taeniopterygidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taenionema	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trichoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydroptilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agraylea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Oxyethira	0	0	2	4	0	3	5	11	0	15	1	3	0	0	0	0
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Leptoceridae	0	0	3	0	1	0	0	2	0	9	0	0	0	0	4	8
Oecetis	0	0	3	2	2	1	1	0	0	2	0	4	2	1	0	0
Triaenodes	0	0	0	0	0	1	1	0	0	0	1	8	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Limnephilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Molannidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Philopotamidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dolophilodes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wormaldia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Phryganeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agrypnia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ptilostomis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Polycentropodidae	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Polycentropus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	LQL	LQL	LQL	LQL	LQL	April Delivery	April Delivery	MQL	MQL	MQL	April Delivery	April Delivery	MQL	MQL	MQL	MQL
Sample:	LQLD2	LQLD3	LQLO1	LQLO2	LQLO3	LQLO4	LQL05	MQInlet1	MQInlet2	MQInlet3	MQLInlet4	MQLInlet5	MQLSeep1	MQLSeep2	MQLSeep3	MQLSeep4
Sample Collection Date:	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16
CC#:	CC171390	CC171391	CC171392	CC171393	CC171394	CC172238	CC172239	CC171395	CC171396	CC171397	CC172232	CC172233	CC171398	CC171399	CC171400	CC171401
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	100	25	25	25	25	25	6.25	6.25	6.25	6.25	6.25	12.5	25	12.5	25
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Heterlimnius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Haliplidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haliplus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peltodytes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0
Atrichopogon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bezzia/ Palpomyia	0	0	0	0	0	2	0	4	0	0	3	1	0	0	0	0
Culicoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dasyhelea	0	0	0	0	0	0	0	1	0	0	0	1	1	0	1	1
Mallochohelea	0	0	0	0	0	0	0	1	0	2	0	0	0	0	1	0
Probezzia	0	0	0	1	0	2	2	0	0	0	0	1	0	0	0	0
| Family: Chaoboridae	60	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chaoborus	27	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Chironomidae	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomus	47	72	1	0	0	48	39	0	0	0	0	0	3	0	0	0
Cladopelma	0	0	0	0	0	0	0	4	0	5	0	0	0	0	0	0
Cryptochironomus	0	0	2	5	4	4	0	0	0	0	0	0	1	1	1	0
Cryptotendipes	0	0	22	7	0	0	0	5	2	0	0	0	0	0	0	3
Dicrotendipes	0	0	0	0	0	10	8	33	12	28	0	24	0	0	0	0
Endochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glyptotendipes	0	0	38	25	21	0	0	0	0	0	0	0	0	0	0	0
Lauterborniella agrayloides	0	0	6	1	0	0	0	0	0	0	0	2	0	0	0	0
Microchironomus	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes	0	0	0	0	0	14	23	2	2	1	0	0	0	0	0	0
Microtendipes pedellus group	0	0	1	7	2	0	0	0	0	0	0	0	0	0	0	0
Nilothauma	0	0	0	1	0	1	1	1	0	0	0	0	0	0	1	0
Pagastiella	0	0	31	39	20	45	66	109	66	97	157	114	8	1	12	24
Parachironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paracladopelma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paralauterborniella nigrohalterale	0	0	0	2	2	0	0	0	0	2	0	0	0	0	0	0
Phaenopsectra	0	6	0	0	0	0	0	1	3	2	0	0	1	0	7	0
Polypedilum	0	1	16	12	5	20	22	44	24	31	129	102	0	3	10	12
Saetheria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stenochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	LQL	LQL	LQL	LQL	LQL	April Delivery	April Delivery	MQL	MQL	MQL	April Delivery	April Delivery	MQL	MQL	MQL	MQL
Sample:	LQLD2	LQLD3	LQLO1	LQLO2	LQLO3	LQLO4	LQL05	MQInlet1	MQInlet2	MQInlet3	MQLInlet4	MQLInlet5	MQLSeep1	MQLSeep2	MQLSeep3	MQLSeep4
Sample Collection Date:	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16
CC#:	CC171390	CC171391	CC171392	CC171393	CC171394	CC172238	CC172239	CC171395	CC171396	CC171397	CC172232	CC172233	CC171398	CC171399	CC171400	CC171401
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	100	25	25	25	25	25	6.25	6.25	6.25	6.25	6.25	12.5	25	12.5	25
Stictochironomus	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Tribelos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xenochironomus	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0
| Tribe: Pseudochironomini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudochironomus	0	0	0	0	0	0	0	1	0	1	0	0	0	2	10	1
| Tribe: Tanytarsini	0	0	9	0	0	8	47	0	4	12	13	14	0	0	0	0
Cladotanytarsus	0	0	35	14	15	0	0	44	6	10	0	15	0	0	0	0
Micropsectra	0	0	30	9	0	0	0	0	0	0	0	0	0	0	0	0
Rheotanytarsus	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Stempellinella	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
Tanytarsus	0	1	0	0	0	15	28	68	10	20	35	67	1	1	6	5
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Protanypus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potthastia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potthastia longimana group	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0
| Subfamily: Orthocladiinae	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Brillia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Cricotopus	0	0	6	0	1	0	5	0	0	0	0	0	0	0	0	0
Eukiefferiella	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Heterotrissocladius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnophyes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metriocnemus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladiinae RAI 004 (Like Helen	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius complex	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
Parakiefferiella	0	0	6	7	4	42	19	13	1	0	0	0	0	1	0	0
Psectrocladius	0	0	4	0	0	0	0	1	0	0	5	0	0	0	3	1
Pseudorthocladius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheocricotopus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Thienemanniella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tvetenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Zalutschia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ablabesmyia	0	0	6	4	0	0	0	0	0	8	0	0	0	0	0	8
Clinotanypus	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0
Guttipelopia guttipennis	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0
Labrundinia	0	0	1	0	0	2	0	1	0	0	2	2	0	0	0	0
Nilotanypus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

Site:	LQL	LQL	LQL	LQL	LQL	April Delivery	April Delivery	MQL	MQL	MQL	April Delivery	April Delivery	MQL	MQL	MQL	MQL
Sample:	LQLD2	LQLD3	LQLO1	LQLO2	LQLO3	LQLO4	LQL05	MQInlet1	MQInlet2	MQInlet3	MQLInlet4	MQLInlet5	MQLSeep1	MQLSeep2	MQLSeep3	MQLSeep4
Sample Collection Date:	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16
CC#:	CC171390	CC171391	CC171392	CC171393	CC171394	CC172238	CC172239	CC171395	CC171396	CC171397	CC172232	CC172233	CC171398	CC171399	CC171400	CC171401
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	100	25	25	25	25	25	6.25	6.25	6.25	6.25	6.25	12.5	25	12.5	25
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentaneura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	1	0	7	3	1	10	18	15	0	0	17	25	0	0	1	0
| Tribe: Procladiini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Procladius	1	0	29	22	16	18	64	36	11	17	29	45	5	1	8	26
| Tribe: Tanypodini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanypus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Dolichopodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Empididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemerodromia	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Simuliidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Simulium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Tabanidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tabanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexatoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnophila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lepidoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Megaloptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Corydalidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sialidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sialis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Odonata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
| Family: Calopterygidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Coenagrionidae	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0
Coenagrion/Enallagma	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
| Family: Corduliidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cordulia shurtleffii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epitheca	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Gomphidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiogomphus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Libellulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Libellula	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

Site:	LQL	LQL	LQL	LQL	LQL	April Delivery	April Delivery	MQL	MQL	MQL	April Delivery	April Delivery	MQL	MQL	MQL	MQL
Sample:	LQLD2	LQLD3	LQLO1	LQLO2	LQLO3	LQLO4	LQL05	MQInlet1	MQInlet2	MQInlet3	MQLInlet4	MQLInlet5	MQLSeep1	MQLSeep2	MQLSeep3	MQLSeep4
Sample Collection Date:	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16
CC#:	CC171390	CC171391	CC171392	CC171393	CC171394	CC172238	CC172239	CC171395	CC171396	CC171397	CC172232	CC172233	CC171398	CC171399	CC171400	CC171401
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	100	25	25	25	25	25	6.25	6.25	6.25	6.25	6.25	12.5	25	12.5	25
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
| Family: Arrenuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arrenurus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Halacaridae	0	0	0	8	1	0	4	2	0	1	0	0	0	0	2	1
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Albertathyas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atractides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hygrobates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnesiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnesia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnocharidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnochares	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Mideidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Midea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Mideopsidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mideopsis	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
| Family: Oxidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pionidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Piona	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchonopsis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Torrenticola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Unionicolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neumania	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unionicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Suborder: Prostigmata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Athienemanniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	LQL	LQL	LQL	LQL	LQL	April Delivery	April Delivery	MQL	MQL	MQL	April Delivery	April Delivery	MQL	MQL	MQL	MQL
Sample:	LQLD2	LQLD3	LQLO1	LQLO2	LQLO3	LQLO4	LQL05	MQInlet1	MQInlet2	MQInlet3	MQLInlet4	MQLInlet5	MQLSeep1	MQLSeep2	MQLSeep3	MQLSeep4
Sample Collection Date:	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16
CC#:	CC171390	CC171391	CC171392	CC171393	CC171394	CC172238	CC172239	CC171395	CC171396	CC171397	CC172232	CC172233	CC171398	CC171399	CC171400	CC171401
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	100	25	25	25	25	25	6.25	6.25	6.25	6.25	6.25	12.5	25	12.5	25
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	4	0	2	0	0	0	0	0	0	0	0	0
| Family: Hydrozetidae	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Malacostraca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Amphipoda	0	0	0	3	0	6	8	5	6	3	10	10	7	0	26	40
| Family: Hyalellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hyalella	0	0	7	4	3	0	0	5	3	3	0	0	2	1	17	32
| Order: Decapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Astacidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pacifastacus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Unionoida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Unionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anodonta	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	8	5	1	1	0	0	0	0	0	0	0	0	9	3	10	15
Pisidium	0	3	0	0	0	1	0	0	0	0	1	0	0	0	2	0
Sphaerium	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	3
| Class: Gastropoda	0	0	5	1	1	0	1	0	0	0	1	0	0	0	3	0
| Order: Basommatophora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ancylidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lymnaeidae	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
Fossaria	0	0	4	0	0	0	0	1	0	2	0	0	0	0	0	0
Lymnaea	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
| Family: Physidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
| Family: Planorbidae	0	0	0	1	0	0	0	4	0	2	0	1	0	0	0	2
Gyraulus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Heterostropha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Valvatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Valvata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	LQL	LQL	LQL	LQL	LQL	April Delivery	April Delivery	MQL	MQL	MQL	April Delivery	April Delivery	MQL	MQL	MQL	MQL
Sample:	LQLD2	LQLD3	LQLO1	LQLO2	LQLO3	LQLO4	LQL05	MQInlet1	MQInlet2	MQInlet3	MQLInlet4	MQLInlet5	MQLSeep1	MQLSeep2	MQLSeep3	MQLSeep4
Sample Collection Date:	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16
CC#:	CC171390	CC171391	CC171392	CC171393	CC171394	CC172238	CC172239	CC171395	CC171396	CC171397	CC172232	CC172233	CC171398	CC171399	CC171400	CC171401
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	100	25	25	25	25	25	6.25	6.25	6.25	6.25	6.25	12.5	25	12.5	25
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Hirudinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Rhynchobdellida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossiphoniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Helobdella stagnalis	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lumbriculus	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enchytraeus	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Mesenchytraeus	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
| Family: Naididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aulodrilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aulodrilus pluriseta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chaetogaster	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnodrilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nais	0	0	6	0	0	0	0	1	0	0	1	0	0	0	0	0
Pristina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telmatodrilus	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telmatodrilus vejdovskyi	0	6	0	4	4	0	0	1	0	0	0	0	0	0	0	0
Tubifex	4	12	0	2	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tubificinae immatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tubificinae with ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tubificinae without	0	0	0	0	0	6	3	0	1	0	1	2	0	0	0	0
Phylum: Tardigrada	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0
Totals:	**157**	**156**	**301**	**200**	**112**	**270**	**372**	**473**	**182**	**303**	**443**	**487**	**73**	**32**	**235**	**241**

Site:	LQL	LQL	LQL	LQL	LQL	April Delivery	April Delivery	MQL	MQL	MQL	April Delivery	April Delivery	MQL	MQL	MQL	MQL
Sample:	LQLD2	LQLD3	LQLO1	LQLO2	LQLO3	LQLO4	LQL05	MQInlet1	MQInlet2	MQInlet3	MQLInlet4	MQLInlet5	MQLSeep1	MQLSeep2	MQLSeep3	MQLSeep4
Sample Collection Date:	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	03-Oct-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16
CC#:	CC171390	CC171391	CC171392	CC171393	CC171394	CC172238	CC172239	CC171395	CC171396	CC171397	CC172232	CC172233	CC171398	CC171399	CC171400	CC171401
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	100	25	25	25	25	25	6.25	6.25	6.25	6.25	6.25	12.5	25	12.5	25
Taxa present but not included:																
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Homoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Aphididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	1	0	1	0	1	1	1	1	1	1	1	1	0	1	1	1
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Nemata	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Totals:	**4**	**3**	**1**	**3**	**4**	**5**	**4**	**3**	**4**	**4**	**4**	**4**	**3**	**2**	**4**	**3**

Table 6-2. Benthic Invertebrate Ta

Cordillera Consulting

Project: Quinsam Benthics 2016

Quinsam Coal Corp, Kathleen Russ
Taxonomist: Sue Salter
suesalter@cordilleraconsulting.ca
250-494-7553

Site:	MQL	MQL	MQL	MQL	MQL	MQL	MQL	April Delivery	April Delivery	GNL	GNL	GNL	GNL	GNL	CABIN	CABIN
Sample:	MQLSeep5	MQLDeep1	MQLDeep2	MQLDeep3	MQLOut1	MQLOut2	MQLOut3	MQLOut4	MQLOut5	GNL1	GNL2	GNL3	GNL4	GNL5	QWA-01	QRD-02
Sample Collection Date:	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	14-Sep-16	15-Sep-16
CC#:	CC171402	CC171403	CC171404	CC171405	CC171406	CC171407	CC171408	CC172234	CC172235	CC171409	CC171410	CC171411	CC171412	CC171413	CC171414	CC171415
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	400	400
SubSample %:	25	100	100	100	25	8	12.5	12.5	12.5	100	100	100	100	100	20	50
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Collembola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Entomobryidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sminthuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
| Family: Baetidae	0	0	0	0	0	0	0	1	0	0	0	0	0	0	19	3
Acentrella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Baetis	0	0	0	0	0	0	0	0	0	2	0	0	0	0	87	81
Baetis tricaudatus group	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	12
Callibaetis	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0
Centroptilum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fallceon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Procloeon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Caenidae	0	0	0	0	7	0	4	0	0	0	0	0	0	0	0	0
Caenis	25	0	1	0	101	47	80	43	39	0	0	0	0	0	0	0
| Family: Ephemerellidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	11
| Family: Heptageniidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	13	90
Rhithrogena	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
| Family: Leptophlebiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	39
Neoleptophlebia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3

Site:	MQL	MQL	MQL	MQL	MQL	MQL	MQL	April Delivery	April Delivery	GNL	GNL	GNL	GNL	GNL	CABIN	CABIN
Sample:	MQLSeep5	MQLDeep1	MQLDeep2	MQLDeep3	MQLOut1	MQLOut2	MQLOut3	MQLOut4	MQLOut5	GNL1	GNL2	GNL3	GNL4	GNL5	QWA-01	QRD-02
Sample Collection Date:	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	14-Sep-16	15-Sep-16
CC#:	CC171402	CC171403	CC171404	CC171405	CC171406	CC171407	CC171408	CC172234	CC172235	CC171409	CC171410	CC171411	CC171412	CC171413	CC171414	CC171415
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	400	400
SubSample %:	25	100	100	100	25	8	12.5	12.5	12.5	100	100	100	100	100	20	50
| Order: Plecoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Capniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Haploperla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Sweltsa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
| Family: Nemouridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Nemoura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Zapada cinctipes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0
| Family: Perlidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calineuria californica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
| Family: Taeniopterygidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taenionema	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
| Order: Trichoptera	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
| Family: Brachycentridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
| Family: Hydropsychidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Hydropsyche	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	2
| Family: Hydroptilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agraylea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyethira	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
| Family: Leptoceridae	1	0	0	0	5	2	0	0	0	0	0	0	0	0	0	0
Oecetis	0	0	0	0	3	0	0	4	0	0	0	0	0	0	0	0
Triaenodes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Limnephilus	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0
| Family: Molannidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Philopotamidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dolophilodes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Wormaldia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
| Family: Phryganeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agrypnia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ptilostomis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Polycentropodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polycentropus	0	0	0	0	0	3	0	1	1	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

Site:	MQL	MQL	MQL	MQL	MQL	MQL	MQL	April Delivery	April Delivery	GNL	GNL	GNL	GNL	GNL	CABIN	CABIN
Sample:	MQLSeep5	MQLDeep1	MQLDeep2	MQLDeep3	MQLOut1	MQLOut2	MQLOut3	MQLOut4	MQLOut5	GNL1	GNL2	GNL3	GNL4	GNL5	QWA-01	QRD-02
Sample Collection Date:	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	14-Sep-16	15-Sep-16
CC#:	CC171402	CC171403	CC171404	CC171405	CC171406	CC171407	CC171408	CC172234	CC172235	CC171409	CC171410	CC171411	CC171412	CC171413	CC171414	CC171415
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	400	400
SubSample %:	25	100	100	100	25	8	12.5	12.5	12.5	100	100	100	100	100	20	50
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	11
Heterlimnius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23
| Family: Haliplidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haliplus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peltodytes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
| Family: Ceratopogonidae	0	0	0	0	13	3	4	3	0	0	0	2	0	0	0	0
Atrichopogon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bezzia/ Palpomyia	0	0	0	0	6	4	0	1	1	0	0	0	0	0	0	0
Culicoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dasyhelea	0	0	1	0	33	11	19	6	3	0	0	0	0	0	0	0
Mallochohelea	0	1	0	0	0	5	0	0	0	0	0	0	0	0	0	0
Probezzia	0	0	0	0	14	4	19	10	4	0	0	0	0	0	0	3
| Family: Chaoboridae	0	36	13	9	0	0	0	0	0	7	7	5	7	4	0	0
Chaoborus	0	16	31	47	0	0	0	0	0	2	4	4	5	6	0	0
| Family: Chironomidae	1	0	0	1	0	0	1	0	0	1	6	2	1	2	4	2
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomus	2	0	0	0	0	0	0	0	0	6	6	10	4	3	0	0
Cladopelma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cryptochironomus	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0
Cryptotendipes	0	0	0	0	0	8	0	0	0	0	0	2	0	0	0	0
Dicrotendipes	0	0	0	0	0	13	5	9	11	0	0	0	0	0	0	0
Endochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glyptotendipes	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0
Lauterborniella agrayloides	0	0	0	0	5	1	0	0	0	0	0	0	0	0	0	0
Microchironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes pedellus group	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nilothauma	0	2	0	0	1	0	2	1	0	0	0	0	0	0	0	0
Pagastiella	30	9	1	0	144	95	99	103	71	0	0	0	0	0	0	0
Parachironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paracladopelma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paralauterborniella nigrohalterale	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Phaenopsectra	0	2	0	1	0	0	0	0	0	0	0	1	0	0	0	0
Polypedilum	11	1	0	0	85	15	12	77	22	0	0	0	0	1	3	0
Saetheria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stenochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	MQL	MQL	MQL	MQL	MQL	MQL	MQL	April Delivery	April Delivery	GNL	GNL	GNL	GNL	GNL	CABIN	CABIN
Sample:	MQLSeep5	MQLDeep1	MQLDeep2	MQLDeep3	MQLOut1	MQLOut2	MQLOut3	MQLOut4	MQLOut5	GNL1	GNL2	GNL3	GNL4	GNL5	QWA-01	QRD-02
Sample Collection Date:	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	14-Sep-16	15-Sep-16
CC#:	CC171402	CC171403	CC171404	CC171405	CC171406	CC171407	CC171408	CC172234	CC172235	CC171409	CC171410	CC171411	CC171412	CC171413	CC171414	CC171415
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	400	400
SubSample %:	25	100	100	100	25	8	12.5	12.5	12.5	100	100	100	100	100	20	50
Stictochironomus	0	0	0	0	0	0	0	0	0	43	45	71	39	32	0	0
Tribelos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xenochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Pseudochironomini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudochironomus	12	1	0	0	7	0	5	0	3	0	0	1	0	0	0	0
| Tribe: Tanytarsini	0	0	1	0	0	0	0	15	20	0	1	11	1	0	0	0
Cladotanytarsus	0	0	0	0	13	8	9	18	0	0	0	2	0	0	0	0
Micropsectra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheotanytarsus	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4
Stempellinella	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Tanytarsus	12	2	0	0	2	5	3	37	5	24	24	62	17	13	13	1
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Protanypus	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potthastia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potthastia longimana group	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brillia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Corynoneura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cricotopus	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1
Heterotrissocladius	0	0	0	0	0	0	0	0	0	8	18	49	20	5	0	0
Limnophyes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metriocnemus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladiinae RAI 004 (Like Helen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius complex	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Parakiefferiella	3	11	1	0	105	34	15	56	19	9	31	94	16	10	0	0
Psectrocladius	0	0	0	0	3	2	3	0	10	0	1	0	0	0	0	0
Pseudorthocladius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheocricotopus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemanniella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Tvetenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
Zalutschia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ablabesmyia	12	0	0	0	37	10	11	1	0	3	0	5	0	1	0	0
Clinotanypus	0	0	0	0	0	2	1	2	1	0	0	0	0	0	0	0
Guttipelopia guttipennis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Labrundinia	0	0	0	0	0	2	2	2	0	0	0	0	0	0	0	0
Nilotanypus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	MQL	MQL	MQL	MQL	MQL	MQL	MQL	April Delivery	April Delivery	GNL	GNL	GNL	GNL	GNL	CABIN	CABIN
Sample:	MQLSeep5	MQLDeep1	MQLDeep2	MQLDeep3	MQLOut1	MQLOut2	MQLOut3	MQLOut4	MQLOut5	GNL1	GNL2	GNL3	GNL4	GNL5	QWA-01	QRD-02
Sample Collection Date:	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	14-Sep-16	15-Sep-16
CC#:	CC171402	CC171403	CC171404	CC171405	CC171406	CC171407	CC171408	CC172234	CC172235	CC171409	CC171410	CC171411	CC171412	CC171413	CC171414	CC171415
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	400	400
SubSample %:	25	100	100	100	25	8	12.5	12.5	12.5	100	100	100	100	100	20	50
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentaneura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	2
Thienemannimyia group	0	0	1	0	0	4	0	19	16	0	0	0	0	0	0	0
| Tribe: Procladiini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Procladius	4	1	0	0	20	9	17	16	16	0	0	0	0	0	0	0
| Tribe: Tanypodini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanypus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Dolichopodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Empididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0
Hemerodromia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
| Family: Simuliidae	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Simulium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0
| Family: Tabanidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tabanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Tipulidae	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	12
Hexatoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	4
Limnophila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lepidoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Megaloptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Corydalidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sialidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sialis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Odonata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Calopterygidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Coenagrionidae	1	0	0	0	2	1	0	1	1	0	0	0	0	0	0	0
Coenagrion/Enallagma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Corduliidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Cordulia shurtleffii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epitheca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Gomphidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiogomphus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Libellulidae	0	0	0	0	0	0	1	3	3	0	0	0	0	0	0	0
Libellula	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	MQL	MQL	MQL	MQL	MQL	MQL	MQL	April Delivery	April Delivery	GNL	GNL	GNL	GNL	GNL	CABIN	CABIN
Sample:	MQLSeep5	MQLDeep1	MQLDeep2	MQLDeep3	MQLOut1	MQLOut2	MQLOut3	MQLOut4	MQLOut5	GNL1	GNL2	GNL3	GNL4	GNL5	QWA-01	QRD-02
Sample Collection Date:	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	14-Sep-16	15-Sep-16
CC#:	CC171402	CC171403	CC171404	CC171405	CC171406	CC171407	CC171408	CC172234	CC172235	CC171409	CC171410	CC171411	CC171412	CC171413	CC171414	CC171415
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	400	400
SubSample %:	25	100	100	100	25	8	12.5	12.5	12.5	100	100	100	100	100	20	50
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	4	1	0	0	0	0	0	2	0	0	0	0
| Family: Arrenuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arrenurus	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Halacaridae	0	0	0	0	1	0	1	2	0	1	0	0	0	0	0	0
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Albertathyas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atractides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hygrobates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
| Family: Limnesiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnesia	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnocharidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnochares	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Mideidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Midea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Mideopsidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mideopsis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
| Family: Oxidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxus	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
| Family: Pionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Piona	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Sperchonopsis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Torrenticola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1
| Family: Unionicolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neumania	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Unionicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Suborder: Prostigmata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Athienemanniidae	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0

Site:	MQL	MQL	MQL	MQL	MQL	MQL	MQL	April Delivery	April Delivery	GNL	GNL	GNL	GNL	GNL	CABIN	CABIN
Sample:	MQLSeep5	MQLDeep1	MQLDeep2	MQLDeep3	MQLOut1	MQLOut2	MQLOut3	MQLOut4	MQLOut5	GNL1	GNL2	GNL3	GNL4	GNL5	QWA-01	QRD-02
Sample Collection Date:	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	14-Sep-16	15-Sep-16
CC#:	CC171402	CC171403	CC171404	CC171405	CC171406	CC171407	CC171408	CC172234	CC172235	CC171409	CC171410	CC171411	CC171412	CC171413	CC171414	CC171415
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	400	400
SubSample %:	25	100	100	100	25	8	12.5	12.5	12.5	100	100	100	100	100	20	50
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
| Family: Hydrozetidae	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0
| Class: Malacostraca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Amphipoda	3	0	0	0	21	6	5	19	18	0	0	0	0	0	0	0
| Family: Hyalellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hyalella	8	0	0	0	8	7	4	0	0	0	0	0	0	0	0	0
| Order: Decapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Astacidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pacifastacus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Unionoida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Unionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anodonta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	5	1	1	0	10	7	6	8	0	0	2	4	3	2	0	1
Pisidium	0	0	0	0	0	0	0	0	4	1	0	3	0	0	0	0
Sphaerium	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
| Class: Gastropoda	2	0	0	0	3	1	1	0	0	0	1	0	0	0	2	1
| Order: Basommatophora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ancylidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lymnaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fossaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lymnaea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Physidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Planorbidae	2	0	0	0	0	5	1	8	0	0	0	0	0	0	0	0
Gyraulus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Heterostropha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Valvatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Valvata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	MQL	MQL	MQL	MQL	MQL	MQL	MQL	April Delivery	April Delivery	GNL	GNL	GNL	GNL	GNL	CABIN	CABIN
Sample:	MQLSeep5	MQLDeep1	MQLDeep2	MQLDeep3	MQLOut1	MQLOut2	MQLOut3	MQLOut4	MQLOut5	GNL1	GNL2	GNL3	GNL4	GNL5	QWA-01	QRD-02
Sample Collection Date:	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	14-Sep-16	15-Sep-16
CC#:	CC171402	CC171403	CC171404	CC171405	CC171406	CC171407	CC171408	CC172234	CC172235	CC171409	CC171410	CC171411	CC171412	CC171413	CC171414	CC171415
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	400	400
SubSample %:	25	100	100	100	25	8	12.5	12.5	12.5	100	100	100	100	100	20	50
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Hirudinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Rhynchobdellida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossiphoniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Helobdella stagnalis	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lumbriculus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enchytraeus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mesenchytraeus	0	1	0	0	6	9	0	0	0	0	0	0	0	0	0	0
| Family: Naididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aulodrilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aulodrilus pluriseta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chaetogaster	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnodrilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nais	0	0	0	0	3	0	1	0	0	0	0	0	0	0	2	0
Pristina	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0
Telmatodrilus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telmatodrilus vejdovskyi	0	0	0	0	4	0	0	0	0	1	0	1	1	0	16	0
Tubifex	0	0	0	0	16	4	4	0	0	4	7	5	4	3	0	3
| Subfamily: Tubificinae immatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tubificinae with ha	0	0	0	0	0	0	0	7	9	0	0	0	0	0	0	0
| Subfamily: Tubificinae without	0	0	0	0	0	22	12	19	27	0	0	0	0	0	0	5
Phylum: Tardigrada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals:	**137**	**85**	**53**	**59**	**700**	**354**	**351**	**497**	**308**	**117**	**158**	**340**	**122**	**85**	**305**	**399**

Site:	MQL	MQL	MQL	MQL	MQL	MQL	MQL	April Delivery	April Delivery	GNL	GNL	GNL	GNL	GNL	CABIN	CABIN
Sample:	MQLSeep5	MQLDeep1	MQLDeep2	MQLDeep3	MQLOut1	MQLOut2	MQLOut3	MQLOut4	MQLOut5	GNL1	GNL2	GNL3	GNL4	GNL5	QWA-01	QRD-02
Sample Collection Date:	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	04-Oct-16	14-Sep-16	15-Sep-16
CC#:	CC171402	CC171403	CC171404	CC171405	CC171406	CC171407	CC171408	CC172234	CC172235	CC171409	CC171410	CC171411	CC171412	CC171413	CC171414	CC171415
Sieve Size:	200	200	200	200	200	200	200	200	200	200	200	200	200	200	400	400
SubSample %:	25	100	100	100	25	8	12.5	12.5	12.5	100	100	100	100	100	20	50
Taxa present but not included:																
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Homoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Aphididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	1	1	1	0	1	1	1	1	1	1	1	1	1	0	0	0
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	1	0	0	0	1	1	1	1	1	1	0	1	0	1	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	13
Phylum: Nemata	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals:	**3**	**3**	**3**	**2**	**4**	**4**	**4**	**4**	**4**	**4**	**3**	**4**	**3**	**3**	**1**	**14**

Table 6-2. Benthic Invertebrate Ta

Cordillera Consulting

Project: Quinsam Benthics 2016

Quinsam Coal Corp, Kathleen Russ
Taxonomist: Sue Salter
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250-494-7553

Site:	CABIN	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW
Sample:	7SQ-03	LWO1	LWO2	LWO3	LWO4	LWO5	LWM1	LWM2	LWM3	LWI1	LWI2	LWI3
Sample Collection Date:	16-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	13-Sep-16	13-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16
CC#:	CC171416	CC171417	CC171418	CC171419	CC171420	CC171421	CC171422	CC171423	CC171424	CC171425	CC171426	CC171427
Sieve Size:	400	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	25	25	25	25	25	50	25	100	25	50	25
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Collembola	0	0	0	0	1	0	0	0	1	1	0	1
| Family: Entomobryidae	0	0	0	0	0	0	0	0	1	0	0	1
| Family: Sminthuridae	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Baetidae	21	0	0	0	0	0	0	0	0	0	0	0
Acentrella	0	0	0	0	0	0	0	0	0	0	0	0
Baetis	1	0	0	0	0	0	0	0	0	0	0	0
Baetis tricaudatus group	0	0	0	0	0	0	0	0	0	0	0	0
Callibaetis	0	0	0	0	0	0	0	0	0	0	0	0
Centroptilum	11	0	0	0	0	0	0	0	0	0	0	0
Fallceon	0	0	0	0	0	0	0	0	0	0	0	0
Procloeon	14	0	0	0	0	0	0	0	0	0	0	0
| Family: Caenidae	0	0	0	0	0	0	0	0	0	0	0	0
Caenis	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ephemerellidae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	2	0	0	0	0	0	0	0	0	0	0	0
Rhithrogena	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Leptophlebiidae	30	0	0	0	0	0	0	0	0	0	0	0
Neoleptophlebia	1	0	0	0	0	0	0	0	0	0	0	0

Site:	CABIN	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW
Sample:	7SQ-03	LWO1	LWO2	LWO3	LWO4	LWO5	LWM1	LWM2	LWM3	LWI1	LWI2	LWI3
Sample Collection Date:	16-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	13-Sep-16	13-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16
CC#:	CC171416	CC171417	CC171418	CC171419	CC171420	CC171421	CC171422	CC171423	CC171424	CC171425	CC171426	CC171427
Sieve Size:	400	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	25	25	25	25	25	50	25	100	25	50	25
| Order: Plecoptera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Capniidae	9	0	0	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	3	0	0	0	0	0	0	0	0	0	0	0
Haploperla	0	0	0	0	0	0	0	0	0	0	0	0
Sweltsa	2	0	0	0	0	0	0	0	0	0	0	0
| Family: Nemouridae	0	0	0	0	0	0	1	0	0	0	0	0
Nemoura	0	0	0	0	0	0	0	0	0	0	0	0
Zapada cinctipes	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	0	0	0	0	0	0	0	0	0	0	0	0
Calineuria californica	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Taeniopterygidae	0	0	0	0	0	0	0	0	0	0	0	0
Taenionema	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trichoptera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	3	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche	1	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydroptilidae	0	0	0	0	0	0	0	0	0	0	0	0
Agraylea	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0	0	0	0	0	0
Oxyethira	14	0	0	0	0	0	0	0	0	0	0	0
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	1	0	0	0	0	0	0	0	0	0	0
| Family: Leptoceridae	2	0	0	0	0	0	0	0	0	0	0	0
Oecetis	0	0	0	0	0	0	0	0	0	0	0	0
Triaenodes	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	0	0	0	0	0	0
Limnephilus	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Molannidae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Philopotamidae	0	0	0	0	0	0	0	0	0	0	0	0
Dolophilodes	0	0	0	0	0	0	0	0	0	0	0	0
Wormaldia	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Phryganeidae	0	0	0	0	0	0	0	0	0	0	0	0
Agrypnia	0	0	0	0	0	0	0	0	0	0	0	0
Ptilostomis	0	2	0	0	0	0	0	0	0	0	0	0
| Family: Polycentropodidae	3	0	0	0	0	0	0	0	0	0	0	0
Polycentropus	13	0	0	0	0	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	0	0	0	0	0	0	0	0	0	0	0	0

Site:	CABIN	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW
Sample:	7SQ-03	LWO1	LWO2	LWO3	LWO4	LWO5	LWM1	LWM2	LWM3	LWI1	LWI2	LWI3
Sample Collection Date:	16-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	13-Sep-16	13-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16
CC#:	CC171416	CC171417	CC171418	CC171419	CC171420	CC171421	CC171422	CC171423	CC171424	CC171425	CC171426	CC171427
Sieve Size:	400	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	25	25	25	25	25	50	25	100	25	50	25
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	0	0	0	0	0	0	0	0	0
Heterlimnius	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Haliplidae	0	0	0	0	0	0	0	0	0	0	0	0
Haliplus	0	0	0	0	0	0	0	0	0	0	0	0
Peltodytes	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	3	1	8	7	0	0
| Family: Ceratopogonidae	1	0	0	0	1	0	0	0	3	2	1	0
Atrichopogon	0	0	0	0	0	0	2	0	0	0	0	0
Bezzia/ Palpomyia	0	0	0	0	0	0	0	0	0	0	0	0
Culicoides	0	0	0	0	0	0	0	0	0	0	0	0
Dasyhelea	0	0	0	0	1	0	0	0	1	3	1	0
Mallochohelea	0	1	0	0	3	0	5	0	0	3	0	0
Probezzia	1	0	0	0	0	0	0	1	1	0	3	0
| Family: Chaoboridae	0	0	0	0	0	0	0	0	0	0	1	0
Chaoborus	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Chironomidae	6	0	1	0	0	0	0	0	1	0	0	0
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0	0	0
Chironomus	0	1	5	0	0	0	0	0	0	0	0	0
Cladopelma	0	0	0	1	0	0	0	0	0	0	0	0
Cryptochironomus	2	0	0	0	0	0	0	0	0	0	0	0
Cryptotendipes	0	0	2	0	0	0	0	0	0	0	0	0
Dicrotendipes	0	0	0	0	0	0	0	0	0	0	0	0
Endochironomus	0	0	0	0	0	0	0	0	0	0	0	0
Glyptotendipes	0	0	0	0	0	0	0	0	0	0	0	0
Lauterborniella agrayloides	0	0	0	0	0	0	0	0	0	0	0	0
Microchironomus	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes	1	0	0	0	0	0	0	0	0	0	0	0
Microtendipes pedellus group	0	0	0	0	0	0	0	0	0	0	0	0
Nilothauma	0	0	0	0	0	0	0	0	0	0	0	0
Pagastiella	25	0	0	0	0	0	0	0	0	0	0	0
Parachironomus	0	0	0	0	0	0	0	0	0	0	0	0
Paracladopelma	0	0	0	0	0	0	0	0	0	0	0	0
Paralauterborniella nigrohalterale	10	0	0	0	1	0	0	0	0	0	0	0
Phaenopsectra	0	0	1	0	1	0	0	0	0	0	0	0
Polypedilum	1	2	0	0	2	37	0	0	0	0	0	0
Saetheria	0	0	0	0	0	0	0	0	0	0	0	0
Stenochironomus	0	0	0	0	0	0	0	0	0	0	0	0

Site:	CABIN	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW
Sample:	7SQ-03	LWO1	LWO2	LWO3	LWO4	LWO5	LWM1	LWM2	LWM3	LWI1	LWI2	LWI3
Sample Collection Date:	16-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	13-Sep-16	13-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16
CC#:	CC171416	CC171417	CC171418	CC171419	CC171420	CC171421	CC171422	CC171423	CC171424	CC171425	CC171426	CC171427
Sieve Size:	400	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	25	25	25	25	25	50	25	100	25	50	25
Stictochironomus	0	0	0	0	0	0	0	0	0	0	0	0
Tribelos	0	0	0	0	0	0	0	0	0	0	0	0
Xenochironomus	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Pseudochironomini	0	0	0	0	0	0	0	0	0	0	0	0
Pseudochironomus	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	0	0	0	0	0	0	0	0	0	0	0	0
Cladotanytarsus	1	0	0	0	0	1	0	0	0	0	0	0
Micropsectra	0	0	0	0	0	0	0	0	0	0	0	0
Rheotanytarsus	3	1	0	0	0	0	0	0	0	0	0	0
Stempellinella	1	0	0	0	0	0	0	0	0	0	0	0
Tanytarsus	14	0	1	0	1	6	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0
Protanypus	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0
Potthastia	0	0	0	0	0	0	0	0	0	0	0	0
Potthastia longimana group	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0	0	0	0	0	0
Brillia	0	0	0	0	0	0	0	0	0	0	0	0
Corynoneura	1	0	0	0	0	0	0	0	0	0	0	0
Cricotopus	0	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella	0	0	0	0	0	0	0	0	0	0	0	0
Heterotrissocladius	0	0	0	0	0	0	0	0	0	0	0	0
Limnophyes	0	0	0	0	0	1	4	0	2	3	0	0
Metriocnemus	0	0	0	1	0	1	7	1	2	0	0	0
Orthocladiinae RAI 004 (Like Helen	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius complex	0	0	0	0	0	0	0	0	0	0	0	0
Parakiefferiella	0	0	1	0	0	0	0	0	0	0	0	0
Psectrocladius	2	0	0	0	0	0	0	0	0	0	0	0
Pseudorthocladius	0	0	0	0	0	0	0	0	0	1	0	0
Rheocricotopus	0	0	0	0	0	0	0	0	0	0	0	0
Thienemanniella	2	0	0	0	0	0	0	0	0	0	0	0
Tvetenia	0	0	0	0	0	0	0	0	0	0	0	0
Zalutschia	0	0	0	0	0	0	1	0	0	0	1	0
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0
Ablabesmyia	7	3	0	0	0	0	0	0	0	0	0	0
Clinotanypus	0	0	0	0	0	0	0	0	0	0	0	0
Guttipelopia guttipennis	0	0	0	0	0	0	0	0	0	0	0	0
Labrundinia	0	0	0	0	0	0	0	0	0	0	0	0
Nilotanypus	0	0	0	0	0	0	0	0	0	0	0	0

Site:	CABIN	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW
Sample:	7SQ-03	LWO1	LWO2	LWO3	LWO4	LWO5	LWM1	LWM2	LWM3	LWI1	LWI2	LWI3
Sample Collection Date:	16-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	13-Sep-16	13-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16
CC#:	CC171416	CC171417	CC171418	CC171419	CC171420	CC171421	CC171422	CC171423	CC171424	CC171425	CC171426	CC171427
Sieve Size:	400	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	25	25	25	25	25	50	25	100	25	50	25
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0
Pentaneura	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Procladiini	0	0	0	0	0	0	0	0	0	0	0	0
Procladius	7	0	5	0	0	0	0	0	0	0	0	0
| Tribe: Tanypodini	0	0	0	0	0	0	0	0	0	0	0	0
Tanypus	0	0	0	0	0	1	0	0	0	0	0	0
| Family: Dolichopodidae	0	0	0	0	0	0	0	0	2	0	1	0
| Family: Empididae	0	0	0	0	0	0	0	0	0	0	0	0
Hemerodromia	1	0	0	0	0	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Simuliidae	0	0	0	0	0	0	0	1	2	0	0	0
Simulium	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Tabanidae	0	0	0	0	0	0	0	0	0	0	0	0
Tabanus	0	0	0	0	0	0	1	0	0	0	0	0
| Family: Tipulidae	1	0	0	0	0	0	0	0	0	0	0	0
Hexatoma	0	0	0	0	0	0	0	0	0	0	0	0
Limnophila	0	0	0	0	0	1	0	0	0	0	0	0
| Order: Lepidoptera	0	0	0	0	0	1	0	0	1	0	0	0
| Order: Megaloptera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Corydalidae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sialidae	0	0	0	0	0	0	0	0	0	0	0	0
Sialis	5	0	0	0	0	0	0	0	0	0	0	0
| Order: Odonata	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Calopterygidae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Coenagrionidae	1	0	0	0	0	0	0	0	0	0	0	0
Coenagrion/Enallagma	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Corduliidae	0	0	0	0	0	0	0	0	0	0	0	0
Cordulia shurtleffii	0	0	0	0	0	0	0	0	0	0	0	0
Epitheca	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Gomphidae	0	0	0	0	0	0	0	0	0	0	0	0
Ophiogomphus	1	0	0	0	0	0	0	0	0	0	0	0
| Family: Libellulidae	0	0	0	0	0	0	0	0	0	0	0	0
Libellula	0	0	0	0	0	0	0	0	0	0	0	0

Site:	CABIN	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW
Sample:	7SQ-03	LWO1	LWO2	LWO3	LWO4	LWO5	LWM1	LWM2	LWM3	LWI1	LWI2	LWI3
Sample Collection Date:	16-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	13-Sep-16	13-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16
CC#:	CC171416	CC171417	CC171418	CC171419	CC171420	CC171421	CC171422	CC171423	CC171424	CC171425	CC171426	CC171427
Sieve Size:	400	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	25	25	25	25	25	50	25	100	25	50	25
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Arrenuridae	0	0	0	0	0	0	0	0	0	0	0	0
Arrenurus	0	1	0	0	1	0	0	0	0	0	0	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	0	0	0
Aturus	1	0	0	0	0	0	0	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Halacaridae	1	0	0	0	0	0	0	1	1	1	1	0
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0	0	0
Albertathyas	0	0	0	0	0	0	0	0	1	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0	0	0
Atractides	2	0	0	0	0	0	0	0	0	0	0	0
Hygrobates	0	1	0	0	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	34	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnesiidae	0	0	0	0	0	0	0	0	0	0	0	0
Limnesia	0	0	0	1	0	0	0	0	0	0	0	0
| Family: Limnocharidae	0	0	0	0	0	0	0	0	0	0	0	0
Limnochares	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Mideidae	0	1	0	0	0	0	0	0	0	0	0	0
Midea	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Mideopsidae	0	0	0	0	0	0	0	0	0	0	0	0
Mideopsis	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Oxidae	0	0	0	0	0	0	0	0	0	0	0	0
Oxus	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pionidae	0	0	0	0	0	7	0	0	0	0	0	0
Piona	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	0	0	0	0	0	0	0	0	0	0	0	0
Sperchonopsis	3	0	0	0	0	0	0	0	0	0	0	0
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0	0
Torrenticola	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Unionicolidae	0	0	0	0	0	0	0	0	0	0	0	0
Neumania	0	0	0	0	0	0	0	0	0	0	0	0
Unionicola	0	0	0	0	0	0	0	0	0	0	0	0
Suborder: Prostigmata	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Athienemanniidae	0	0	0	0	0	0	0	0	0	0	0	0

Site:	CABIN	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW
Sample:	7SQ-03	LWO1	LWO2	LWO3	LWO4	LWO5	LWM1	LWM2	LWM3	LWI1	LWI2	LWI3
Sample Collection Date:	16-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	13-Sep-16	13-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16
CC#:	CC171416	CC171417	CC171418	CC171419	CC171420	CC171421	CC171422	CC171423	CC171424	CC171425	CC171426	CC171427
Sieve Size:	400	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	25	25	25	25	25	50	25	100	25	50	25
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	0	1	1	1	0	0	0	0
| Family: Hydrozetidae	0	0	0	0	0	0	1	0	0	0	0	0
| Class: Malacostraca	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Amphipoda	1	0	0	0	0	0	0	0	0	0	0	0
| Family: Hyalellidae	0	0	0	0	0	0	0	0	0	0	0	0
Hyalella	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Decapoda	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Astacidae	0	0	0	0	0	0	0	0	0	0	0	0
Pacifastacus	3	0	0	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Unionoida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Unionidae	0	0	0	0	0	0	0	0	0	0	0	0
Anodonta	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	0	27	1	5	3	12	3	6	3	5	19	1
Pisidium	0	0	0	0	0	0	0	2	2	0	0	0
Sphaerium	0	2	0	1	1	2	1	0	1	1	5	0
| Class: Gastropoda	0	2	0	0	0	1	1	0	0	0	0	0
| Order: Basommatophora	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ancylidae	0	0	0	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lymnaeidae	0	0	0	0	0	0	0	0	0	0	0	0
Fossaria	0	0	0	0	0	0	0	0	0	0	0	0
Lymnaea	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Physidae	0	0	0	0	0	0	0	0	0	0	0	0
Physella	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Planorbidae	0	0	0	0	0	1	0	0	0	0	0	0
Gyraulus	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Heterostropha	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Valvatidae	0	0	0	0	0	0	0	0	0	0	0	0
Valvata	0	0	0	0	0	0	0	0	0	0	0	0

Site:	CABIN	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW
Sample:	7SQ-03	LWO1	LWO2	LWO3	LWO4	LWO5	LWM1	LWM2	LWM3	LWI1	LWI2	LWI3
Sample Collection Date:	16-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	13-Sep-16	13-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16
CC#:	CC171416	CC171417	CC171418	CC171419	CC171420	CC171421	CC171422	CC171423	CC171424	CC171425	CC171426	CC171427
Sieve Size:	400	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	25	25	25	25	25	50	25	100	25	50	25
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Hirudinea	18	0	0	0	0	0	0	0	0	0	0	0
| Order: Rhynchobdellida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossiphoniidae	0	0	0	0	0	0	0	0	0	0	0	0
Helobdella stagnalis	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0	0
Lumbriculus	0	0	0	0	41	38	0	0	127	0	45	25
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	0	0	0	0
Enchytraeus	0	0	0	0	0	0	0	0	0	0	0	0
Mesenchytraeus	0	0	2	2	26	2	15	0	0	1	0	0
| Family: Naididae	6	0	0	0	0	0	0	0	0	0	0	0
Aulodrilus	0	0	0	0	0	0	0	0	0	0	0	0
Aulodrilus pluriseta	0	0	0	0	0	0	0	0	0	0	0	0
Chaetogaster	0	0	0	0	0	0	0	0	0	0	0	0
Limnodrilus	0	0	0	0	0	0	0	0	0	0	0	0
Nais	0	0	0	0	0	0	0	0	0	0	0	0
Pristina	0	0	0	0	0	0	0	0	0	0	0	0
Telmatodrilus	0	0	0	0	0	0	0	0	0	0	0	0
Telmatodrilus vejdovskyi	0	0	0	0	0	0	0	0	0	0	0	0
Tubifex	1	0	0	0	20	1	0	0	0	2	15	4
| Subfamily: Tubificinae immatu	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tubificinae with ha	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tubificinae without	44	0	0	6	0	7	40	40	0	24	8	0
Phylum: Tardigrada	0	0	0	0	0	0	0	0	0	0	0	0
Totals:	**338**	**45**	**19**	**17**	**103**	**121**	**86**	**54**	**160**	**54**	**101**	**32**

Site:	CABIN	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW	LW
Sample:	7SQ-03	LWO1	LWO2	LWO3	LWO4	LWO5	LWM1	LWM2	LWM3	LWI1	LWI2	LWI3
Sample Collection Date:	16-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	13-Sep-16	13-Sep-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16	05-Oct-16
CC#:	CC171416	CC171417	CC171418	CC171419	CC171420	CC171421	CC171422	CC171423	CC171424	CC171425	CC171426	CC171427
Sieve Size:	400	200	200	200	200	200	200	200	200	200	200	200
SubSample %:	100	25	25	25	25	25	50	25	100	25	50	25
Taxa present but not included:												
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Homoptera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Aphididae	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	1	1	0	1	1	1	1	0	1	1	1	1
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	1	0	0	0	0	0	0	0	0	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	1	0	1	0	1	1	1	1	1	0	1	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	0	0	0	0	2	3	6	0	1	3
Phylum: Nemata	1	1	1	1	1	1	1	1	1	1	1	1
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	1	0	0	0	0	0	0	0	0	1	0	0
Totals:	**5**	**2**	**2**	**2**	**3**	**3**	**5**	**5**	**9**	**3**	**4**	**5**

Table 6-3. Summary Statistics for Benthic Invertebrate Community Indices.

Site	Habitat	Index	n	Minimum	Maximum	Mean	Standard Deviation	Standard Error
NNLinlet	Inlet	Density	5	29,317	82,410	57,849	24,749	11,068
NNLinlet	Inlet	Species Richness	5	25	39	31	6	3
NNLinlet	Inlet	EPT Richness	5	2	6	4	1.58	0.71
NNLinlet	Inlet	Simpson's Index of Diversity	5	0.89	0.94	0.91	0.02	0.01
NNLinlet	Inlet	Simpson's Evenness	5	0.33	0.41	0.36	0.03	0.01
NNLdeep	Deep	Density	3	2,510	4,285	3,237	930	537
NNLdeep	Deep	Species Richness	3	12	15	14	2	1
NNLdeep	Deep	EPT Richness	3	0	1	0.7	0.58	0.33
NNLdeep	Deep	Simpson's Index of Diversity	3	0.78	0.81	0.8	0.02	0.01
NNLdeep	Deep	Simpson's Evenness	3	0.3	0.44	0.37	0.07	0.04
NNLseep	Seep	Density	5	3,953	9,060	5,482	2,045	915
NNLseep	Seep	Species Richness	5	23	30	27	2	1
NNLseep	Seep	EPT Richness	5	1	2	1.8	0.45	0.2
NNLseep	Seep	Simpson's Index of Diversity	5	0.83	0.89	0.87	0.03	0.01
NNLseep	Seep	Simpson's Evenness	5	0.22	0.35	0.29	0.05	0.02
NNLoutlet	Outlet	Density	5	6,175	46,745	23,650	18,707	8,366
NNLoutlet	Outlet	Species Richness	5	20	44	32	10	5
NNLoutlet	Outlet	EPT Richness	5	2	6	3.8	1.48	0.66
NNLoutlet	Outlet	Simpson's Index of Diversity	5	0.68	0.92	0.82	0.1	0.05
NNLoutlet	Outlet	Simpson's Evenness	5	0.14	0.27	0.22	0.05	0.02
LLinlet	Inlet	Density	5	27,412	83,333	53,105	20,816	9,309
LLinlet	Inlet	Species Richness	5	30	46	36	7	3
LLinlet	Inlet	EPT Richness	5	2	7	4	2.12	0.95
LLinlet	Inlet	Simpson's Index of Diversity	5	0.85	0.87	0.86	0.01	0
LLinlet	Inlet	Simpson's Evenness	5	0.14	0.26	0.2	0.04	0.02
LLseep	Seep	Density	6	375	4,617	1,904	1,431	584
LLseep	Seep	Species Richness	6	5	10	7	2	1
LLseep	Seep	EPT Richness	6	0	0	0	0	0
LLseep	Seep	Simpson's Index of Diversity	6	0.56	0.78	0.71	0.09	0.04
LLseep	Seep	Simpson's Evenness	6	0.25	0.9	0.55	0.21	0.09
LLdeep	Deep	Density	3	620	1,472	1,101	436	252
LLdeep	Deep	Species Richness	3	7	12	10	3	2
LLdeep	Deep	EPT Richness	3	0	1	0.3	0.58	0.33
LLdeep	Deep	Simpson's Index of Diversity	3	0.68	0.77	0.74	0.05	0.03
LLdeep	Deep	Simpson's Evenness	3	0.26	0.61	0.42	0.17	0.1
LLoutlet	Outlet	Density	5	14,024	36,877	22,565	9,546	4,269
LLoutlet	Outlet	Species Richness	5	18	38	30	8	3
LLoutlet	Outlet	EPT Richness	5	2	7	4.4	1.95	0.87
LLoutlet	Outlet	Simpson's Index of Diversity	5	0.85	0.92	0.89	0.03	0.01
LLoutlet	Outlet	Simpson's Evenness	5	0.26	0.41	0.34	0.06	0.03
MQLinlet	Inlet	Density	5	42,013	112,419	87,165	30,356	13,576
MQLinlet	Inlet	Species Richness	5	19	37	26	7	3
MQLinlet	Inlet	EPT Richness	5	2	5	3.8	1.3	0.58
MQLinlet	Inlet	Simpson's Index of Diversity	5	0.77	0.89	0.84	0.05	0.02
MQLinlet	Inlet	Simpson's Evenness	5	0.22	0.29	0.26	0.03	0.01
MQLseep	Seep	Density	5	1,847	27,124	11,842	9,551	4,271
MQLseep	Seep	Species Richness	5	11	25	18	6	3
MQLseep	Seep	EPT Richness	5	2	4	2.6	0.89	0.4
MQLseep	Seep	Simpson's Index of Diversity	5	0.69	0.88	0.8	0.08	0.04
MQLseep	Seep	Simpson's Evenness	5	0.18	0.43	0.32	0.09	0.04
MQLdeep	Deep	Density	3	765	1,226	947	245	142
MQLdeep	Deep	Species Richness	3	5	14	10	5	3
MQLdeep	Deep	EPT Richness	3	0	1	0.3	0.58	0.33
MQLdeep	Deep	Simpson's Index of Diversity	3	0.35	0.76	0.57	0.21	0.12
MQLdeep	Deep	Simpson's Evenness	3	0.23	0.31	0.28	0.04	0.02
MQLoutlet	Outlet	Density	5	35,549	64,000	47,565	12,366	5,530
MQLoutlet	Outlet	Species Richness	5	25	36	32	4	2
MQLoutlet	Outlet	EPT Richness	5	3	5	4	1	0.45
MQLoutlet	Outlet	Simpson's Index of Diversity	5	0.85	0.9	0.89	0.02	0.01
MQLoutlet	Outlet	Simpson's Evenness	5	0.21	0.39	0.28	0.07	0.03
LQLinlet	Inlet	Density	5	1,674	30,586	14,520	11,533	5,158
LQLinlet	Inlet	Species Richness	5	13	33	22	8	4
LQLinlet	Inlet	EPT Richness	5	1	4	2	1.22	0.55
LQLinlet	Inlet	Simpson's Index of Diversity	5	0.79	0.92	0.87	0.05	0.02
LQLinlet	Inlet	Simpson's Evenness	5	0.3	0.58	0.4	0.12	0.05
LQLdeep1	Deep	Density	3	1,717	2,265	2,078	312	180

Site	Habitat	Index	n	Minimum	Maximum	Mean	Standard Deviation	Standard Error
LQLdeep1	Deep	Species Richness	3	11	13	12	1	1
LQLdeep1	Deep	EPT Richness	3	0	1	0.3	0.58	0.33
LQLdeep1	Deep	Simpson's Index of Diversity	3	0.71	0.74	0.73	0.02	0.01
LQLdeep1	Deep	Simpson's Evenness	3	0.29	0.31	0.3	0.01	0.01
LQLdeep2	Deep	Density	5	1,991	2,871	2,392	338	151
LQLdeep2	Deep	Species Richness	5	5	10	8	2	1
LQLdeep2	Deep	EPT Richness	5	0	0	0	0	0
LQLdeep2	Deep	Simpson's Index of Diversity	5	0.51	0.65	0.61	0.05	0.02
LQLdeep2	Deep	Simpson's Evenness	5	0.28	0.41	0.35	0.05	0.02
LQLoutlet	Outlet	Density	5	6,464	21,468	14,485	5,729	2,562
LQLoutlet	Outlet	Species Richness	5	21	36	29	7	3
LQLoutlet	Outlet	EPT Richness	5	3	5	4.2	0.84	0.37
LQLoutlet	Outlet	Simpson's Index of Diversity	5	0.89	0.93	0.9	0.02	0.01
LQLoutlet	Outlet	Simpson's Evenness	5	0.34	0.42	0.38	0.03	0.01
GLstation	Ref	Density	5	1,226	4,905	2,372	1,465	655
GLstation	Ref	Species Richness	5	14	23	17.6	4	2
GLstation	Ref	EPT Richness	5	0	3	1.2	1.1	0.49
GLstation	Ref	Simpson's Index of Diversity	5	0.81	0.84	0.82	0.01	0.01
GLstation	Ref	Simpson's Evenness	5	0.25	0.4	0.34	0.07	0.03
LWinlet	Wetland	Density	3	1,847	3,116	2,626	682	394
LWinlet	Wetland	Species Richness	3	5	13	10	4	3
LWinlet	Wetland	EPT Richness	3	0	0	0	0	0
LWinlet	Wetland	Simpson's Index of Diversity	3	0.37	0.77	0.63	0.22	0.13
LWinlet	Wetland	Simpson's Evenness	3	0.32	0.33	0.32	0.01	0
LWmiddle	Wetland	Density	3	2,308	3,116	2,635	425	246
LWmiddle	Wetland	Species Richness	3	9	18	14	5	3
LWmiddle	Wetland	EPT Richness	3	0	1	0.3	0.58	0.33
LWmiddle	Wetland	Simpson's Index of Diversity	3	0.37	0.74	0.52	0.2	0.11
LWmiddle	Wetland	Simpson's Evenness	3	0.09	0.26	0.18	0.09	0.05
LWoutlet	Wetland	Density	5	981	6,983	3,520	2,786	1,246
LWoutlet	Wetland	Species Richness	5	7	18	12.2	4	2
LWoutlet	Wetland	EPT Richness	5	0	2	0.4	0.89	0.4
LWoutlet	Wetland	Simpson's Index of Diversity	5	0.63	0.84	0.75	0.08	0.04
LWoutlet	Wetland	Simpson's Evenness	5	0.21	0.68	0.41	0.22	0.1

Appendix V-IV
Statistical Analysis Results for Benthic Invertebrate Community Comparisons

Stantec

Table 1. Summary of Statistical Analysis Results

Station Type	Metric	Test Used	Data Used	Significant Difference?	Comments
Inlet	Density	Mixed-effects model	Raw	**Yes**	Overall, *impact level* is significant (p = 0.047), but difference between any pair of stations is small
	Taxon Richness	Mixed-effects model	Raw	No	
	Simpson's Diversity	Non-parametric	Raw	**Yes**	High impact differs from low impact but not medium
	Simpson's Evenness	Mixed-effects model	Raw	**Yes**	High impact differs from medium and low impact
Deep	Density	Non-parametric	Raw	**Yes**	High impact differs from medium and low impact
	Taxon Richness	Non-parametric	Raw	**Yes**	Low impact differs from both medium and high impacts
	Simpson's Diversity	Non-parametric	Raw	**Yes**	Low impact differs from both medium and high impacts
	Simpson's Evenness	Non-parametric	Raw	No	
Seep (vs deep stations)	Density	Mixed-effects model	Ln(x+1)	**Yes**	High impact differs from low impact but not medium
	Taxon Richness	Mixed-effects model	Raw	No	
	Simpson's Diversity	Mixed-effects model	Raw	No	
	Simpson's Evenness	Mixed-effects model	Raw	No	Overall, *impact level* is marginally non-significant (p = 0.07), but difference between high and medium levels is strong
Seep (vs shallow stations)	Density	Non-parametric	Raw	No	
	Taxon Richness	Non-parametric	Raw	No	
	Simpson's Diversity	Non-parametric	Raw	**Yes**	Medium impact differs from both high and low impacts
	Simpson's Evenness	Non-parametric	Raw	No	
Outlet	Density	Mixed-effects model	Ln(x+1)	No	Marginally non-significant (p = 0.056) difference between medium and high impact levels; no low impact stations considered for outflows
	Taxon Richness	Mixed-effects model	Raw	No	No low impact stations considered for outflows
	Simpson's Diversity	Non-parametric	Raw	No	No low impact stations considered for outflows
	Simpson's Evenness	Mixed-effects model	Raw	No	No low impact stations considered for outflows

COMPARISON OF INLET STATIONS

Table 2. Summary of Inlet-station Analysis

<table>
<tr><th>Test</th><th>Density</th><th>Taxon Richness</th><th>Simpson's Diversity</th><th>Simpson's Evenness</th></tr>
<tr><td colspan="5">Raw data</td></tr>
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<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Middle Quinsam</td><td>0.418</td></tr><tr><td>Long</td><td>0.439</td></tr><tr><td>Lower Quinsam 1</td><td>0.863</td></tr><tr><td>No Name</td><td>0.469</td></tr></table></td><td>Normality assumption met in all stations
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Middle Quinsam</td><td>0.666</td></tr><tr><td>Long</td><td>0.879</td></tr><tr><td>Lower Quinsam 1</td><td>0.345</td></tr><tr><td>No Name</td><td>0.615</td></tr></table></td><td>Normality assumption met in all stations
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Middle Quinsam</td><td>0.895</td></tr><tr><td>Long</td><td>0.973</td></tr><tr><td>Lower Quinsam 1</td><td>0.291</td></tr><tr><td>No Name</td><td>0.199</td></tr></table></td></tr>
<tr><td>Normality tests: by impact level</td><td>Normality assumption met in all impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.417</td></tr><tr><td>Medium</td><td>0.857</td></tr><tr><td>Low</td><td>0.224</td></tr></table></td><td>Normality assumption met in all impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.774</td></tr><tr><td>Medium</td><td>0.863</td></tr><tr><td>Low</td><td>0.469</td></tr></table></td><td>Normality assumption violated in high impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.032</td></tr><tr><td>Medium</td><td>0.345</td></tr><tr><td>Low</td><td>0.615</td></tr></table></td><td>Normality assumption met in all impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.765</td></tr><tr><td>Medium</td><td>0.291</td></tr><tr><td>Low</td><td>0.199</td></tr></table></td></tr>
<tr><td>Homogeneity of variance by station</td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>0.646</td></tr><tr><td>P</td><td>0.597</td></tr></table></td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>0.156</td></tr><tr><td>P</td><td>0.924</td></tr></table></td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>1.613</td></tr><tr><td>P</td><td>0.226</td></tr></table></td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>2.177</td></tr><tr><td>P</td><td>0.131</td></tr></table></td></tr>
<tr><td>Homogeneity of variance by impact level</td><td>Homogeneous variance assumption met across all impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>2.481</td></tr><tr><td>P</td><td>0.113</td></tr></table></td><td>Homogeneous variance assumption met across all impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>0.479</td></tr><tr><td>P</td><td>0.628</td></tr></table></td><td>Homogeneous variance assumption met across all impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>0.907</td></tr><tr><td>P</td><td>0.422</td></tr></table></td><td>Homogeneous variance assumption met across all impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>2.772</td></tr><tr><td>P</td><td>0.091</td></tr></table></td></tr>
<tr><td>Ln-transformation attempted</td><td>No</td><td>No</td><td>Yes</td><td>No</td></tr>
</table>

<table>
<tr><th>Test</th><th>Density</th><th>Taxon Richness</th><th>Simpson's Diversity</th><th>Simpson's Evenness</th></tr>
<tr><td colspan="5">Ln-transformed data</td></tr>
<tr><td>Normality tests: by station</td><td>N/A</td><td>N/A</td><td>Normality assumption met in all stations<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Middle Quinsam</td><td>0.644</td></tr><tr><td>Long</td><td>0.877</td></tr><tr><td>Lower Quinsam 1</td><td>0.333</td></tr><tr><td>No Name</td><td>0.624</td></tr></table></td><td>N/A</td></tr>
<tr><td>Normality tests: by impact level</td><td>N/A</td><td>N/A</td><td>Normality assumption violated in high impact levels<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.027</td></tr><tr><td>Medium</td><td>0.333</td></tr><tr><td>Low</td><td>0.624</td></tr></table></td><td>N/A</td></tr>
<tr><td>Homogeneity of variance by station</td><td>N/A</td><td>N/A</td><td>Homogeneous variance assumption met across all station<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>1.605</td></tr><tr><td>P</td><td>0.228</td></tr></table></td><td>N/A</td></tr>
<tr><td>Homogeneity of variance by impact level</td><td>N/A</td><td>N/A</td><td>Homogeneous variance assumption met across all impact levels<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>0.885</td></tr><tr><td>P</td><td>0.431</td></tr></table></td><td>N/A</td></tr>
<tr><td>Analytical approach used</td><td>Mixed-effects model on raw data</td><td>Mixed-effects model on raw data</td><td>Non-parametric tests on raw data</td><td>Mixed-effects-model on raw data</td></tr>
<tr><td>Conclusion</td><td>Marginally significant difference observed across impact levels</td><td>Marginally non-significant difference observed across impact levels</td><td>Statistically significant difference observed across impact levels</td><td>Statistically significant difference observed across impact levels</td></tr>
</table>

COMPARISON OF INLET STATIONS - MODELLING RESULTS

Table 3. Detailed Statistical Results for Inlet Stations

Density — Mixed Effects model

Summary of model parameter estimates:

Comparison (impact level)	Estimate	SE	T	|Estimate|*2SE>0	Interpretation
Intercept (high) to 0	70135.04	17030.24	4.12	Yes	Intercept significantly greater than zero (trivial result)
Intercept vs medium	-55615.18	29497.24	-1.89	No	Not significantly different from high impact stations(s)
Intercept vs low	-12286.47	29497.24	-0.42	No	Not significantly different from high impact stations(s)

Analysis of deviance of models with and without inclusion of *impact* variable:

Model	DF	LogLik	Deviance	X^2	X^2df	X^2 p value	Interpretation
Full Model	5	-229.81	465.63	6.11	2	**0.047**	**Inclusion of impact variable is marginally significant**
No Impact Variable	3	-232.87	459.62				

Taxon Richness — Mixed Effects model

Summary of model parameter estimates:

Comparison (impact level)	Estimate	SE	T	|Estimate|*2SE>0	Interpretation
Intercept (high) to 0	3.9	0.49	7.95	Yes	Intercept significantly greater than zero (trivial result)
Intercept vs medium	-1.9	0.85	-2.24	Yes	**Significantly different from high impact station(s)**
Intercept vs low	0.1	0.85	0.12	No	Not significantly different from high impact station(s)

Analysis of deviance of models with and without inclusion of *impact* variable:

Model	DF	LogLik	Deviance	X^2	X^2df	X^2 p value	Interpretation
Full Model	5	-35.533	71.065	5.723	2	0.057	Inclusion of impact variable is marginally non-significant
No Impact Variable	3	-38.394	76.789				

Simpson's Diversity — Non-parametric tests

Kruskal-Wallis Test:

Statistic	DF	P value	Interpretation
8.12	2	**0.017**	Significant difference across impact levels

Dunn's post-hoc comparisons, with p values adjusted for multiple comparisons

Comparison	X^2	Z	P	P_{adj}	interpretation
High v Low	8.117	-2.81	0.002	0.014	Significant difference identified in high - low comparison
High v Medium	8.117	-1.39	0.08	0.23	No significant difference
Low - Medium	8.117	1.23	0.11	0.20	No significant difference

Simpson's Evenness — Mixed Effects model

Summary of model parameter estimates:

Comparison (impact level)	Estimate	SE	T	|Estimate|*2SE>0	Interpretation
Intercept (high) to 0	0.23	0.03	8.4	Yes	Intercept significantly greater than zero (trivial result)
Intercept vs medium	0.17	0.05	3.7	Yes	**Significantly different from high impact station(s)**
Intercept vs low	0.13	0.05	2.7	Yes	**Significantly different from high impact station(s)**

Analysis of deviance of models with and without inclusion of *impact* variable:

Model	DF	LogLik	Deviance	X^2	X^2df	X^2 p value	Interpretation
Full Model	5	27.08	-54.160	10.359	2	**0.006**	**Inclusion of impact variable is highly significant**
No Impact Variable	3	21.90	-43.801				

COMPARISON OF DEEP STATIONS

Table 4. Summary of Deep-station Analysis

<table>
<tr><th>Test</th><th>Density</th><th>Taxon Richness</th><th>Simpson's Diversity</th><th>Simpson's Evenness</th></tr>
<tr><td colspan="5">Raw data</td></tr>
<tr><td>Normality tests: by station</td><td>Normality assumption violated in Lower Quinsam Lake 1
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Middle Quinsam</td><td>0.339</td></tr><tr><td>Long</td><td>0.577</td></tr><tr><td>Lower Quinsam 1</td><td>0.044</td></tr><tr><td>Lower Quinsam 2</td><td>0.967</td></tr><tr><td>Gooseneck</td><td>0.056</td></tr><tr><td>No Name</td><td>0.418</td></tr></table></td><td>Normality assumption violated in Lower Quinsam Lake 1
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Middle Quinsam</td><td>0.637</td></tr><tr><td>Long</td><td>0.363</td></tr><tr><td>Lower Quinsam 1</td><td><0.0001</td></tr><tr><td>Lower Quinsam 2</td><td>0.826</td></tr><tr><td>Gooseneck</td><td>0.685</td></tr><tr><td>No Name</td><td>0.637</td></tr></table></td><td>Normality assumption violated in Lower Quinsam Lake 1 and 2
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Middle Quinsam</td><td>0.734</td></tr><tr><td>Long</td><td>0.179</td></tr><tr><td>Lower Quinsam 1</td><td>0.034</td></tr><tr><td>Lower Quinsam 2</td><td>0.024</td></tr><tr><td>Gooseneck</td><td>0.891</td></tr><tr><td>No Name</td><td>0.075</td></tr></table></td><td>Normality assumption violated in Lower Quinsam Lake 1
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Middle Quinsam</td><td>0.095</td></tr><tr><td>Long</td><td>0.797</td></tr><tr><td>Lower Quinsam 1</td><td>0.048</td></tr><tr><td>Lower Quinsam 2</td><td>0.936</td></tr><tr><td>Gooseneck</td><td>0.175</td></tr><tr><td>No Name</td><td>0.833</td></tr></table></td></tr>
<tr><td>Normality tests: by impact level</td><td>Normality assumption violated in medium impact Station
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.628</td></tr><tr><td>Medium</td><td>0.027</td></tr><tr><td>Low</td><td>0.056</td></tr></table></td><td>Normality assumption met in all impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.529</td></tr><tr><td>Medium</td><td>0.713</td></tr><tr><td>Low</td><td>0.685</td></tr></table></td><td>Normality assumption violated in high impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.041</td></tr><tr><td>Medium</td><td>0.507</td></tr><tr><td>Low</td><td>0.891</td></tr></table></td><td>Normality assumption met in all impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.122</td></tr><tr><td>Medium</td><td>0.178</td></tr><tr><td>Low</td><td>0.175</td></tr></table></td></tr>
<tr><td>Homogeneity of variance by stations</td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>5</td></tr><tr><td>F</td><td>0.616</td></tr><tr><td>P</td><td>0.69</td></tr></table></td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>5</td></tr><tr><td>F</td><td>0.839</td></tr><tr><td>P</td><td>0.541</td></tr></table></td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>5</td></tr><tr><td>F</td><td>2.607</td></tr><tr><td>P</td><td>0.066</td></tr></table></td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>5</td></tr><tr><td>F</td><td>1.522</td></tr><tr><td>P</td><td>0.426</td></tr></table></td></tr>
<tr><td>Homogeneity of variance by impact level</td><td>Homogeneous variance assumption met across all impact levels
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<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>0.046</td></tr><tr><td>P</td><td>0.955</td></tr></table></td><td>Homogeneous variance assumption met across all impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>2.366</td></tr><tr><td>P</td><td>0.121</td></tr></table></td><td>Homogeneous variance assumption met across all impact levels
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<tr><td>Normality tests: by impact level</td><td>Normality assumption met across all impact levels<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.646</td></tr><tr><td>Medium</td><td>0.384</td></tr><tr><td>Low</td><td>0.423</td></tr></table></td><td>Normality assumption met across all impact levels<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.286</td></tr><tr><td>Medium</td><td>Station</td></tr><tr><td>Low</td><td>0.830</td></tr></table></td><td>Normality assumption violated in high impact levels<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.027</td></tr><tr><td>Medium</td><td>0.455</td></tr><tr><td>Low</td><td>0.892</td></tr></table></td><td>Normality assumption met across all impact levels<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.185</td></tr><tr><td>Medium</td><td>0.193</td></tr><tr><td>Low</td><td>0.170</td></tr></table></td></tr>
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<tr><td>Homogeneity of variance by impact level</td><td>Homogeneous variance assumption met across all impact levels<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>1.091</td></tr><tr><td>P</td><td>0.356</td></tr></table></td><td>Homogeneous variance assumption met across all impact levels<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>0.477</td></tr><tr><td>P</td><td>0.628</td></tr></table></td><td>Homogeneous variance assumption met across all impact levels<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>2.195</td></tr><tr><td>P</td><td>0.139</td></tr></table></td><td>Homogeneous variance assumption met across all impact levels<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>0.884</td></tr><tr><td>P</td><td>0.430</td></tr></table></td></tr>
<tr><td>Analytical approach used</td><td>Non-parametric tests on raw data</td><td>Non-parametric tests on raw data</td><td>Non-parametric tests on raw data</td><td>Non-parametric tests on raw data</td></tr>
<tr><td>Conclusion</td><td>Statistically significant difference observed across groups</td><td>Statistically significant difference observed across groups</td><td>Statistically significant difference observed across groups</td><td>No statistically significant difference observed across groups</td></tr>
</table>

COMPARISON OF DEEP STATIONS

Table 5. Detailed Statistical Results for Deep Stations

<table>
<tr><th>Metric</th><th>Analytical methods used</th><th>Statistics</th></tr>
<tr><td>Density</td><td>Non-parametric tests</td><td>Kruskal-Wallis Test:
<table>
<tr><td>Statistic</td><td>DF</td><td>P value</td><td>Interpretation</td></tr>
<tr><td>12.68</td><td>2</td><td>0.002</td><td>Significant difference across impact levels</td></tr>
</table>
Dunn's post-hoc comparisons, with p values adjusted for multiple comparisons
<table>
<tr><td>Comparison</td><td>X^2</td><td>Z</td><td>P</td><td>P_{adj}</td><td>Interpretation</td></tr>
<tr><td>High v Low</td><td>12.68</td><td>-2.12</td><td>0.017</td><td>0.046</td><td>Significant difference identified in high - low comparison</td></tr>
<tr><td>High v Medium</td><td>12.68</td><td>-3.55</td><td>0.0002</td><td>0.001</td><td>Significant difference identified in high - medium comparison</td></tr>
<tr><td>Low - Medium</td><td>12.68</td><td>-0.96</td><td>0.17</td><td>0.31</td><td>No significant difference</td></tr>
</table></td></tr>
<tr><td>Taxon Richness</td><td>Non-parametric tests</td><td>Kruskal-Wallis Test:
<table>
<tr><td>Statistic</td><td>DF</td><td>P value</td><td>Interpretation</td></tr>
<tr><td>10.02</td><td>2</td><td>0.007</td><td>Significant difference across impact levels</td></tr>
</table>
Dunn's post-hoc comparisons, with p values adjusted for multiple comparisons
<table>
<tr><td>Comparison</td><td>X^2</td><td>Z</td><td>P</td><td>P_{adj}</td><td>Interpretation</td></tr>
<tr><td>High v Low</td><td>10.02</td><td>-2.83</td><td>0.002</td><td>0.006</td><td>Significant difference identified in high - low comparison</td></tr>
<tr><td>High v Medium</td><td>10.02</td><td>-0.34</td><td>0.36</td><td>0.67</td><td>No significant difference</td></tr>
<tr><td>Low - Medium</td><td>10.02</td><td>2.85</td><td>0.002</td><td>0.012</td><td>Significant difference identified in low – medium comparison</td></tr>
</table></td></tr>
<tr><td>Simpson's Diversity</td><td>Non-parametric tests</td><td>Kruskal-Wallis Test:
<table>
<tr><td>Statistic</td><td>DF</td><td>P value</td><td>Interpretation</td></tr>
<tr><td>10.64</td><td>2</td><td>0.005</td><td>Significant difference across impact levels</td></tr>
</table>
Dunn's post-hoc comparisons, with p values adjusted for multiple comparisons
<table>
<tr><td>Comparison</td><td>X^2</td><td>Z</td><td>P</td><td>P_{adj}</td><td>Interpretation</td></tr>
<tr><td>High v Low</td><td>10.64</td><td>-2.87</td><td>0.002</td><td>0.006</td><td>Significant difference identified in high - low comparison</td></tr>
<tr><td>High v Medium</td><td>10.64</td><td>-0.26</td><td>0.39</td><td>0.73</td><td>No significant difference</td></tr>
<tr><td>Low - Medium</td><td>10.64</td><td>2.98</td><td>0.001</td><td>0.008</td><td>Significant difference identified in low – medium comparison</td></tr>
</table></td></tr>
<tr><td>Simpson's Evenness</td><td>Non-parametric tests</td><td>Kruskal-Wallis Test:
<table>
<tr><td>Statistic</td><td>DF</td><td>P value</td><td>Interpretation</td></tr>
<tr><td>0.25</td><td>2</td><td>0.88</td><td>No significant difference across impact levels</td></tr>
</table>
Post-hoc comparisons not required.</td></tr>
</table>

COMPARISON OF SEEP STATIONS TO DEEP MEDIUM AND LOW-IMPACT STATIONS

Table 6. Summary of Seep-vs-Deep Analysis

<table>
<tr><th>Test</th><th>Density</th><th>Taxon Richness</th><th>Simpson's Diversity</th><th>Simpson's Evenness</th></tr>
<tr><td colspan="5">Raw data</td></tr>
<tr><td>Normality tests: by station</td><td>Normality assumption violated in No Name Lake (High-impact) station<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Middle Quinsam</td><td>0.484</td></tr><tr><td>Lower Quinsam 1</td><td>0.857</td></tr><tr><td>No Name (High impact)</td><td>0.030</td></tr><tr><td>No Name (Low impact)</td><td>0.224</td></tr></table></td><td>Normality assumption met across all stations<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Middle Quinsam</td><td>0.546</td></tr><tr><td>Lower Quinsam 1</td><td>0.863</td></tr><tr><td>No Name (High impact)</td><td>0.278</td></tr><tr><td>No Name (Low impact)</td><td>0.469</td></tr></table></td><td>Normality assumption met across all stations<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Middle Quinsam</td><td>0.391</td></tr><tr><td>Lower Quinsam 1</td><td>0.345</td></tr><tr><td>No Name (High impact)</td><td>0.069</td></tr><tr><td>No Name (Low impact)</td><td>0.615</td></tr></table></td><td>Normality assumption met across all stations<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Middle Quinsam</td><td>0.846</td></tr><tr><td>Lower Quinsam 1</td><td>0.291</td></tr><tr><td>No Name (High impact)</td><td>0.750</td></tr><tr><td>No Name (Low impact)</td><td>0.199</td></tr></table></td></tr>
<tr><td>Normality tests: by impact level</td><td>Normality assumption violated in high impact stations<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.007</td></tr><tr><td>Medium</td><td>0.857</td></tr><tr><td>Low</td><td>0.224</td></tr></table></td><td>Normality assumption met in all impact levels<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.165</td></tr><tr><td>Medium</td><td>0.863</td></tr><tr><td>Low</td><td>0.469</td></tr></table></td><td>Normality assumption met in all impact levels<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.053</td></tr><tr><td>Medium</td><td>0.345</td></tr><tr><td>Low</td><td>0.615</td></tr></table></td><td>Normality assumption met in all impact levels<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.982</td></tr><tr><td>Medium</td><td>0.291</td></tr><tr><td>Low</td><td>0.199</td></tr></table></td></tr>
<tr><td>Homogeneity of variance by station</td><td>Homogeneous variance assumption violated across stations<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>3.684</td></tr><tr><td>P</td><td>0.034</td></tr></table></td><td>Homogeneous variance assumption met across all stations<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>1.435</td></tr><tr><td>P</td><td>0.270</td></tr></table></td><td>Homogeneous variance assumption met across all stations<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>1.696</td></tr><tr><td>P</td><td>0.208</td></tr></table></td><td>Homogeneous variance assumption met across all stations<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>1.356</td></tr><tr><td>P</td><td>0.292</td></tr></table></td></tr>
<tr><td>Homogeneity of variance by impact level</td><td>Homogeneous variance assumption violated across impact levels<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>4.566</td></tr><tr><td>P</td><td>0.026</td></tr></table></td><td>Homogeneous variance assumption met across impact levels<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>0.258</td></tr><tr><td>P</td><td>0.775</td></tr></table></td><td>Homogeneous variance assumption met across impact levels<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>1.845</td></tr><tr><td>P</td><td>0.188</td></tr></table></td><td>Homogeneous variance assumption met across impact levels<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>1.911</td></tr><tr><td>P</td><td>0.178</td></tr></table></td></tr>
<tr><td>Ln-transformation attempted</td><td>Yes</td><td>No</td><td>No</td><td>No</td></tr>
</table>

<table>
<tr><th>Test</th><th>Density</th><th>Taxon Richness</th><th>Simpson's Diversity</th><th>Simpson's Evenness</th></tr>
<tr><td colspan="5">Ln-transformed data</td></tr>
<tr><td>Normality tests: by stations</td><td>Normality assumption met across all stations<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Middle Quinsam</td><td>0.677</td></tr><tr><td>Lower Quinsam 1</td><td>0.578</td></tr><tr><td>No Name (High impact)</td><td>0.126</td></tr><tr><td>No Name (Low impact)</td><td>0.162</td></tr></table></td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>Normality tests: by impact level</td><td>Normality assumption met across all impact levels<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.912</td></tr><tr><td>Medium</td><td>0.578</td></tr><tr><td>Low</td><td>0.162</td></tr></table></td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>Homogeneity of variance by station</td><td>Homogeneous variance assumption met across all stations<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>1.226</td></tr><tr><td>P</td><td>0.333</td></tr></table></td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>Homogeneity of variance by impact level</td><td>Homogeneous variance assumption met across all impact levels<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>0.91</td></tr><tr><td>P</td><td>0.421</td></tr></table></td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>Analytical approach used</td><td>Mixed effects model on log data</td><td>Mixed effects model on raw data</td><td>Mixed effects model on raw data</td><td>Mixed effects model on raw data</td></tr>
<tr><td>Conclusion</td><td>Statistically significant difference observed across groups</td><td>No statistically significant difference observed across groups</td><td>No statistically significant difference observed across groups</td><td>Marginally non-significant difference observed across groups</td></tr>
</table>

COMPARISON OF SEEP STATIONS TO DEEP MEDIUM AND LOW-IMPACT STATIONS

Table 7. Detailed Statistical Results for Seep-vs-Deep Analyses

Density — Mixed Effects model (log data)

Summary of model parameter estimates:

Comparison (impact level)	Estimate	SE	T	|Estimate|*2SE>0	Interpretation
Intercept (high) to 0	8.81	0.26	34.22	Yes	Intercept significantly greater than zero (trivial result)
Intercept vs medium	0.37	0.45	0.82	No	Not significantly different from high impact station(s)
Intercept vs low	2.07	0.45	4.64	**Yes**	**Significantly different from high impact station(s)**

Analysis of deviance of models with and without inclusion of *impact* variable:

Model	DF	LogLik	Deviance	X^2	X^2df	X^2 p value	Interpretation
Full Model	5	-22.645	45.289	10.332	2	**0.006**	**Inclusion of impact variable is highly significant**
No Impact Variable	3	-27.810	55.621				

Taxon Richness — Mixed Effects model

Summary of model parameter estimates:

Comparison (impact level)	Estimate	SE	T	|Estimate|*2SE>0	Interpretation
Intercept (high) to 0	22.5	4.30	5.23	Yes	Intercept significantly greater than zero (trivial result)
Intercept vs medium	-0.3	7.45	-0.04	No	Not significantly different from high impact station(s)
Intercept vs low	8.7	7.45	1.17	No	Not significantly different from high impact station(s)

Analysis of deviance of models with and without inclusion of *impact* variable:

Model	DF	LogLik	Deviance	X^2	X^2df	X^2 p value	Interpretation
Full Model	5	-64.420	128.839	3.779	2	0.151	Inclusion of impact variable is not significant
No Impact Variable	3	-66.309	132.619				

Simpson's Diversity — Mixed Effects model

Summary of model parameter estimates:

Comparison (impact level)	Estimate	SE	T	|Estimate|*2SE>0	Interpretation
Intercept (high) to 0	83	0.03	24.36	Yes	Intercept significantly greater than zero (trivial result)
Intercept vs medium	0.04	0.06	0.66	No	Not significantly different from high impact station(s)
Intercept vs low	0.07	0.06	1.26	No	Not significantly different from high impact station(s)

Analysis of deviance of models with and without inclusion of *impact* variable:

Model	DF	LogLik	Deviance	X^2	X^2df	X^2 p value	Interpretation
Full Model	5	30.951	-61.902	3.895	2	0.143	Inclusion of impact variable is not significant
No Impact Variable	3	29.004	-58.007				

Simpson's Evenness — Mixed Effects model

Summary of model parameter estimates:

Comparison (impact level)	Estimate	SE	T	|Estimate|*2SE>0	Interpretation
Intercept (high) to 0	0.30	0.03	12.05	Yes	Intercept significantly greater than zero (trivial result)
Intercept vs medium	0.10	0.04	2.26	Yes	Significantly different from high impact station(s)
Intercept vs low	0.05	0.04	1.18	No	Not significantly different from high impact station(s)

Analysis of deviance of models with and without inclusion of *impact* variable:

Model	DF	LogLik	Deviance	X^2	X^2df	X^2 p value	Interpretation
Full Model	5	23.776	-47.552	5.271	2	0.072	Inclusion of impact variable is marginally non-significant
No Impact Variable	3	21.140	-42.281				

COMPARISON OF SEEP STATIONS TO INLET MEDIUM AND LOW-IMPACT STATIONS

Table 8. Summary of Seep-vs-Inlet Analysis

<table>
<tr><th>Test</th><th>Density</th><th>Taxon Richness</th><th>Simpson's Diversity</th><th>Simpson's Evenness</th></tr>
<tr><td colspan="5">Raw data</td></tr>
<tr><td>Normality tests: by station</td><td>Normality assumption violated in Lower Quinsam Lake 1 and No Name Lake
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Long</td><td>0.092</td></tr><tr><td>Lower Quinsam 1</td><td>0.044</td></tr><tr><td>Lower Quinsam 2</td><td>0.967</td></tr><tr><td>Gooseneck</td><td>0.056</td></tr><tr><td>No Name (High)</td><td>0.030</td></tr></table></td><td>Normality assumption violated in Lower Quinsam Lake 1
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Long</td><td>0.121</td></tr><tr><td>Lower Quinsam 1</td><td><0.0001</td></tr><tr><td>Lower Quinsam 2</td><td>0.826</td></tr><tr><td>Gooseneck</td><td>0.685</td></tr><tr><td>No Name (High)</td><td>0.278</td></tr></table></td><td>Normality assumption violated in Lower Quinsam Lake 1 and 2
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Long</td><td>0.095</td></tr><tr><td>Lower Quinsam 1</td><td>0.034</td></tr><tr><td>Lower Quinsam 2</td><td>0.024</td></tr><tr><td>Gooseneck</td><td>0.891</td></tr><tr><td>No Name (High)</td><td>0.069</td></tr></table></td><td>Normality assumption violated in Lower Quinsam Lake 1
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Long</td><td>0.791</td></tr><tr><td>Lower Quinsam 1</td><td>0.048</td></tr><tr><td>Lower Quinsam 2</td><td>0.936</td></tr><tr><td>Gooseneck</td><td>0.175</td></tr><tr><td>No Name (High)</td><td>0.750</td></tr></table></td></tr>
<tr><td>Normality tests: by impact level</td><td>Normality assumption met across impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.179</td></tr><tr><td>Medium</td><td>0.945</td></tr><tr><td>Low</td><td>0.056</td></tr></table></td><td>Normality assumption violated in high-impact level
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.012</td></tr><tr><td>Medium</td><td>0.613</td></tr><tr><td>Low</td><td>0.685</td></tr></table></td><td>Normality assumption met across impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.183</td></tr><tr><td>Medium</td><td>0.303</td></tr><tr><td>Low</td><td>0.891</td></tr></table></td><td>Normality assumption met across impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.118</td></tr><tr><td>Medium</td><td>0.269</td></tr><tr><td>Low</td><td>0.175</td></tr></table></td></tr>
<tr><td>Homogeneity of variance by station</td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>4</td></tr><tr><td>F</td><td>0.559</td></tr><tr><td>P</td><td>0.695</td></tr></table></td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>4</td></tr><tr><td>F</td><td>0.991</td></tr><tr><td>P</td><td>0.436</td></tr></table></td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>4</td></tr><tr><td>F</td><td>1.607</td></tr><tr><td>P</td><td>0.213</td></tr></table></td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>4</td></tr><tr><td>F</td><td>2.199</td></tr><tr><td>P</td><td>0.108</td></tr></table></td></tr>
<tr><td>Homogeneity of variance by impact level</td><td>Homogeneous variance assumption violated across impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>4.864</td></tr><tr><td>P</td><td>0.018</td></tr></table></td><td>Homogeneous variance assumption violated across impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>4.381</td></tr><tr><td>P</td><td>0.026</td></tr></table></td><td>Homogeneous variance assumption met across impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>2.613</td></tr><tr><td>P</td><td>0.097</td></tr></table></td><td>Homogeneous variance assumption met across impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>3.02</td></tr><tr><td>P</td><td>0.070</td></tr></table></td></tr>
<tr><td>Ln-transformation attempted</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
</table>

<table>
<tr><th>Test</th><th>Density</th><th>Taxon Richness</th><th>Simpson's Diversity</th><th>Simpson's Evenness</th></tr>
<tr><td colspan="5">Ln-transformed data</td></tr>
<tr><td>Normality tests: by station</td><td>Normality assumption violated in Lower Quinsam Lake 1
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Long</td><td>0.408</td></tr><tr><td>Lower Quinsam 1</td><td>0.039</td></tr><tr><td>Lower Quinsam 2</td><td>0.994</td></tr><tr><td>Gooseneck</td><td>0.423</td></tr><tr><td>No Name (High)</td><td>0.126</td></tr></table></td><td>Normality assumption violated in Lower Quinsam Lake 1
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Long</td><td>0.109</td></tr><tr><td>Lower Quinsam 1</td><td><0.0001</td></tr><tr><td>Lower Quinsam 2</td><td>0.671</td></tr><tr><td>Gooseneck</td><td>0.830</td></tr><tr><td>No Name (High)</td><td>0.235</td></tr></table></td><td>Normality assumption violated in Lower Quinsam Lake 1 and 2
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Long</td><td>0.088</td></tr><tr><td>Lower Quinsam 1</td><td>0.034</td></tr><tr><td>Lower Quinsam 2</td><td>0.021</td></tr><tr><td>Gooseneck</td><td>0.892</td></tr><tr><td>No Name (High)</td><td>0.069</td></tr></table></td><td>Normality assumption violated in Lower Quinsam Lake 1
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Long</td><td>0.878</td></tr><tr><td>Lower Quinsam 1</td><td>0.048</td></tr><tr><td>Lower Quinsam 2</td><td>0.935</td></tr><tr><td>Gooseneck</td><td>0.170</td></tr><tr><td>No Name (High)</td><td>0.734</td></tr></table></td></tr>
<tr><td>Normality tests: by impact level</td><td>Normality assumption met across all impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.244</td></tr><tr><td>Medium</td><td>0.931</td></tr><tr><td>Low</td><td>0.423</td></tr></table></td><td>Normality assumption violated in high-impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.027</td></tr><tr><td>Medium</td><td>0.595</td></tr><tr><td>Low</td><td>0.830</td></tr></table></td><td>Normality assumption met across all impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.132</td></tr><tr><td>Medium</td><td>0.271</td></tr><tr><td>Low</td><td>0.892</td></tr></table></td><td>Normality assumption met across all impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.270</td></tr><tr><td>Medium</td><td>0.291</td></tr><tr><td>Low</td><td>0.170</td></tr></table></td></tr>
<tr><td>Homogeneity of variance by station</td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>4</td></tr><tr><td>F</td><td>1.061</td></tr><tr><td>P</td><td>0.403</td></tr></table></td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>4</td></tr><tr><td>F</td><td>2.743</td></tr><tr><td>P</td><td>0.059</td></tr></table></td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>4</td></tr><tr><td>F</td><td>1.551</td></tr><tr><td>P</td><td>0.228</td></tr></table></td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>4</td></tr><tr><td>F</td><td>1.969</td></tr><tr><td>P</td><td>0.14</td></tr></table></td></tr>
<tr><td>Homogeneity of variance by impact level</td><td>Homogeneous variance assumption met across all impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>3.174</td></tr><tr><td>P</td><td>0.062</td></tr></table></td><td>Homogeneous variance assumption violated across impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>5.955</td></tr><tr><td>P</td><td>0.009</td></tr></table></td><td>Homogeneous variance assumption met across all impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>2.414</td></tr><tr><td>P</td><td>0.114</td></tr></table></td><td>Homogeneous variance assumption met across all impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>2</td></tr><tr><td>F</td><td>3.348</td></tr><tr><td>P</td><td>0.055</td></tr></table></td></tr>
<tr><td>Analytical approach used</td><td>Non-parametric tests on raw data</td><td>Non-parametric tests on raw data</td><td>Non-parametric tests on raw data</td><td>Non-parametric tests on raw data</td></tr>
<tr><td>Conclusion</td><td>No statistically significant difference observed across groups</td><td>No statistically significant difference observed across groups</td><td>Statistically significant difference observed across groups</td><td>No statistically significant difference observed across groups</td></tr>
</table>

COMPARISON OF SEEP STATIONS TO INLET MEDIUM AND LOW-IMPACT STATIONS

Table 9. Detailed Statistical Results for Deep Stations

<table>
<tr><th>Metric</th><th>Analytical methods used</th><th>Statistics</th></tr>
<tr><td>Density</td><td>Non-parametric tests</td><td>Kruskal-Wallis Test:
<table>
<tr><th>Statistic</th><th>DF</th><th>P value</th><th>Interpretation</th></tr>
<tr><td>0.769</td><td>2</td><td>0.681</td><td>No significant difference across impact levels</td></tr>
</table>
Post-hoc comparisons not required.</td></tr>
<tr><td>Taxon Richness</td><td>Non-parametric tests</td><td>Kruskal-Wallis Test:
<table>
<tr><th>Statistic</th><th>DF</th><th>P value</th><th>Interpretation</th></tr>
<tr><td>4.570</td><td>2</td><td>0.102</td><td>No significant difference across impact levels</td></tr>
</table>
Post-hoc comparisons not required.</td></tr>
<tr><td>Simpson's Diversity</td><td>Non-parametric tests</td><td>Kruskal-Wallis Test:
<table>
<tr><th>Statistic</th><th>DF</th><th>P value</th><th>Interpretation</th></tr>
<tr><td>10.64</td><td>2</td><td>0.005</td><td>Significant difference across impact levels</td></tr>
</table>
Dunn's post-hoc comparisons, with p values adjusted for multiple comparisons
<table>
<tr><th>Comparison</th><th>X^2</th><th>Z</th><th>P</th><th>P_{adj}</th><th>Interpretation</th></tr>
<tr><td>High v Low</td><td>10.64</td><td>-0.71</td><td>0.24</td><td>0.44</td><td>No significant difference</td></tr>
<tr><td>High v Medium</td><td>10.64</td><td>2.71</td><td>0.003</td><td>0.009</td><td>Significant difference identified in high – medium comparison</td></tr>
<tr><td>Low - Medium</td><td>10.64</td><td>2.88</td><td>0.002</td><td>0.011</td><td>Significant difference identified in low – medium comparison</td></tr>
</table></td></tr>
<tr><td>Simpson's Evenness</td><td>Non-parametric tests</td><td>Kruskal-Wallis Test:
<table>
<tr><th>Statistic</th><th>DF</th><th>P value</th><th>Interpretation</th></tr>
<tr><td>0.612</td><td>2</td><td>0.736</td><td>No significant difference across impact levels</td></tr>
</table>
Post-hoc comparisons not required.</td></tr>
</table>

COMPARISON OF OUTLET STATIONS

Table 10. Summary of Outlet-station Analysis

<table>
<tr><th>Test</th><th>Density</th><th>Taxon Richness</th><th>Simpson's Diversity</th><th>Simpson's Evenness</th></tr>
<tr><td colspan="5">Raw data</td></tr>
<tr><td>Normality tests: by station</td><td>Normality assumption met across all stations
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Long</td><td>0.434</td></tr><tr><td>Lower Quinsam 1</td><td>0.965</td></tr><tr><td>Middle Quinsam</td><td>0.248</td></tr><tr><td>No Name</td><td>0.233</td></tr></table></td><td>Normality assumption met across all station
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Long</td><td>0.611</td></tr><tr><td>Lower Quinsam 1</td><td>0.334</td></tr><tr><td>Middle Quinsam</td><td>0.240</td></tr><tr><td>No Name</td><td>0.285</td></tr></table></td><td>Normality assumption violated in Middle Quinsam Lake
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Long</td><td>0.623</td></tr><tr><td>Lower Quinsam 1</td><td>0.415</td></tr><tr><td>Middle Quinsam</td><td>0.027</td></tr><tr><td>No Name</td><td>0.316</td></tr></table></td><td>Normality assumption met across all stations
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Long</td><td>0.990</td></tr><tr><td>Lower Quinsam 1</td><td>0.864</td></tr><tr><td>Middle Quinsam</td><td>0.708</td></tr><tr><td>No Name</td><td>0.504</td></tr></table></td></tr>
<tr><td>Normality tests: by impact level</td><td>Normality assumption violated in medium- impact level
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.514</td></tr><tr><td>Medium</td><td>0.034</td></tr><tr><td>Low</td><td>N/A</td></tr></table></td><td>Normality assumption met across all impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.160</td></tr><tr><td>Medium</td><td>0.202</td></tr><tr><td>Low</td><td>N/A</td></tr></table></td><td>Normality assumption violated in medium impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.185</td></tr><tr><td>Medium</td><td>0.002</td></tr><tr><td>Low</td><td>N/A</td></tr></table></td><td>Normality assumption met across all impact levels
<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.804</td></tr><tr><td>Medium</td><td>0.540</td></tr><tr><td>Low</td><td>N/A</td></tr></table></td></tr>
<tr><td>Homogeneity of variance by station</td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>1.28</td></tr><tr><td>P</td><td>0.315</td></tr></table></td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>0.684</td></tr><tr><td>P</td><td>0.575</td></tr></table></td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>2.769</td></tr><tr><td>P</td><td>0.076</td></tr></table></td><td>Homogeneous variance assumption met across all stations
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>0.547</td></tr><tr><td>P</td><td>0.657</td></tr></table></td></tr>
<tr><td>Homogeneity of variance by impact level</td><td>Homogeneous variance assumption met across impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>1</td></tr><tr><td>F</td><td>0.523</td></tr><tr><td>P</td><td>0.479</td></tr></table></td><td>Homogeneous variance assumption met across impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>1</td></tr><tr><td>F</td><td>4.015</td></tr><tr><td>P</td><td>0.060</td></tr></table></td><td>Homogeneous variance assumption met across impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>1</td></tr><tr><td>F</td><td>1.746</td></tr><tr><td>P</td><td>0.203</td></tr></table></td><td>Homogeneous variance assumption met across impact levels
<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>1</td></tr><tr><td>F</td><td>2.054</td></tr><tr><td>P</td><td>0.169</td></tr></table></td></tr>
<tr><td>Ln-transformation attempted</td><td>Yes</td><td>No</td><td>Yes</td><td>No</td></tr>
</table>

<table>
<tr><th>Test</th><th>Density</th><th>Taxon Richness</th><th>Simpson's Diversity</th><th>Simpson's Evenness</th></tr>
<tr><td colspan="5">Ln-transformed data</td></tr>
<tr><td>Normality tests: by station</td><td>Normality assumption met across all stations<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Long</td><td>0.569</td></tr><tr><td>Lower Quinsam 1</td><td>0.583</td></tr><tr><td>Middle Quinsam</td><td>0.307</td></tr><tr><td>No Name (High)</td><td>0.403</td></tr></table></td><td>N/A</td><td>Normality assumption violated in Middle Quinsam Lake<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>Long</td><td>0.604</td></tr><tr><td>Lower Quinsam 1</td><td>0.419</td></tr><tr><td>Middle Quinsam</td><td>0.026</td></tr><tr><td>No Name (High)</td><td>0.298</td></tr></table></td><td>N/A</td></tr>
<tr><td>Normality tests: by impact level</td><td>Normality assumption met across all impact levels<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.439</td></tr><tr><td>Medium</td><td>0.528</td></tr><tr><td>Low</td><td>N/A</td></tr></table></td><td>N/A</td><td>Normality assumption violated in medium impact levels<table><tr><td>Station</td><td>Shapiro test p</td></tr><tr><td>High</td><td>0.174</td></tr><tr><td>Medium</td><td>0.001</td></tr><tr><td>Low</td><td>N/A</td></tr></table></td><td>N/A</td></tr>
<tr><td>Homogeneity of variance by station</td><td>Homogeneous variance assumption met across stations<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>2.872</td></tr><tr><td>P</td><td>0.069</td></tr></table></td><td>N/A</td><td>Homogeneous variance assumption met across stations<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>3</td></tr><tr><td>F</td><td>2.739</td></tr><tr><td>P</td><td>0.078</td></tr></table></td><td>N/A</td></tr>
<tr><td>Homogeneity of variance by impact level</td><td>Homogeneous variance assumption met across impact levels<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>1</td></tr><tr><td>F</td><td>0.580</td></tr><tr><td>P</td><td>0.456</td></tr></table></td><td>N/A</td><td>Homogeneous variance assumption met across impact levels<table><tr><td>Statistic</td><td>Value</td></tr><tr><td>DF</td><td>1</td></tr><tr><td>F</td><td>1.174</td></tr><tr><td>P</td><td>0.203</td></tr></table></td><td>N/A</td></tr>
<tr><td>Analytical approach used</td><td>Mixed-effects model on log data</td><td>Mixed-effects model on raw data</td><td>Non-parametric tests on raw data</td><td>Mixed-effects model on raw data</td></tr>
<tr><td>Conclusion</td><td>No statistically significant difference observed across groups</td><td>No statistically significant difference observed across groups</td><td>No statistically significant difference observed across groups</td><td>No statistically significant difference observed across groups</td></tr>
</table>

COMPARISON OF OUTLET STATIONS

Table 11. Detailed Statistical Results for Outlet Stations

Density — Mixed-effects model (log data)

Summary of model parameter estimates:

Comparison (impact level)	Estimate	SE	T	|Estimate| *2SE>0	Interpretation
Intercept (high) to 0	10.35	0.29	35.26	Yes	Intercept significantly greater than zero (trivial result)
Intercept vs medium	-0.72	0.42	-1.72	No	Not significantly different from high impact station(s)

Analysis of deviance of models with and without inclusion of *impact* variable:

Model	DF	LogLik	Deviance	X^2	X^2df	X^2 p value	Interpretation
Full Model	4	-17.607	35.213	3.641	1	0.056	Inclusion of impact variable is marginally non-significant
No Impact Variable	3	-19.427	38.854				

Taxon Richness — Mixed-effects model

Summary of model parameter estimates:

Comparison (impact level)	Estimate	SE	T	|Estimate| *2SE>0	Interpretation
Intercept (high) to 0	31.2	2.32	13.47	Yes	Intercept significantly greater than zero (trivial result)
Intercept vs medium	-0.9	3.28	-0.27	No	Not significantly different from high impact station(s)

Analysis of deviance of models with and without inclusion of *impact* variable:

Model	DF	LogLik	Deviance	X^2	X^2df	X^2 p value	Interpretation
Full Model	4	-67.150	134.300	0.084	1	0.772	Inclusion of impact variable is not significant
No Impact Variable	3	-67.192	134.384				

Simpson's Diversity — Non-parametric tests

Kruskal-Wallis Test:

Statistic	DF	P value	Interpretation
0.006	1	0.940	No significant difference across impact levels

Post-hoc comparisons not required.

Simpson's Evenness — Mixed-effects model

Summary of model parameter estimates:

Comparison (impact level)	Estimate	SE	T	|Estimate| *2SE>0	Interpretation
Intercept (high) to 0	0.31	0.06	5.19	Yes	Intercept significantly greater than zero (trivial result)
Intercept vs medium	-0.01	0.08	-0.14	No	Not significantly different from high impact station(s)

Analysis of deviance of models with and without inclusion of *impact* variable:

Model	DF	LogLik	Deviance	X^2	X^2df	X^2 p value	Interpretation
Full Model	4	26.013	-52.026	0.039	1	0.844	Inclusion of impact variable is not significant
No Impact Variable	3	25.994	-51.987				

Appendix V-V
Quinsam River CABIN
Field Data and Map

Field Crew: JF/KR Site Code: QWA 01

Sampling Date: (DD/MM/YYYY) 14/09/16

☑ **Occupational Health & Safety: Site Inspection Sheet completed**

PRIMARY SITE DATA

CABIN Study Name: Quinsam Watershed Local Basin Name: Quinsam Subbasin

River/Stream Name: Quinsam River Stream Order: (map scale 1:50,000) 4

Select one: ☑ Test Site ☐ Potential Reference Site

Geographical Description/Notes:

Surrounding Land Use: (check those present) Information Source: Local Expert

☑ Forest ☐ Field/Pasture ☐ Agriculture ☐ Residential/Urban

☑ Logging ☑ Mining ☐ Commercial/Industrial ☐ Other _____

Dominant Surrounding Land Use: (check one) Information Source: Local Expert

☐ Forest ☐ Field/Pasture ☐ Agriculture ☐ Residential/Urban

☑ Logging ☐ Mining ☐ Commercial/Industrial ☐ Other _____

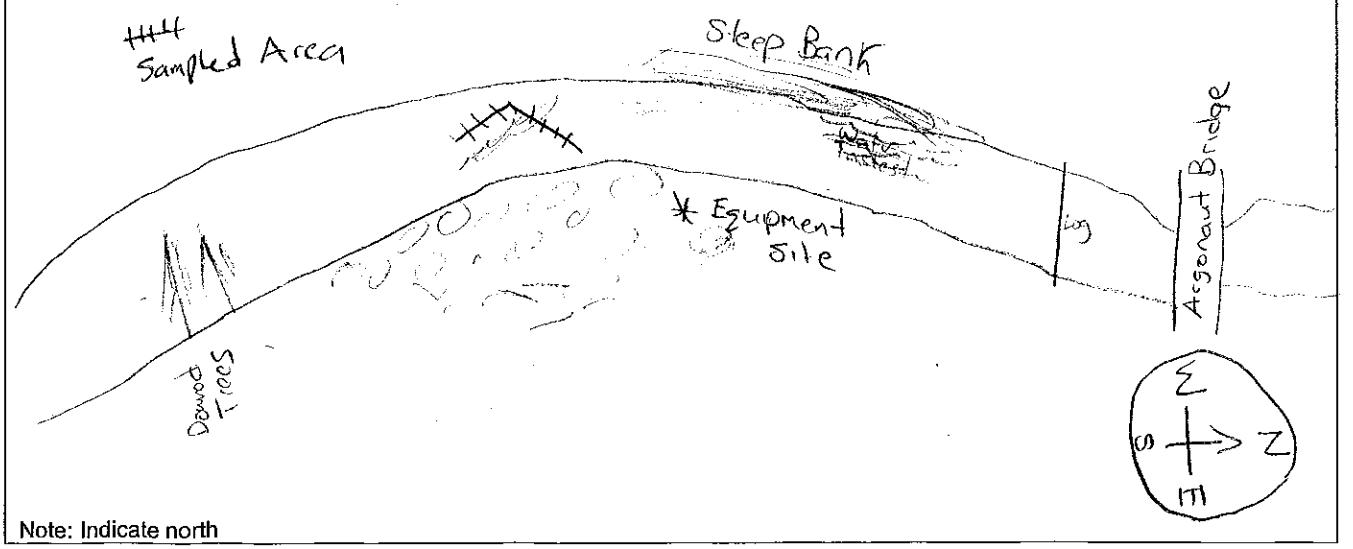
Location Data

Accuracy ± 6M

Latitude: 49.929901 N Longitude: - 125.510513 W (DMS or DD)

Elevation: ~~296~~ 297M (fasl or masl) GPS Datum: ☑ GRS80 (NAD83/WGS84) ☐ Other: _____

Site Location Map Drawing



Note: Indicate north

Field Crew: JF/KC Site Code: QWA-01

Sampling Date: (DD/MM/YYYY) 14/09/2016

Photos

☑ Field Sheet ☑ Upstream ☐ Downstream ☐ Across Site ☐ Aerial View (google earth)

☐ Substrate (exposed) ☐ Substrate (aquatic) ☐ Other _____

REACH DATA *(represents 6 times bankfull width)*

1. Habitat Types: *(check those present)*

☑ Riffle ☑ Rapids ☑ Straight run ☐ Pool/Back Eddy

2. Canopy Coverage: *(stand in middle of stream and look up, check one)*

☐ 0 % ☐ 1-25 % ☐ 26-50 % ☐ 51-75 % ☑ 76-100 %

3. Macrophyte Coverage: *(not algae or moss, check one)*

☑ 0 % ☐ 1-25 % ☐ 26-50 % ☐ 51-75 % ☐ 76-100 %

4. Streamside Vegetation: *(check those present)*

☐ ferns/grasses ☑ shrubs ☑ deciduous trees ☑ coniferous trees

5. Dominant Streamside Vegetation: *(check one)*

☐ ferns/grasses ☑ shrubs ☐ deciduous trees ☐ coniferous trees

6. Periphyton Coverage on Substrate: *(benthic algae, not moss, check one)*

☑ **1** - Rocks are not slippery, no obvious colour (thin layer < 0.5 mm thick)

☐ **2** - Rocks are slightly slippery, yellow-brown to light green colour (0.5-1 mm thick)

☐ **3** - Rocks have a noticeable slippery feel (footing is slippery), with patches of thicker green to brown algae (1-5 mm thick)

☐ **4** - Rocks are very slippery (algae can be removed with thumbnail), numerous large clumps of green to dark brown algae (5 mm -20 mm thick)

☐ **5** - Rocks are mostly obscured by algal mat, extensive green, brown to black algal mass may have long strands (> 20 mm thick)

Note: 1 through 5 represent categories entered into the CABIN database.

BENTHIC MACROINVERTEBRATE DATA

Habitat sampled: (*check one*) ☑ riffle ☐ rapids ☐ straight run

400 µm mesh Kick Net	Yes
Person sampling	KR
Sampling time (i.e. 3 min.)	3 Min
No. of sample jars	1
Typical depth in kick area (cm)	25-50 cm

Preservative used: Formalin

Sampled sieved on site using "Bucket Swirling Method":

☐ YES ☐ NO

If YES, debris collected for QAQC ☐

Note: Indicate if a sampling method other than the recommended 400 µm mesh kick net is used.

CABIN CANADIAN AQUATIC BIOMONITORING NETWORK

Field Crew: JT/KR Site Code: OWA-01

Sampling Date: (DD/MM/YYYY) 14/09/2016

WATER CHEMISTRY DATA Time: 10:00 am (24 hr clock) Time zone: PST

Air Temp: 15°C (°C) Water Temp: 16.2 (°C) pH: 7.51

Specific Conductance: 47.9 (µs/cm) DO: 7.09 (mg/L) Turbidity: _____ (NTU)

ORP 143.9

Check if water samples were collected for the following analyses:

- ☑ TSS (Total Suspended Solids)
- ☐ Nitrogen (i.e. Total, Nitrate, Nitrite, Dissolved, and/or Ammonia)
- ☐ Phosphorus (Total, Ortho, and/or Dissolved)
- ☑ Major Ions (i.e. Alkalinity, Hardness, Chloride, and/or Sulphate) ☑ Other Metals

Note: Determining alkalinity is recommended, as are other analyses, but not required for CABIN assessments.

CHANNEL DATA

Slope - Indicate how slope was measured: (check one)

☐ **Calculated from map**

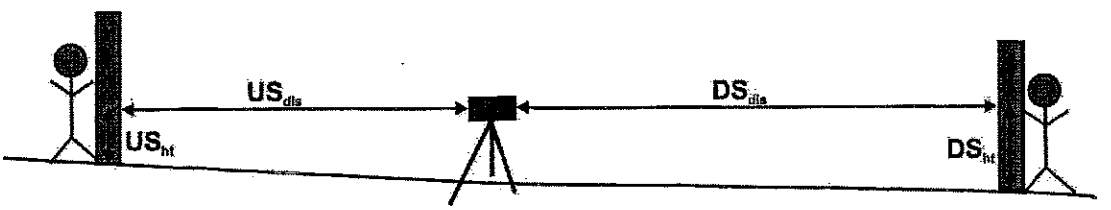
Scale: _____ (Note: small scale map recommended if field measurement is not possible - i.e. 1:20,000).
contour interval (vertical distance) _____ (m),
distance between contour intervals (horizontal distance) _____ (m)
slope = vertical distance/horizontal distance = _____

OR

☑ **Measured in field**

Circle device used and fill out table according to device:
(a) Survey Equipment b. Hand Level & Measuring Tape

Measurements	Upstream (U/S)	Downstream(D/S)	Calculation
[a]Top Hairline (T)			
[a]Mid Hairline (ht) OR [b]Height of rod			
[a]Bottom Hairline (B)			
[b]Distance (dis) OR [a]T-B x 100	[a]US_{dis}=T-B	[a]DS_{dis}=T-B	$US_{dis}+DS_{dis}$=
Change in height (Δht)			$DS_{ht}-US_{ht}$=
Slope (Δht/total dis)			



Field Crew: JF/KR Site Code: QWA01

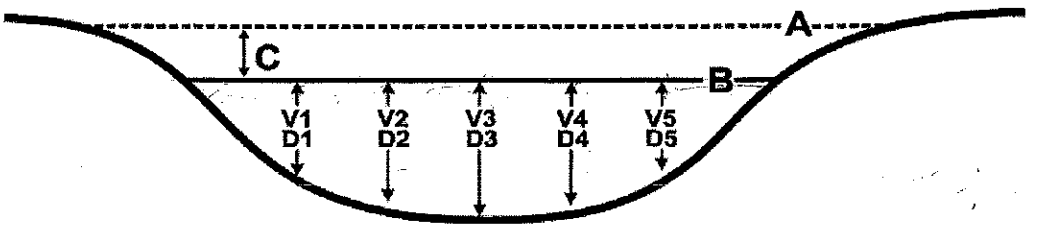
Sampling Date: (DD/MM/YYYY) 14/09/2016

Widths and Depth

Location at site: Within Kick Area (Indicate where in sample reach, ex. d/s of kick area)

A - Bankfull Width: 11.70 (m) B - Wetted Stream Width: ~~11.85~~ (m) 11.35m

C - Bankfull–Wetted Depth (height from water surface to Bankfull): 0.53m (cm)



Note:
Wetted widths > 5 m, measure a minimum of 5-6 equidistant locations;
Wetted widths < 5 m, measure 3-4 equidistant locations.

Velocity and Depth

Check appropriate velocity measuring device and fill out the appropriate section in chart below. Distance from shore and depth are required regardless of method:

☐ **Velocity Head Rod (or ruler)**: Velocity Equation (m/s) = √ [2(ΔD/100) * 9.81]

☑ **Rotary meters**: Gurley/Price/Mini-Price/Propeller (Refer to specific meter conversion chart for calculation)

☐ **Direct velocity measurements**: ☐ Marsh-McBirney ☐ Sontek or ☐ Other

1.9 3.8 5.7 7.6 9.5

	1	2	3	4	5	6	AVG
Distance from Shore (m)	~~1.00~~	~~3.20~~	~~4.80~~	~~6.40~~	~~8.00~~	~~9.6~~	
Depth (**D**) (cm)	35.5	42	30	34	27		
Velocity Head Rod (ruler)							
Flowing water Depth (D_1) (cm)							
Depth of Stagnation (D_2) (cm)							
Change in depth ($\Delta D = D_2 - D_1$) (cm)							
Rotary meter							
Revolutions							
Time (minimum 40 seconds)							
Direct Measurement or calculation							
Velocity (**V**) (m/s)	0.4	0.5	0.7	0.6	0.7		

Field Crew: KR / JE Site Code: QWA-01

Sampling Date: (DD/MM/YYYY) 14/09/2016

SUBSTRATE DATA

Surrounding/Interstitial Material

Circle the substrate size category for the surrounding material.

Substrate Size Class	Category	
Organic Cover	0	0
< 0.1 cm (fine sand, silt or clay)	1	0
0.1-0.2 cm (coarse sand)	2	0
0.2-1.6 cm (gravel)	3	11
1.6-3.2 cm (small pebble)	4	6
3.2-6.4 cm (large pebble)	5	22
6.4-12.8 cm (small cobble)	6	31
12.8-25.6 cm (cobble)	7	20
> 25.6 cm (boulder)	8	10
Bedrock	9	

100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embededness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

	Diameter (cm)	E		Diameter (cm)	E		Diameter (cm)	E		Diameter (cm)	E
1	0.5		26	1		51	4		76	2.5	
2	4		27	8		52	14		77	3	
3	2.5		28	4		53	12	1/4	78	1.5	
4	16		29	0.5		54	9		79	6	
5	22		30	1		55	5.5		80	10.5	
6	4		31	32		56	15.5		81	3.5	
7	1		32	9		57	11		82	8	1/4
8	1.5		33	5	0	58	1		83*	6	1/4
9	2		34	10		59	4		84	5.2	
10	5	1/2	35	2		60	3		85	13	
11	0.5		36	0.5		61	13		86	12	
12	4.5		37	7		62	9		87	5.5	
13	13		38	7		63*	1	0	88	5.5	
14	16		39	1.5		64	3		89	4	
15	22		40	4		65	15		90	14	
16	8		41	10		66	6		91	6	
17	12.5		42	39		67	11.5		92	9	
18	12		43	11	1/2	68	3.5		93*	9	0
19	7		44	8		69	2		94	4.5	
20	8.5	1/4	45	3		70	7		95	6	
21	15		46	2		71	7		96	4	
22	20		47	1		72	14.5		97	3.3	
23	17		48	15		73*	8.5	3/4	98	4.6	
24	2		49	0.5		74	19		99	4.5	
25	1		50	4		75	6.5		100	11	1/2

Note: The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

Field Crew: JF/KR Site Code: QINA-01

Sampling Date: (DD/MM/YYYY) 14/09/2016

SITE INSPECTION

Site Inspected by: JF/KR

Communication Information

☑ Itinerary left with contact person (include contact numbers)

Contact Person: Gary or Nick Time checked-in: 9:00

Form of communication: ☑ radio ☐ cell ☐ satellite ☐ hotel/pay phone ☐ SPOT

Phone number: (250) 286-3224

Vehicle Safety

☑ Safety equipment (first aid, fire extinguisher, blanket, emergency kit in vehicle)

☑ Equipment and chemicals safely secured for transport

☑ Vehicle parked in safe location; pylons, hazard light, reflective vests if necessary

Notes:

Shore & Wading Safety

☑ Wading Task Hazard Analysis read by all field staff

☑ Wading Safe Work Procedures read by all field staff

☑ Instream hazards identified (i.e. log jams, deep pools, slippery rocks)

☑ PFD worn

☑ Appropriate footwear, waders, wading belt

☒ Belay used No

Notes:

QRD-02

Field Crew: JF, KR & NB Site Code: ~~QRD01~~

Sampling Date: (DD/MM/YYYY) 15/09/2016

☐ **Occupational Health & Safety: Site Inspection Sheet completed**

PRIMARY SITE DATA

CABIN Study Name: Quinsam Watershed Local Basin Name: Quinsam Sub-Basin

River/Stream Name: Quinsam River Stream Order: (map scale 1:50,000) 4

Select one: ☑ Test Site ☐ Potential Reference Site

Geographical Description/Notes:

Surrounding Land Use: (check those present) Information Source: _____

☑ Forest ☐ Field/Pasture ☐ Agriculture ☐ Residential/Urban

☑ Logging ☑ Mining ☐ Commercial/Industrial ☐ Other _____

Dominant Surrounding Land Use: (check one) Information Source: _____

☐ Forest ☐ Field/Pasture ☐ Agriculture ☐ Residential/Urban

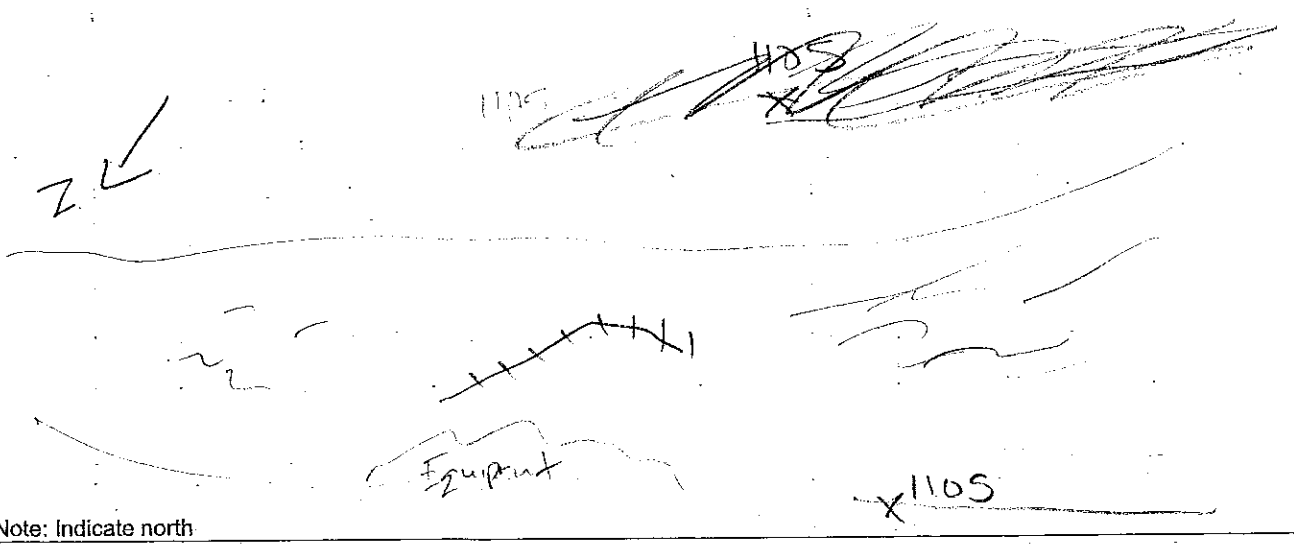
☑ Logging ☐ Mining ☐ Commercial/Industrial ☐ Other _____

Location Data

Latitude: 49.941631 N Longitude: - 25.460419 W (DMS or DD)

Elevation: 216 (fasl or masl) GPS Datum: ☐ GRS80 (NAD83/WGS84) ☐ Other: _____

Site Location Map Drawing



Note: Indicate north

Field Crew: JF/NB/KP Site Code: QRD-02

Sampling Date: (DD/MM/YYYY) 15/09/2017

Photos

☐ Field Sheet ☑ Upstream ☑ Downstream ☑ Across Site ☐ Aerial View

☑ Substrate (exposed) ☑ Substrate (aquatic) ☐ Other _____

REACH DATA *(represents 6 times bankfull width)*

1. Habitat Types: *(check those present)*

☑ Riffle ☐ Rapids ☑ Straight run ☐ Pool/Back Eddy

2. Canopy Coverage: *(stand in middle of stream and look up, check one)*

☐ 0 % ☐ 1-25 % ☑ 26-50 % ☐ 51-75 % ☐ 76-100 %

3. Macrophyte Coverage: *(not algae or moss, check one)*

☑ 0 % ☐ 1-25 % ☐ 26-50 % ☐ 51-75 % ☐ 76-100 %

4. Streamside Vegetation: (*check those present)*

☑ ferns/grasses ☑ shrubs ☐ deciduous trees ☑ coniferous trees

5. Dominant Streamside Vegetation: *(check one)*

☐ ferns/grasses ☑ shrubs ☐ deciduous trees ☐ coniferous trees

6. Periphyton Coverage on Substrate: *(benthic algae, not moss, check one)*

☑ **1** - Rocks are not slippery, no obvious colour (thin layer < 0.5 mm thick)

☐ **2** - Rocks are slightly slippery, yellow-brown to light green colour (0.5-1 mm thick)

☐ **3** - Rocks have a noticeable slippery feel (footing is slippery), with patches of thicker green to brown algae (1-5 mm thick)

☐ **4** - Rocks are very slippery (algae can be removed with thumbnail), numerous large clumps of green to dark brown algae (5 mm -20 mm thick)

☐ **5** - Rocks are mostly obscured by algal mat, extensive green, brown to black algal mass may have long strands (> 20 mm thick)

Note: 1 through 5 represent categories entered into the CABIN database.

BENTHIC MACROINVERTEBRATE DATA

Habitat sampled: (*check one*) ☑ riffle ☐ rapids ☐ straight run

400 µm mesh Kick Net	Yes
Person sampling	JF
Sampling time (i.e. 3 min.)	3 min
No. of sample jars	1
Typical depth in kick area (cm)	40cm

Preservative used: Form.

Sampled sieved on site using "Bucket Swirling Method":

☐ YES ☐ NO

If YES, debris collected for QAQC ☐

Note: Indicate if a sampling method other than the recommended 400 µm mesh kick net is used.

Field Crew: JF/KR/NB Site Code: QUO2

Sampling Date: (DD/MM/YYYY) 15/09/16

WATER CHEMISTRY DATA **Time:** 13:00 (24 hr clock) **Time zone:** PST

Air Temp: 18°C (°C) Water Temp: 17.4 (°C) pH: 7.84

Specific Conductance: 145.6 (µs/cm) DO: 7.82 (mg/L) Turbidity: _____ (NTU)

Check if water samples were collected for the following analyses:

- ☑ TSS (Total Suspended Solids)
- ☐ Nitrogen (i.e. Total, Nitrate, Nitrite, Dissolved, and/or Ammonia)
- ☐ Phosphorus (Total, Ortho, and/or Dissolved)
- ☑ Major Ions (i.e. Alkalinity, Hardness, Chloride, and/or Sulphate)
- ☑ Other Metals

Note: Determining alkalinity is recommended, as are other analyses, but not required for CABIN assessments.

CHANNEL DATA

Slope - Indicate how slope was measured: (check one)

☐ **Calculated from map**

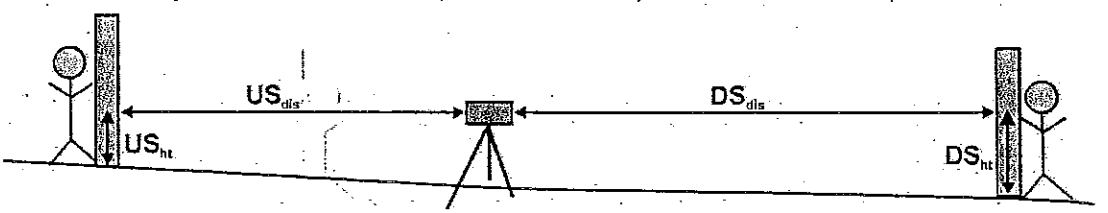
Scale: _____ (Note: small scale map recommended if field measurement is not possible - i.e. 1:20,000).
contour interval (vertical distance) _____ (m),
distance between contour intervals (horizontal distance) _____ (m)
slope = vertical distance/horizontal distance = _____

OR

☑ **Measured in field**

Circle device used and fill out table according to device:
(a. Survey Equipment) b. Hand Level & Measuring Tape

Measurements	Upstream (U/S)	Downstream(D/S)	Calculation
[a]Top Hairline (T)			
[a]Mid Hairline (ht) OR [b]Height of rod			
[a]Bottom Hairline (B)			
[b]Distance (dis) OR [a]T-B x 100	[a]US_{dis}=T-B	[a]DS_{dis}=T-B	$US_{dis}+DS_{dis}$=
Change in height (Δht)			$DS_{ht}-US_{ht}$=
Slope (Δht/total dis)			1.03



Field Crew: KR JF INB Site Code: QRD-02

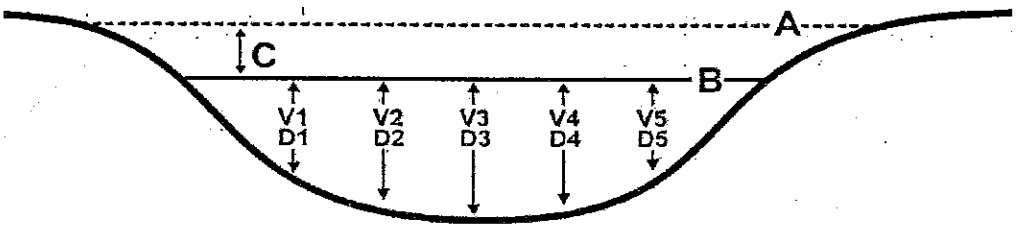
Sampling Date: (DD/MM/YYYY) 15/09/2016

Widths and Depth

Location at site: Through kick (Indicate where in sample reach, ex. d/s of kick area)

A - Bankfull Width: 18.7 (m) B - Wetted Stream Width: 13.9 (m)

C - Bankfull–Wetted Depth (height from water surface to Bankfull): 0.62m (cm)



Note:
Wetted widths > 5 m, measure a minimum of 5-6 equidistant locations;
Wetted widths < 5 m, measure 3-4 equidistant locations.

Velocity and Depth

Check appropriate velocity measuring device and fill out the appropriate section in chart below. Distance from shore and depth are required regardless of method:

☐ **Velocity Head Rod (or ruler):** Velocity Equation (m/s) = $\sqrt{[2(\Delta D/100) * 9.81]}$

☑ **Rotary meters:** Gurley/Price/Mini-Price/Propeller (Refer to specific meter conversion chart for calculation)

☐ **Direct velocity measurements:** ☐ Marsh-McBirney ☐ Sontek or ☐ Other_____

	1	2	3	4	5	6	AVG
Distance from Shore (m)	2.32	4.64	6.96	9.28	11.60		
Depth (D) (cm) X	21	25	48	43	34		
Velocity Head Rod (ruler)							
Flowing water Depth (D_1) (cm)							
Depth of Stagnation (D_2) (cm)							
Change in depth ($\Delta D=D_2-D_1$) (cm)							
Rotary meter							
Revolutions							
Time (minimum 40 seconds)							
Direct Measurement or calculation							
Velocity (V) (m/s) X	0.3	0.4	0.8	1.0	0.7	~~0.64~~	0.64

3.2/5

Field Crew: JF/KR/NB Site Code: QRD-02

Sampling Date: (DD/MM/YYYY) 15/09/2016

SUBSTRATE DATA

Surrounding/Interstitial Material

Circle the substrate size category for the surrounding material.

Substrate Size Class	Category
Organic Cover	0
< 0.1 cm (fine sand, silt or clay)	1
0.1-0.2 cm (coarse sand)	2
0.2-1.6 cm (gravel)	3
1.6-3.2 cm (small pebble)	4
3.2-6.4 cm (large pebble)	5
6.4-12.8 cm (small cobble)	6
12.8-25.6 cm (cobble)	7
> 25.6 cm (boulder)	8
Bedrock	9

100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embededness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

	Diameter (cm)	E		Diameter (cm)	E		Diameter (cm)	E		Diameter (cm)	E
1	0		26	1		51	5		76	2	
2 X	5	0	27	5		52 X	1	0	77	0	
3	3		28	8		53	6		78	21	
4	11		29	3		54	5		79	4	
5	15		30	0.3		55	10		80	13	
6	0		31	4		56	2		81	22	
7	23		32 X	5	1/4	57	10		82 X	14	1/4
8	7		33	1		58	0		83	19	
9	18		34	7		59	41		84	9	
10	1.0		35	3		60	35		85	15	
11	13		36	1		61	19		86	10	
12 X	6	0	37	2		62 X	14	3/4	87	1	
13	15		38	5		63	16		88	2	
14	0		39	18		64	22		89	9	
15	10		40	8		65	15		90	16	
16	0		41	3		66	21		91	7	
17	21		42 X	0		67	7		92 X	1	0
18	16		43	1	1/4	68	14		93	9	
19	10		44	9		69	12		94	9	
20	19		45	7		70	15		95	0.5	
21	7		46	2		71	16		96	8	
22 X	20	1/2	47	8		72 X	6	0	97	0	
23	0.5		48	5		73	17		98	6	
24	5		49	24		74	22		99	2	
25	8		50	3		75	6		100	16	

Note: The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

Field Crew: JF/KR/NB Site Code: QRD-02

Sampling Date: (DD/MM/YYYY) 15/09/2016

SITE INSPECTION

Site Inspected by: JF/KR/NB

Communication Information

☑ Itinerary left with contact person (include contact numbers)

Contact Person: Gary Time checked-in: 11:15

Form of communication: ☑ radio ☑ cell ☐ satellite ☐ hotel/pay phone ☐ SPOT

Phone number: (250) 286-3224

Vehicle Safety

☑ Safety equipment (first aid, fire extinguisher, blanket, emergency kit in vehicle)

☑ Equipment and chemicals safely secured for transport

☑ Vehicle parked in safe location; pylons, hazard light, reflective vests if necessary

Notes:

Shore & Wading Safety

☑ Wading Task Hazard Analysis read by all field staff

☑ Wading Safe Work Procedures read by all field staff

☑ Instream hazards identified (i.e. log jams, deep pools, slippery rocks)

☑ PFD worn

☑ Appropriate footwear, waders, wading belt

☒ Belay used

Notes:

TSQ-03

Field Crew: JF/KR/NB Site Code: ~~TSQ-03~~

Sampling Date: (DD/MM/YYYY) 19/09/2016

☐ **Occupational Health & Safety: Site Inspection Sheet completed**

PRIMARY SITE DATA

CABIN Study Name: Quinsam Watershed Local Basin Name: Quinsam Sub-Basin

River/Stream Name: Quinsam River Stream Order: (map scale 1:50,000) 4

Select one: ☑ Test Site ☐ Potential Reference Site

Geographical Description/Notes:

Surrounding Land Use: (check those present) Information Source: ~~Local Expert~~

☑ Forest ☐ Field/Pasture ☐ Agriculture ☐ Residential/Urban

☑ Logging ☑ Mining ☐ Commercial/Industrial ☐ Other _____

Dominant Surrounding Land Use: (check one) Information Source: ~~Local Expert~~

☐ Forest ☐ Field/Pasture ☐ Agriculture ☐ Residential/Urban

☑ Logging ☐ Mining ☐ Commercial/Industrial ☐ Other _____

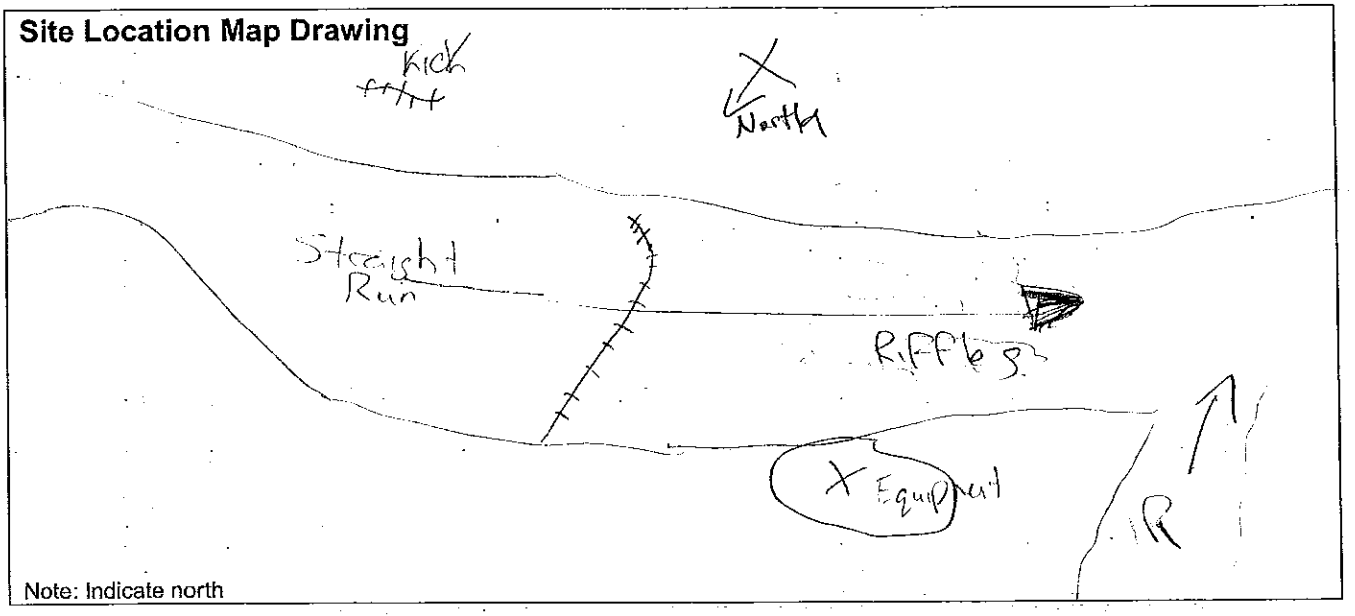
Location Data

Check GPS

Latitude: 49.939487 N Longitude: - 125.417030 W (DMS or DD) Accuracy +/- 5m

Elevation: 197 (fasl or masl) GPS Datum: ☐ GRS80 (NAD83/WGS84) ☐ Other: _____

Site Location Map Drawing



Note: Indicate north

CABIN

Field Crew: KR/JF/NB Site Code: TSQ-03

Sampling Date: (DD/MM/YYYY) 19/09/2016

Photos

☐ Field Sheet ☑ Upstream ☑ Downstream ☑ Across Site ☐ Aerial View
☑ Substrate (exposed) ☑ Substrate (aquatic) ☐ Other _____

REACH DATA *(represents 6 times bankfull width)*

1. Habitat Types: *(check those present)*
☑ Riffle ☐ Rapids ☑ Straight run ☐ Pool/Back Eddy

2. Canopy Coverage: *(stand in middle of stream and look up, check one)*
☐ 0 % ☐ 1-25 % ☑ 26-50 % ☐ 51-75 % ☐ 76-100 %

3. Macrophyte Coverage: *(not algae or moss, check one)*
☐ 0 % ☑ 1-25 % ☐ 26-50 % ☐ 51-75 % ☐ 76-100 %

4. Streamside Vegetation: (*check those present)*
☑ ferns/grasses ☑ shrubs ☑ deciduous trees ☑ coniferous trees

5. Dominant Streamside Vegetation: *(check one)*
☐ ferns/grasses ☑ shrubs ☐ deciduous trees ☐ coniferous trees

6. Periphyton Coverage on Substrate: *(benthic algae, not moss, check one)*

☐ **1** - Rocks are not slippery, no obvious colour (thin layer < 0.5 mm thick)
☑ **2** - Rocks are slightly slippery, yellow-brown to light green colour (0.5-1 mm thick)
☐ **3** - Rocks have a noticeable slippery feel (footing is slippery), with patches of thicker green to brown algae (1-5 mm thick)
☐ **4** - Rocks are very slippery (algae can be removed with thumbnail), numerous large clumps of green to dark brown algae (5 mm -20 mm thick)
☐ **5** - Rocks are mostly obscured by algal mat, extensive green, brown to black algal mass may have long strands (> 20 mm thick)

Note: 1 through 5 represent categories entered into the CABIN database.

BENTHIC MACROINVERTEBRATE DATA

Habitat sampled: (*check one*) ☐ riffle ☐ rapids ☑ straight run

400 µm mesh Kick Net	Yes
Person sampling	KR
Sampling time (i.e. 3 min.)	3 min
No. of sample jars	1
Typical depth in kick area (cm)	75 cm

Preservative used: Formalin

Sampled sieved on site using "Bucket Swirling Method":
☐ YES ☐ NO
If YES, debris collected for QAQC ☐

Note: Indicate if a sampling method other than the recommended 400 µm mesh kick net is used.

TSQ-03

Field Crew: KP/TF/NB Site Code: ~~TSQ~~

Sampling Date: (DD/MM/YYYY) 19/09/2016

WATER CHEMISTRY DATA **Time:** 12:00 (24 hr clock) **Time zone:** PST

Air Temp: 18°C (°C) Water Temp: 14.9 (°C) pH: 7.32

Specific Conductance: 135.5 (µs/cm) DO: 7.83 (mg/L) Turbidity: _____ (NTU)

134.0 mV

Check if water samples were collected for the following analyses:

- ☑ TSS (Total Suspended Solids)
- ☐ Nitrogen (i.e. Total, Nitrate, Nitrite, Dissolved, and/or Ammonia)
- ☐ Phosphorus (Total, Ortho, and/or Dissolved)
- ☑ Major Ions (i.e. Alkalinity, Hardness, Chloride, and/or Sulphate)
- ☑ Other Metals

Note: Determining alkalinity is recommended, as are other analyses, but not required for CABIN assessments.

CHANNEL DATA

Slope - Indicate how slope was measured: (check one)

☐ **Calculated from map**

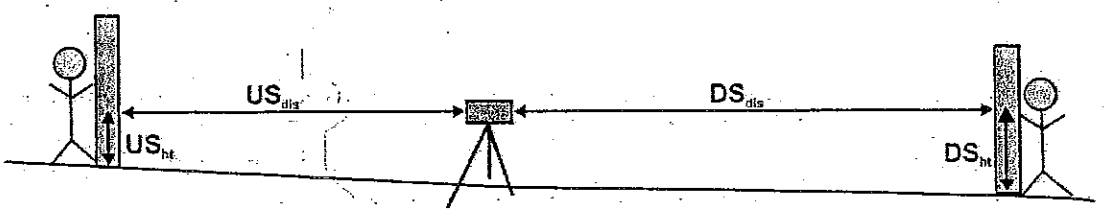
Scale: _____ (Note: small scale map recommended if field measurement is not possible - i.e. 1:20,000).
contour interval (vertical distance) _____ (m),
distance between contour intervals (horizontal distance) _____ (m)
slope = vertical distance/horizontal distance = _____

OR

☒ **Measured in field**

Circle device used and fill out table according to device:
(a.) Survey Equipment b. Hand Level & Measuring Tape

Measurements	Upstream (U/S)	Downstream(D/S)	Calculation
[a]Top Hairline (T)			
[a]Mid Hairline (ht) OR [b]Height of rod			
[a]Bottom Hairline (B)			
[b]Distance (dis) OR [a]T-B x 100	[a]US_{dis}=T-B	[a]DS_{dis}=T-B	$US_{dis}+DS_{dis}$=
Change in height (Δht)			$DS_{ht}-US_{ht}$=
Slope (Δht/total dis)			0.80



Field Crew: JF/KL/NB Site Code: TSQ-03

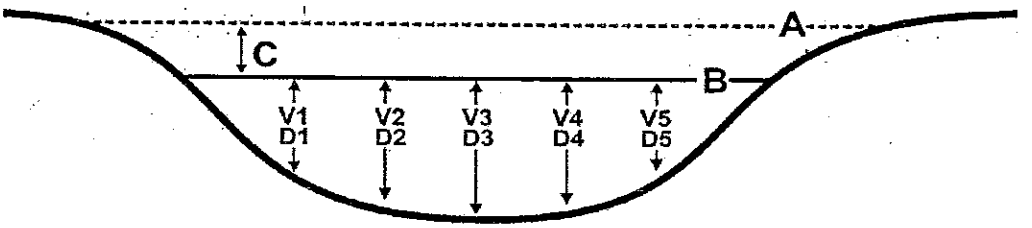
Sampling Date: (DD/MM/YYYY) 19/09/2016

Widths and Depth

Location at site: Through kick (Indicate where in sample reach, ex. d/s of kick area)

A - Bankfull Width: 25.40 (m) B - Wetted Stream Width: 14.40 (m)

C - Bankfull–Wetted Depth (height from water surface to Bankfull): 49 (cm)



Note:
Wetted widths > 5 m, measure a minimum of 5-6 equidistant locations;
Wetted widths < 5 m, measure 3-4 equidistant locations.

Velocity and Depth

Check appropriate velocity measuring device and fill out the appropriate section in chart below. Distance from shore and depth are required regardless of method:

☐ **Velocity Head Rod (or ruler)**: Velocity Equation (m/s) = $\sqrt{[2(\Delta D/100) * 9.81]}$

☑ **Rotary meters**: Gurley/Price/Mini-Price/Propeller (Refer to specific meter conversion chart for calculation)

☐ **Direct velocity measurements**: ☐ Marsh-McBirney ☐ Sontek or ☐ Other_____

	1	2	3	4	5	6	AVG
Distance from Shore (m)	2.42	4.84	7.26	9.68	12.10		
Depth (D) (cm)	80	71	52	56	42		60.2
Velocity Head Rod (ruler)							
Flowing water Depth (D_1) (cm)							
Depth of Stagnation (D_2) (cm)							
Change in depth ($\Delta D = D_2 - D_1$) (cm)							
Rotary meter							
Revolutions							
Time (minimum 40 seconds)							
Direct Measurement or calculation							
Velocity (V) (m/s)	0.2	0.3	0.2	0.2	0		0.18 M/S

TSQ-03

Field Crew: KR/NB/JF Site Code: [redacted]

Sampling Date: (DD/MM/YYYY) 19/09/2016

SUBSTRATE DATA

Surrounding/Interstitial Material

Circle the substrate size category for the surrounding material.

Substrate Size Class	Category
Organic Cover	0
< 0.1 cm (fine sand, silt or clay)	1
0.1-0.2 cm (coarse sand)	2
0.2-1.6 cm (gravel)	3
1.6-3.2 cm (small pebble)	4
3.2-6.4 cm (large pebble)	5
6.4-12.8 cm (small cobble)	6
12.8-25.6 cm (cobble)	7
> 25.6 cm (boulder)	8
Bedrock	9

100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embededness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

	Diameter (cm)	E		Diameter (cm)	E		Diameter (cm)	E		Diameter (cm)	E
1	14	0	26	11		51	13		76	1	
2	11		27	35		52	28		77	9	
3	17		28	48		53	11		78	30	
4	34		29	4		54	7		79	5	
5	12		30	33	1/2	55	15		80	30	1/4
6	29		31	57		56	9		81	59	
7	20		32	20		57	4		82	24	
8	5		33	55		58	28		83	1	
9	27		34	2		59	5		84	21	
10	2	0	35	9		60	410		85	0.5	
11	21		36	8		61	23		86	20	
12	46		37	48		62	81		87	18	
13	27		38	14		63	27		88	28	
14	10		39	23		64	9		89	4	
15	17		40	31	3/4	65	3		90	1	
16	14		41	14		66	8		91	0	
17	58		42	13		67	41		92	2.0	
18	15		43	35		68	33		93	3	
19	29		44	1		69	11		94	0	
20	19	1/4	45	10		70	12	1/4	95	12	
21	31		46	14		71	01		96	37	
22	5		47	39		72	22		97	3	
23	47		48	14		73	12		98	35	
24	9		49	17		74	10		99	10	
25	36		50	32	1/2	75	14		100	3	

Note: The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

Field Crew: KR/NB/JF Site Code: 7SQ-03

Sampling Date: (DD/MM/YYYY) 19/09/2016

SITE INSPECTION

Site Inspected by: JF/KR/NB

Communication Information

☑ Itinerary left with contact person (include contact numbers)

Contact Person: Gary Time checked-in: 10:00

Form of communication: ☑ radio ☐ cell ☐ satellite ☐ hotel/pay phone ☐ SPOT

Phone number: (250) 426-3204

Vehicle Safety

☐ Safety equipment (first aid, fire extinguisher, blanket, emergency kit in vehicle)

☑ Equipment and chemicals safely secured for transport

☑ Vehicle parked in safe location; pylons, hazard light, reflective vests if necessary

Notes:

Shore & Wading Safety

☑ Wading Task Hazard Analysis read by all field staff

☑ Wading Safe Work Procedures read by all field staff

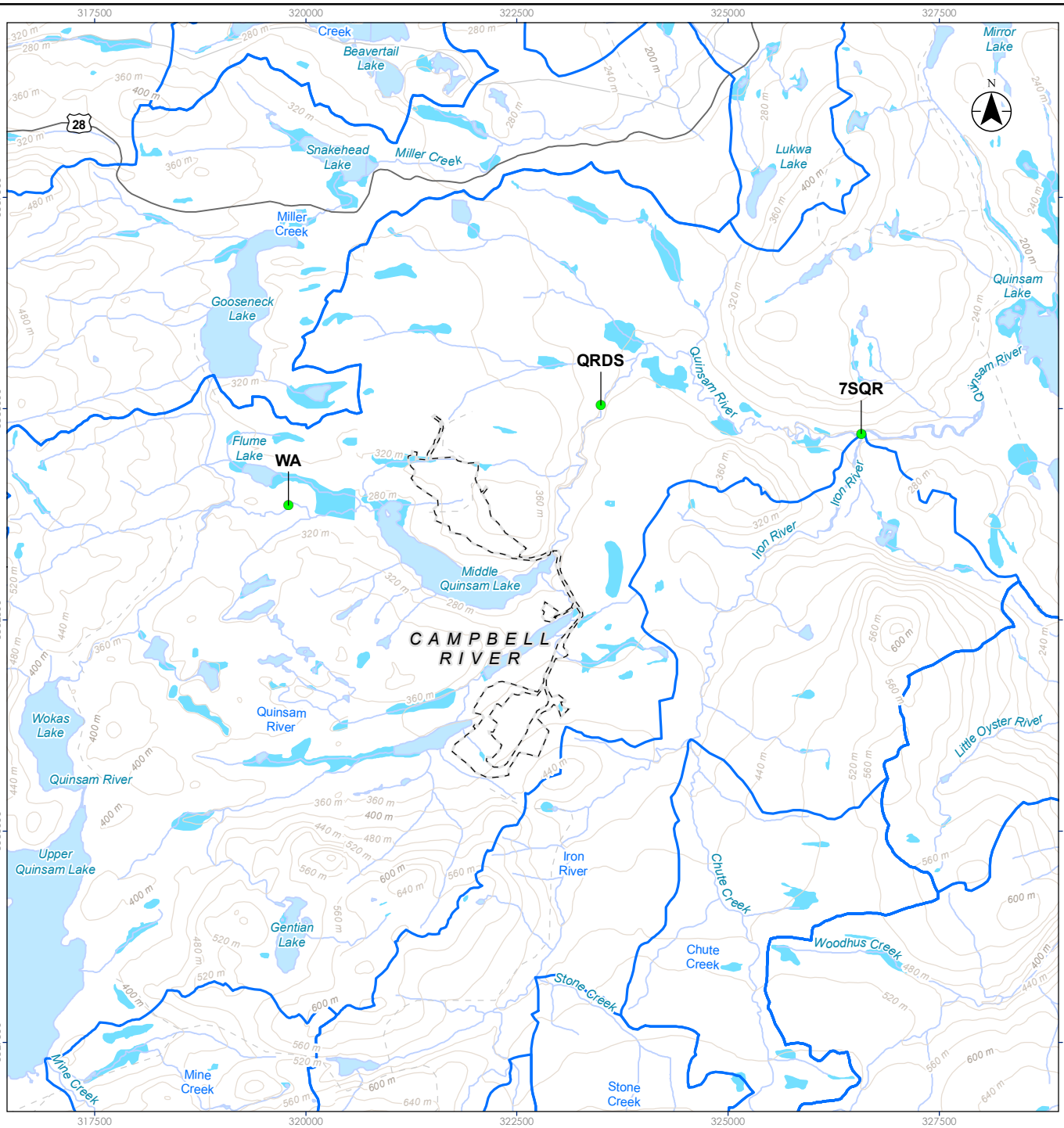
☑ Instream hazards identified (i.e. log jams, deep pools, slippery rocks)

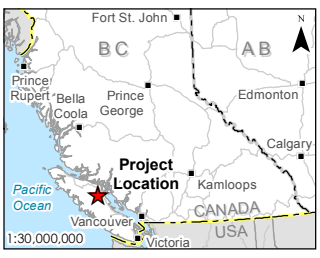
☑ PFD worn

☑ Appropriate footwear, waders, wading belt

☒ Belay used

Notes:





- Benthic Invertebrate Sampling Site
- Highway
- Local Street
- Resource Road
- Topographic Contour
- Municipal Boundary
- Watercourse
- Waterbody
- Wetland
- Freshwater Atlas Watershed
- Alpine (none found in study area)

0 0.5 1 1.5 2 km

1:70,000 (at original document size of 8.5x11)

Notes
1. Coordinate System: NAD 1983 UTM Zone 10N
2. Data Source: DataBC, Government of British Columbia; Natural Resources Canada
3. This document is provided by Quinsam Coal for use by the intended recipient only.
This information is confidential and proprietary to Quinsam Coal and is not to be provided to any other recipient without the written consent of Quinsam Coal.

DRAFT

Stantec

Project Location
Southwest of Campbell River, BC

Project Number 123220667
Prepared by S.PARKER 20170731
Discipline Review by P.REECE 20170731
GIS Review by R.COATTA 20170731

Client/Project
Quinsam Coal

Figure No.
6-A

Title
Quinsam Mine
Benthic Invertebrate Watercourse Sampling Sites

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Appendix VI

QUINSAM COAL CORPORTION

Quinsam Coal Corporation Sediment & Biological Monitoring Plan

Environmental Management Act PE-7008

Quinsam Coal Environmental Department

8/8/2017

Contents

1. Introduction 2
2. Study Objectives: 4
3. Study Approach: 4
4. Field Methods 6
5. Laboratory Analysis 7
6. Quality Assurance/Quality Control (QA/QC) 8
7. Data Analysis and Reporting 10
8. Results and Discussion 12
9. Closure 13
References 14

List of Tables in the Report

Table 1: Sediment and Benthic Monitoring Locations And Sampling Outline
Table 2: Relative Percentage Difference (RPD) for Sediment with Values Greater than 20%

1. Introduction

Quinsam Coal environmental personnel have been conducting a diverse environmental monitoring program throughout mining history governed largely by the effluent permit PE: 7008. As part of the most recently amended version of the effluent permit (dated September 22, 2014), Quinsam Coal has been directed to conduct a sediment and benthic monitoring program as stated in Section 4.2.7 of the effluent permit. This monitoring program was designed to supplement existing water quality history by evaluating sediment chemistry and benthic biota in water bodies that receive mine impacted water discharges and evaluate any changes. In addition, reference sites that are deemed non-mine impacted have been selected in the region that share similar characteristics to the impacted areas. In total, five lakes, one wetland and one river system, covering 23 independent sites were evaluated as displayed in the table below. Near seep sediment monitoring applicable to No Name Lake and Middle Quinsam Lake seeps sites consisted of a set of three samples equally spaced on a 5 metre triangular grid. Long Lake near seep sediment monitoring sites consists of a set of six samples equally spaced on a 5 metre triangular grid.

Table 1: Sediment and Benthic Monitoring Locations And Sampling Outline

Site Type	Site	Latitude	Longitude	EMS ID	# of Sites	Spatial Variance Program - Standard				Water Chemistry		Biological Monitoring CABIN	Benthic Community Taxonomy & Count for all Lake & Wetland Monitoring Sites
						Replicates	Field Split	Total Metals Analyzed	PAH Analyzed	Replicates	# of samples including reps	Total	
No Name Lake	NNL inlet	49.904255	-125.491745	E224246	1	5	0	5	5	1	2		**5**
	NNL deep	49.905361	-125.48561	E217018	1	5	0	5	5		3		**3**
	NNL seep	**49.906889**	**-125.481361**	**E292114**	**1**	**5**	**1**	**5**	**5**		**1**		**3**
	NNL outlet	49.907421	-125.482216	E217017	1	5	0	5	5		1		**5**
Long Lake	LL inlet	49.91275	-125.477306	E292121	1	5	0	3	3		1		**5**
	LL deep	49.91651	-125.46907	E292122	1	5	0	3	3	1	4		**3**
	LL seep	**49.91361**	**-125.47472**	**E292123**	**1**	**6**	**1**	**6**	**6**		**2**		**3**
	LL outlet	49.918999	-125.482216	E219412	1	5	0	3	5		1		**5**
Middle Quinsam Lake	MQL inlet	49.927695	-125.494145	E206901	1	5	0	3	3		1		**5**
	MQL deep	49.92067	-125.47741	E292115	1	5	0	3	3	1	4		**3**
	MQL seep	**49.930194**	**-125.492148**	**E292116**	**1**	**5**	**1**	**5**	**5**		**1**		**3**
	MQL outlet	49.924438	-125.467613	O900504	1	5	0	4	3	1	1		**5**
Lower Quinsam Lake	LQL inlet	49.950005	-125.389992	E292117	1	5	0	5	3		1		**5**
	LQL deep 1 (M1)	**49.954972**	**-125.384666**	**E29118**	**1**	**5**	**1**	**5**	**5**	**1**	**4**		**3**
	LQL deep 2 (M2)	49.939079	-125.376656	E292119	1	5	0	5	3		3		**3**
	LQL outlet	49.938999	-125.374008	E292120	1	5	0	5	3		1		**5**
Gooseneck Lake	GNL			1132502	1	5	1	4	4	1	4		**5**
Lower Wetland	Lower wetland inlet	49.939995	-125.442001	E292124	1	5	0	3	3		1		**3**
	Lower wetland middle	49.939438	-125.438187	E292125	1	5	0	3	3		1		**3**
	Lower wetland outlet	**49.939009**	**-125.437996**	**E292112**	**1**	**5**	**1**	**5**	**5**		**1**		**3**
Quinsam River	**WA**	**49.929882**	**-125.510498**	**O126402**	**1**	**5**	**1**	**5**	**5**	**1**	**2**	**1**	
	QRDS1	49.941631	-125.460419	E286930	1	5	0	5	5		1	1	
	7SQR	**49.939487**	**-125.41703**	**E292113**	**1**	**5**	**1**	**5**	**5**	**1**	**2**	**1**	
Total					**23**	**116**	**8**	**100**	**95**	**8**	**43**	**3**	**78**

2. Study Objectives:

The primary objective of this study is to provide supplementary information to existing environmental data to further evaluate watershed health based on sediment chemistry and benthic invertebrate communities. Results are evaluated on spatial and temporal scales to assess sediment composition, parameters of interest (POI), and benthic communities. Upon completion of data acquisition and report compilation, qualified professionals from Stantec, a consulting company contracted by Quinsam Coal, will review the data submitted, provide insight on watershed health, and provide recommendations on future monitoring and environmental practices.

3. Study Approach:

Quinsam Coal environmental staff collected sediment and benthic samples at 23 locations defined by the Ministry of Environment (MoE) in the effluent permit PE 7008. The sampling regime was developed with guidance from various documents including:

- Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators Version 2 – BC MoE, 2016;
- British Columbia Field Sampling Manual for Continues Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples – BC MoE 2013;
- Integrated Long Lake Sediment Assessment – Golder, 2010;
- Toxicity and Bioavailability Review with Background Assessment Long Lake at Quinsam Coal Mine – SLR, 2015

In addition to reference from these documents, frequent liaison with local BC Ministry of Environment (MoE) staff and Stantec was conducted to ensure specific program requirements were met. To properly represent the sampling locations, the program was modelled after the Spatial Variance Program (Standard) as found within the Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators Version 2 and standard methodologies developed by the Canadian Aquatic Biomonitoring Network (CABIN). Training in conjunction with the Canadian Aquatic Biomonitoring Network (CABIN) was completed by Quinsam staff in mid-2016.

The spatial variance sampling design was chosen to improve confidence on sampling and is the preferred method for assessing variability among sediment sites for mine projects (MoE 2016). Sediment and benthic composition tends to be dynamic showing great variability across relatively small areas. To enhance the representation of the sites selected, five replicate samples were collected per site and results were used to statistically demonstrate variability within a site.

The study approach was evaluated on a Spatial Scale, which considers geographic boundaries, type of habitat sampled (stream, riffle, lakes, wetlands), size of sampling unit – site (Stream segment) versus points within a site (microhabitat).

Three locations on the Quinsam River required CABIN sampling, which is an aquatic biomonitoring program used to assess freshwater ecosystem health. Those locations are:

- Quinsam River upstream of mine influenced Middle Quinsam Lake Inlet (WA),
- Quinsam River Downstream of the North mine influence and upstream of 7 South Mining Operation QRDS1 (QRDS1)
- Quinsam River downstream of 7- South Mining Operation (7SQR)

CABIN uses the Reference Condition Approach (RCA), under which the natural variability of the benthic macroinvertebrate community is modeled based on the environmental characteristics of a wide range of reference sites. The benthic invertebrate and environmental data from QRDS1 and 7SQR was compared to the reference condition generated by the CABIN model. Site WA was used as a reference site.

All sediment and benthic samples were sent to the testing laboratories but due to efforts to reduce costs, only three replicates per site were analyzed (with the exception of one site per waterbody where all five replicates were analyzed). The remaining two replicate samples from each site were placed on hold for future analysis if deemed necessary. To determine if the two remaining samples were needed for analysis, percent relative standard deviation (%RSD) was calculated between the three samples. If the %RSD was greater than 20%, the two additional samples were analyzed to provide further representation of the sampling location.

Samples were analyzed for many constituents to encompass most parameters that may be found in mine discharge and parameters found in previous studies. Parameters analyzed included: total metals (<64 micron fraction), particle size, total organic carbon, pH, PAHs, sulphur and total moisture. Additional information on laboratory analysis can be found in Section

5: Laboratory Analysis of this report. Table 1 summarizes the monitoring locations, station coordinates and number of samples collected per site.

4. Field Methods

General information and guidance is provided below. All field methods were performed following those procedures outlined in the *British Columbia Field Sampling Manual for Continuous Monitoring plus the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples 2013 edition* and those procedures outlined in the *Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators Version 2 June 2016.*

Sediment

- Sediment in rivers and shallow wetlands were collected with spoons and containers; obtaining enough sediment across a large enough area to represent the location. Each river replicate was a composite from at least three areas.

- Lakes and deep wetlands were sampled with an Eckman sampler with 5 individual grabs obtained for one sample to provide enough sediment for the required analysis. Each replicate sample was taken using the same method.

- Appropriate cleaning of sampling equipment with acetone and de-ionized water (for organics) or nitric acid and de-ionized water (for metals) was performed between sites to avoid cross contamination.

- Each sediment sample was contained in two 500 ml white plastic containers and one 120 ml glass soil jar.

- Sites selected for initial analysis of the five replicate sediment samples were selected from areas where either maximum or minimum variability are expected. For example, maximum variability might be expected at a site reflecting inputs of mine contact water or a near-shore area and minimum variability might be expected in deep habitat in the reference lake.

Benthic Invertebrates

Lake and deep wetland sediment for benthic invertebrate analysis was also collected with an Eckman sampler similar to the sediment samples. Each replicate sample was taken in the same manner. A mesh size of 200 micron (µm) was used to "filter" the composite samples using specially constructed mesh bags used as a sieve. River benthic invertebrate samples were collected with a kick net 300 µm, following the CABIN method. All benthic samples were preserved using either 10 % formalin or ethanol as outlined in the above referenced documents.

5. Laboratory Analysis

Sediment Analysis

Sediment analysis was conducted by Maxxam Analytics, located in Burnaby, BC. The required parameters, with corresponding hold times are as follows:

- Total Moisture: 14 days
- Polycyclic Aromatic Hydrocarbons (PAH): 14 days
- Particle Size: 180 days
- Total Metals: 180 day hold time (28 days for Mercury)
- pH: 365 days
- TOC: 28 days wet, unlimited dried
- Total Sulphur

The short hold time for PAHs meant that data needed to be reviewed soon after receiving results, to allow for sample re-analysis based on outlier results or analysis of additional replicates based on high within-site variability. All metal parameters were analyzed on the <63 µm particle size fraction. It was requested that laboratory detection limits be set below the ISQG wherever possible.

Benthic Invertebrate Analysis

Benthic invertebrate samples were sent to Cordillera Consulting Inc. in Summerland, BC for specimen enumeration and taxonomy analysis to the lowest practical level.

Water Chemistry

Water samples were collected prior to sediment sampling at each site following the stipulations in the permit, with 10% of samples having field replicates. As this program was incorporated in the last two weeks of the "5 in 30" receiving environment program, lake and river sampling included the required water chemistry and depth profiling where appropriate.

6. Quality Assurance/Quality Control (QA/QC)

The water, sediment, and benthic samples were collected in accordance with methods described in "*The British Columbia Field Sampling Manual for Continuous Monitoring of Air- Emissions, Water, Soil, Sediment, and Biological Samples* " and the "*Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators, Version 2, 2016*. This includes following specified field protocols: use of measures to reduce potential cross-contamination; use of field duplicates, split samples, method blanks and assessment of within-site variability; and checking for transcription errors.

Laboratory detection limits were above the ISQG on thirteen occasions as percent moisture of the sample was too high. Wherever possible QCC resampled the site for PAH so detection limits would provide accurate information and results could be compared to ISQG standards. This occurred thirteen times altogether for PAH samples. Resampling for PAH occurred at the following locations:

No Name Lake on September 22, 2016 at sites:

- NNLI3 and
- NNO 1, 2 and 3

Middle Quinsam Lake on October 4th, 2016 at sites:

- MQLI1,
- MQLNS 1, 2, 3, 4, 5 and
- MQLO 1, 2, 3

Appendix I, Tables 231 to 253 display the analyses for PAH in sediment with the sample class denoted with an X representing the samples that were resampled at a later date.

Appendix V provides details of the analytical methods and results for benthic community and structure from Cordillera Consulting Inc.

The table below displays the relative percentage difference (RPD) for sediment values greater than 20%. RPD values were analyzed for 456 parameters of which 38 parameters resulted in an RPD greater than 20 percent, 7 of which were greater than 50 percent. This equates to 8.3 percent of an RPD failure. PAH associated parameters occurred most frequently, with RPD failures occurring 28 times. This may be attributed to the low detection limits required for these parameters. The site locations with RPD's greater than 20 percent are displayed in the table below.

Table 2: Relative Percentage Difference (RPD) Sediment Values Greater Than 20 %

Relative Percent Difference (RPD) Sediment Values Greater Than 20%

Site Code	EMS ID	Date	Parameter	Units	Result 1	Result 2	RPD Greater than 20%	LMDL	5XDL
7SQR1	E292113	19-Sep-16	Fluoranthene	mg/kg	0.0081	0.011	30	0.0010	0.005
7SQR1	E292113	19-Sep-16	Benzo(a)anthracene	mg/kg	0.0061	0.0085	33	0.0010	0.005
7SQR1	E292113	19-Sep-16	HighMolecularWeightPAH	mg/kg	0.032	0.045	34	0.0010	0.005
7SQR1	E292113	19-Sep-16	Chrysene	mg/kg	0.0090	0.013	36	0.0010	0.005
7SQR1	E292113	19-Sep-16	Pyrene	mg/kg	0.0064	0.010	44	0.0010	0.005
7SQR1	E292113	19-Sep-16	Phenanthrene	mg/kg	0.044	0.075	52	0.0010	0.005
7SQR1	E292113	19-Sep-16	LowMolecularWeightPAH	mg/kg	0.13	0.25	63	0.0010	0.005
7SQR1	E292113	19-Sep-16	Naphthalene	mg/kg	0.037	0.072	64	0.0010	0.005
7SQR1	E292113	19-Sep-16	(2)Methylnaphthalene	mg/kg	0.051	0.10	65	0.00050	0.0025
7SQR1	E292113	19-Sep-16	Total Sulphur	%	0.17	0.084	68	0.030	0.15
LLNS1	E292123	31-Aug-16	Anthracene	mg/kg	0.033	0.026	24	0.0010	0.005
LLNS1	E292123	31-Aug-16	Total Tin	mg/kg	6.24	0.52	169	0.10	0.5
LQL1	E29118	12-Sep-16	Fluoranthene	mg/kg	0.017	0.021	21	0.0010	0.005
LQL1	E29118	12-Sep-16	D10-Anthracene	%	80	99	21	%	
LQL1	E29118	12-Sep-16	pH-L	mg/kg	5.85	7.31	22		0
LQL1	E29118	12-Sep-16	LowMolecularWeightPAH	mg/kg	0.34	0.43	23	0.0010	0.005
LQL1	E29118	12-Sep-16	Sand	%	22	17	26	%	
LQL1	E29118	12-Sep-16	Phenanthrene	mg/kg	0.074	0.098	28	0.0010	0.005
LQL1	E29118	12-Sep-16	Anthracene	mg/kg	0.0081	0.011	30	0.0010	0.005
LQL1	E29118	12-Sep-16	HighMolecularWeightPAH	mg/kg	0.065	0.089	31	0.0010	0.005
LQL1	E29118	12-Sep-16	D14-Terphenyl	%	69	95	32	2.0	10
LQL1	E29118	12-Sep-16	Benzo(b&j)fluoranthene	mg/kg	0.013	0.018	32	0.0010	0.005
LQL1	E29118	12-Sep-16	Benzo(a)anthracene	mg/kg	0.010	0.014	33	0.0010	0.005
LQL1	E29118	12-Sep-16	Naphthalene	mg/kg	0.10	0.14	33	0.0010	0.005
LQL1	E29118	12-Sep-16	D8-Naphthalene	%	67	97	37	0.0010	0.005
LQL1	E29118	12-Sep-16	D8-Acenaphthylene	%	63	92	37	0.00050	0.0025
LQL1	E29118	12-Sep-16	Chrysene	mg/kg	0.016	0.024	40	0.0010	0.005
LWO1	E292112	13-Sep-16	LowMolecularWeightPAH	mg/kg	0.019	0.015	24	0.0010	0.005
LWO1	E292112	13-Sep-16	D10-Anthracene	%	97	124	24	%	
LWO1	E292112	13-Sep-16	Clay	%	12	8.8	31	2.0	10
LWO1	E292112	13-Sep-16	Fluoranthene	mg/kg	0.0042	0.0060	35	0.0010	0.005
LWO1	E292112	13-Sep-16	HighMolecularWeightPAH	mg/kg	0.0042	0.0060	35	0.0010	0.005
MQLNS1	E292116	01-Sep-16	Naphthalene	mg/kg	0.041	0.032	25	0.0010	0.005
NNLS1	E292114	24-Aug-16	Clay	%	8.8	12	31	2.0	10
WA1	O126402	14-Sep-16	Total Organic Carbon	mg/kg	45000	34000	28	%	
WA1	O126402	14-Sep-16	Total Bismuth	mg/kg	0.55	0.41	29	0.10	0.5
WA1	O126402	14-Sep-16	Total Sulphur	%	0.25	0.15	50	0.030	0.15
WA1	O126402	14-Sep-16	Silt	%	4.9	2.5	65	%	

7. Data Analysis and Reporting

The sediment results were compared to the British Columbia Working Sediment Guidelines for Freshwater Aquatic Life, Interim Sediment Quality Guidelines (ISQG) and Probable Effects Levels (PEL). Parameter concentrations were compared within and among sites in each waterbody and among waterbodies for spatial differences. Results will also be compared to historical data, if available, for temporal trends.

Benthic invertebrate results for community descriptors (specimen density, species richness, diversity and evenness indices) are also compared within and among waterbodies. The community composition of each site is discussed in relation to tolerance of disturbed conditions. The monitoring report includes recommendations, by an appropriately qualified professional, for the subsequent monitoring cycle.

By encompassing 23 sites in this study, a large area is examined showing distribution of sediment constituents and resident biota providing insight on areas that may be impacted. Results from baseline monitoring and previous studies are used as reference to determine if POI concentrations are changing and may indicate if local mining disturbance and discharges are causing any accumulation of materials and subsequent changes in benthic communities. Following data compilation, thorough review based on results with consideration of collective mining discharges occurred to assess watershed health. Guidelines including ISQG, PEL and Sediment Quality Objectives (SQO) derived for Long Lake, were used as standards to aid with qualitative assessment. This information was reviewed by qualified professionals to ascertain study integrity and to interpret results. A qualified biologist(s) reviewed the benthic community composition and identified if benthic communities were under stress with respect to mining impacts. Recommendations from this study are meant to direct future monitoring efforts and potential environmental practices at the mine site.

Appendix I Tables 167 through 254 present analytical results from the sediment sampling program completed by Quinsam Coal in August through October 2016. Each table contains one sampling location consisting of multiple replicates (3-6 sub samples) to identify within-site variability. Sub samples were obtained at 5m equidistant spacing as directed by the Ministry of Environment (MOE) including the requirements outlined in the “Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators, Version 2, 2016” to ensure

an accurate representation of each location and to minimize the influences of outlier samples. Each table includes descriptive statistics to represent the given location and display within-site variability, particularly % relative standard deviation. PAH and metals results have been separated for ease of comparison and viewing.

Analytical results for PAH samples are displayed as explicit results as issued by the laboratory as well as Total Organic Carbon (TOC) adjusted results. The adjusted results are calculated based on TOC concentrations found within their respective samples and normalized to a 1% TOC composition. For any sample that contains TOC composition different than 1%, the result is adjusted proportionately. For example, a sample containing a composition of 5% TOC would have PAH concentrations divided by 5 for the adjustment. As PAH are only found within the organic carbon portion of the sediment, it is necessary to account for the varying amounts of carbon that may be present to give a fair and uniform representation of results from sample to sample. Effectively, this adjustment serves as a compensation for the varying amounts of carbon that are found in samples throughout the watershed.

Various standards have been adopted for this study to help evaluate and assess sediment quality throughout the watershed. It was necessary to apply multiple standards to: maximize the amount of parameters with a reference; include site specific references; include TOC compensated results; and, include comparisons for varying degrees of effects levels.

The Interim Sediment Quality Guidelines (ISQG) have been created and compiled by the Canadian Council of Ministers of the Environment. “Sediment quality guidelines provide scientific benchmarks, or reference points, for evaluating the potential for observing adverse biological effects in aquatic systems” (CCME, 1999). Guidelines have been derived from numerous studies completed in the 1990’s that established “an association between the concentration of each chemical measured in the sediment and any biological effect observed” (CCME, 1999). These guidelines have been split into two separate assessment values known as “Threshold Effect Level” (TEL) and “Probable Effect Level” (PEL). The TEL represents the concentration below which adverse biological effects are expected to occur rarely. The PEL defines the level above which adverse effects are expected to occur frequently. It is noted that a few Ontario Sediment Quality Guidelines were integrated into the ISQG and PEL standards to expand the reach of the comparison. They are indicated on the standard table included.

To evaluate TOC adjusted PAH parameters, provincial guidelines provided by the BC MoE have been used, known as the British Columbia Ambient Sediment Quality Guidelines (BCASQG). These standards are dynamic as they change proportionately to the varying amounts of TOC observed in the sediment samples. For ease of comparison and reduced workload, these standards have been kept stationary and the PAH result has been adjusted instead as stated above.

For Long Lake, additional standards have been included that recognize the elevated metal concentrations that occur naturally in the lake due to local hydrology and geology. Defined as "Sediment Quality Objectives" (SQO), these standards are derived from a combination of studies completed prior to mining influence in Long Lake and ISQG. Private consultants named SLR compiled the sediment quality information from the pre-mining era (pre 1987) and derived a series of background concentrations for Long Lake. The SQOs mainly consist of these concentrations however, ISQG take precedent for parameters when the background concentration is lower than the ISQG.

As presented in the tables for metals, colours have been assigned for particular parameters to highlight those parameters of concern (POC). These POC's are of higher concern due to their toxicity and/or being found in elevated concentrations in present or previous studies. Parameters highlighted in blue are of highest concern and orange are considered secondary.
Exceedance tables have been compiled with metals and PAHs grouped separately to match analytical results table and for simplified review. It is noted that the PAH exceedance table where compared to the ISQG have green highlighting around many of the exceedances. These values that are highlighted exceed the ISQG standards but do not exceed the BCASQG after TOC compensation.

8. Results and Discussion

Analytical results pertaining to water chemistry and sediment chemistry are available in Appendix I, Tables 167 to 254 for this program. Summary of total metals exceedances are available in Appendix I, Tables (193 to 203) with total metal results of individual sites available in (208 to 230). PAH sediment exceedances are available in Appendix I, Tables (204 to 207) with PAH sediment results of individual sites available in (231 to 253). Refer to Sections (9

through 11) of the "*2016-17 Annual Water Quality Monitoring Report*", for a detailed discussion of the results and an assessment of the watershed health. Appendix XI displays figures (1 through 18) for the entire sediment and biological study and each individual lake comparing historical to present results for parameters of interest such as arsenic, iron, manganese, and total PAH.

9. Closure

We trust this report meets your requirements, please contact the environmental department at Quinsam Coal Corporation with any questions.

Quinsam Coal Corporation Environmental Department

Reviewed by:

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APPENDIX VII

MINISTRY OF ENVIRONMENT REGIONAL OPERATIONS BRANCH

NON-COMPLIANCE REPORTING MAILBOX NOTIFICATION

To: EnvironmentalNonCompliance@gov.bc.ca

Subject: 2016-05-3 authorization # PE7008 Quinsam Coal Corporation. Permit limit exceedance for dissolved phosphorus at site BDS for Settling Pond #1 E218582.

Attention: Non-compliance report for Authorization #7008. Site BDS was in excess of permit limits for dissolved phosphorous (P-D) applied to Settling Pond #1 E218582. Spill report was filed with PEP on April 18th, 2016 spill report number is DRG# 160152. The 24 hour cumulative amount discharged into Long Lake was 67089.6 $m^{3.}$

Date of Non-compliance: 2016-04-4 (24 hour period).

Location of Non-compliance: [5800 Argonaut Main, Campbell River B.C. Quinsam Coal Mine Site]

Nature of Non-compliance: On April 4th, 2016 monthly sampling returned results for P-D at 0.0608 mg/L. This value exceeded the permit limits of 0.03 mg/L applied to the site BDS.

Initial Response/Actions taken: Results were uploaded into the Quinsam database identifying the permit non-compliance on April 18th, 2016. The spill was reported to PEP. An investigation was initiated with further analyses carried out at sites upstream of BDS (SPD & SPEFF) at BDS and downstream at LLE and into the receiving environment (Long Lake) at LLEZ2 where the effluent from LLE enters the lake at various dates from April 4th to April 20th, 2016 as played in Table 1.

Monitoring conducted: Regular weekly sampling as required by the permit has been conducted. Re-sampling for P-D has been initiated as stated above. Laboratory analytical results at all locations sampled were below permit limits of 0.03 mg/L for P-D. All results following April 4th have been returned below permit limits.

Future action items: Environmental personnel will continue to monitor the location. It seems this was an unusual event as further sampling has resulted in low dissolved phosphorous.

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Table 1: Dissolved Phosphorous

Site	SPD	SPD	SPEFF	SPEFF	SPEFF	BDS	BDS	BDS	LLE	LLE	LLE	LLEZ2	LLEZ2	Permit
Date	11-Apr	18-Apr	4-Apr	11-Apr	18-Apr	4-Apr	11-Apr	18-Apr	4-Apr	11-Apr	18-Apr	13-Apr	20-Apr	for SPD
P-D (mg/L)	0.0042	0.0098	0.0118	0.0096	0.0114	0.0608	0.0034	0.0064	NS	0.0063	0.0106	<0.0020	0.0037	**0.03**

MINISTRY OF ENVIRONMENT REGIONAL OPERATIONS BRANCH

NON-COMPLIANCE REPORTING MAILBOX NOTIFICATION

To: EnvironmentalNonCompliance@gov.bc.ca

Subject: 2016-04-18 Authorization # 7008 equipment malfunction resulting in non-compliance for total suspended solids *(TSS)* required from discharge at E207409.

Attention: *Non-compliance report for Authorization # 7008. Quinsam Coal Corporation*
Equipment malfunction of composite sampler required for 24 hour TSS samples at settling pond E207409.

Date of Non-compliance: 2016-04-2 to 2016-04-3 midnight to midnight both days.

Location of Non-compliance [5800 Argonaut Main, Quinsam Coal Mine Site]

Nature of Non-compliance: Equipment malfunction of ISCO composite sampler. System reported an error of a 'distributor arm jam' over the weekend (Saturday and Sunday) resulting in missed composite samples. All results for E207409 discharge from March 27th through April 9th, 2016 have been reported as <4 mg/L for TSS. Excluding April 2nd and 3rd, 2016 as there are no results.

Initial Response/Actions taken: Distributor arm and the spring was fixed on April 4th, 2016. The system has been functioning normally since the repairs; new spring and distributor arm have been ordered for contingency measures.

Monitoring conducted: Regular daily composite sampling and weekly sampling required by permit has been conducted. All required maintenance and system performance has been completed. System has been functioning normally. All monitoring data results have been reported as below permit limits of 25 mg/L for TSS and less than detection limits of 4 mg/L.

Future action items: Environmental personnel inspect the system Monday through Thursday to ensure it is functioning correctly and collect TSS samples. This is routine; however, further inspections of springs and distributor arms has now been included on the Thursday inspections.

Contact information:
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MINISTRY OF ENVIRONMENT REGIONAL OPERATIONS BRANCH

NON-COMPLIANCE REPORTING MAILBOX NOTIFICATION

To: EnvironmentalNonCompliance@gov.bc.ca

Subject: Permit non-compliance report for settling pond 7SSD EMS # E292069, authorization #7008. Non-compliance for 2 discrete total suspended solids (TSS) samples required from discharge at E292069 occurred on 2016-10-07 & 2016-10-16. Spill Report (DRI 162073).

Attention: *Non-compliance report for Authorization # 7008. Quinsam Coal Corporation*
TSS results from 2016-10-07 & 2016-10-16 at 7SSD EMS # E292069.

Date of Non-compliance: 2016-10-07 & 2016-10-16 (two discrete incidences).

Location of Non-compliance: [5800 Argonaut Main, Quinsam Coal Mine Site]

Nature of Non-compliance: The TSS exceedance was attributed to an extreme storm event causing increased mobilization of suspended solids in the area. The amount of precipitation received at the site was recorded as 52mm on Oct 7th and 121.2mm on Oct 14-16th and more specifically, the intense rainfall experienced on Oct 16th (45 mm). The 121.6 mm of precipitation received through Oct 14th through 16th exceeds a 72 hour, Rainfall Return Period for 100 years of 120 mm recently reported in the draft *Technical Memorandum for the 2-North Pit Tailings Disposal Facility & South Dam* by Golder Associates. Results were reported as 27.3 mg/L and 35 mg/L, respectively which were in excess of the permit limit for a daily 24 hour composite sample of 25 mg/L there is a permit limit for an hourly composite of 35 mg/L, however these samples were not hourly composites. As stated in the Effluent permit, sections 2.1.7, 2.2.5, during extreme storm events the director may establish a maximum level of TSS for Settling Ponds 1 and 4 this is not stated for 7SSD settling pond. The extreme storm event should be taken into consideration when reviewing this permit limit non-compliance with respect to the above stated information.

Initial Response/Actions taken: Provincial Emergency Response Program (PEP) was notified and a spill report was generated (DRG 162073).
A larger 12kW pump hard powered, with generator backup, has been brought to the site to eliminate future non-compliances. The objective of the pump is to reduce the volume of water entering 7SSD, which will reduce discharge. This is achieved by redirecting water entering the pre-setting pond at 7SSD to the portal pond, then underground 5-South. There are now two pumps set up at the containment pond redirecting any water back to the portal pond then to 5-South underground mine.

Monitoring conducted: Regular daily composite and weekly sampling required by permit has been conducted. A 96-hr Rainbow trout toxicity test collected on Oct 17th passed with 100% survival and a 7-day *Ceridaphnia dubia* chronic toxicity test was conducted from the downstream site 7S, Stream 1 (EMS # E292109) has passed. These results indicate that the water quality during the time of the elevated TSS at 7SSD did not impact aquatic life downstream. With the exception of TSS at the settling pond, all other permit limits and water quality guidelines have been met at 7SSD and 7S. All TSS samples downstream at 7S were reported as <4 mg/L.
Future action items: Environmental personnel and surface maintenance crews were at the site monitoring the pumps and water levels/ quality. Water is pumped to the containment pond, alleviating discharge from the settling pond. It is anticipated that the larger pumping capacity of the newly installed pump will aid in eliminating future non-compliances of this nature.

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MINISTRY OF ENVIRONMENT REGIONAL OPERATIONS BRANCH

NON-COMPLIANCE REPORTING MAILBOX NOTIFICATION

To: EnvironmentalNonCompliance@gov.bc.ca

Subject: Permit non-compliance report for settling pond #4, EMS # E207409, and authorization # 7008. Non-compliance for 1 discrete, total suspended solid (TSS) 24 hour composite sample required from discharge E207409 occurred on 2016-10-23. Spill report # DGI 162161.

Attention: *Non-compliance report for Authorization # 7008. Quinsam Coal Corporation*
TSS results from 2016-10-23 at Settling Pond #4, EMS # E207409.

Date of Non-compliance: 2016-10-23

Location of Non-compliance: [5800 Argonaut Main, Quinsam Coal Mine Site]

Nature of Non-compliance: The TSS exceedance may have been the result of a few key actions including: initiation of a dewatering pump; rising and falling pond water levels; precipitation and mobilization of local materials. The rapid increase in pond water level was observed on October 21st – 22nd shortly after the initiation of the underground 1-Mains dewatering pumping system which delivers mine water into WD. This system had received an upgrade just prior to pumping initiation and was offline for approximately 3 preceding weeks. The increased water level in the pond caused an increased discharge rate reducing pond retention time and the ability of suspended solids to settle. TSS levels began to elevate after this pump initiation. On October 23rd, water levels in the pond decreased abruptly indicating a possible site power outage and discontinuity in pumping. Water levels began to increase later that morning indicating recommencement of pumping. These events of fluctuating water levels may have mobilized local materials and increased suspended solids.

In addition to increased water levels from the dewatering system, the ponded water became increasingly turbid and exhibited an orange colour. This occurrence has been noted before upon initiation of the 1-Mains dewatering system and with abrupt changes in groundwater elevations in that pumping area. It is feasible that water pumped to surface from underground contains elevated suspended solids, undergoes precipitation upon exposure to oxygen or experiences some other chemical reaction. As observed during other events with high TSS, precipitation is often a key factor. There was moderate rainfall recorded on site concurrent with days of elevated TSS which may have influenced additional materials into the pond from local runoff.

Initial Response/Actions taken: Provincial Emergency Response Program (PEP) was notified. An internal investigation was initiated. All flow and precipitation data was downloaded. The results indicate that the above description of events has been validated.

Monitoring conducted: All permitted required monitoring for this location has been performed. TSS 24 hour composite samples have been collected daily and downstream (WC) results have resulted in <4.0 mg/L for TSS. In response to the TSS exceedance experienced on October 23rd, 2016, continuous TSS monitoring has continued while additional samples have been obtained at key sites. Water samples have been collected at the dewatering system wellhead on November 1st and WD on November 2nd for analysis including TSS and metals. Concentrations of analyzed parameters can be submitted upon receipt of analysis from the laboratory. It is noted that all TSS levels in WD reported from the laboratory after the exceedance (up to October 27th) have been found within permit limits.

Future action items: Further observations with respect to dewatering system operation, TSS and metal concentrations, pond turbidity and precipitation will be recorded and used to develop and employ best practices.

Contact information:
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kar@quinsam.com, jaf@quinsam.com

To: EnvironmentalNonCompliance@gov.bc.ca

Subject: Permit non-compliance report for Settling Pond #4, EMS # E207409 and authorization # 7008. Non-compliance for 10 total suspended solid (TSS) 24 hour composite samples required from discharge E207409 occurring from 2016-11-4 to 2016-11-13. Provincial Emergency Program (PEP) was informed with spill reports generated for Nov. 4th through 6th (DGI 162328) and Nov 7th through 13th (DGI 162403).

Attention: *Non-compliance report for Authorization # 7008. Quinsam Coal Corporation TSS results from 2016-11-4 to 2016-11-13 at Settling Pond #4, EMS # E207409.*

Date of Non-compliance: *2016-11-4 to 2016-11-13*

Location of Non-compliance: [5800 Argonaut Main, Quinsam Coal Mine Site]

Nature of Non-compliance: The TSS exceedances resulted from extreme storm events (high precipitation) resulting in increased water levels in the surrounding area and including underground (2-North mine). From October 1st through November 23rd the mine has received 651.7 mm of precipitation with 363.2 mm received during the month of October and more specifically 205.6 mm received from November 1 through 13th. Table 1 display's the 24-hour and 72-hour Rainfall Return Periods specifically derived for the mine site by Golder Associates in 2016. Table 2 below, displays precipitation and discharge at Settling Pond #4 and highlights the 24-hour and 72-hour rainfall return periods exceeding 2, 5, 10 & 100 year events associated with Table 1. As depicted in the tables the mine has experienced record rainfall events exceeding 100 year 72-hour events on Oct 14th through 16th with 121.23 mm of rain received.

Table 1: 24-hour and 72 hour Rainfall Return Periods

Return Period (Years)	24-hour Rainfall Depth (mm)	72-hour Rainfall Depth (mm)
2	44.2	69.6
5	55.1	87.1
10	61.6	96.8
25	68.9	107
50	73.8	114
100	78.3	120
200	82.3	125
500	87.2	131
1000	90.5	134
PMP*	260	386

*Probable Maximum Precipitation=PMP

Golder Associates 2016

Exceeding 2 Yr 24 Hr

Exceeding 5 Yr 24 Hr

Exceeding 2 Yr 72 Hr

Exceeding 5 Yr 72 Hr

Exceeding 10 Yr 72 Hr

Exceeding 100 Yr 72 Hr

Table 2: Daily Precipitation and Discharge at Settling Pond # 4 Compared to 24-hr & 72 hr Rainfall				
Date	Precip. (mm)	Settling Pond #4 Max. Discharge	Settling Pond #4 Av. Discharge	72 Hr Rainfall Depth (mm)
01-Oct-16	0	0.08	0.08	
02-Oct-16	11.4	0.08	0.08	
03-Oct-16	2.8	0.08	0.07	14.2
04-Oct-16	0	0.06	0.05	14.2
05-Oct-16	18.4	0.06	0.05	21.2
06-Oct-16	19.1	0.12	0.05	37.5
07-Oct-16	**52.9**	0.17	0.14	**90.4**
08-Oct-16	13.7	0.18	0.17	**85.7**
09-Oct-16	11.6	0.17	0.14	**78.2**
10-Oct-16	0.1	0.14	0.13	25.4
11-Oct-16	0.1	0.13	0.10	11.8
12-Oct-16	0.1	0.12	0.10	0.3
13-Oct-16	6.8	0.14	0.12	7
14-Oct-16	33.7	0.17	0.15	40.6
15-Oct-16	42.5	0.20	0.17	**83**
16-Oct-16	**45**	0.21	0.18	**121.2**
17-Oct-16	1.4	0.19	0.18	**88.9**
18-Oct-16	4	0.17	0.15	50.4
19-Oct-16	0.3	0.14	0.13	5.7
20-Oct-16	7.6	0.13	0.12	11.9
21-Oct-16	2.3	0.17	0.13	10.2
22-Oct-16	8.6	0.20	0.19	18.5
23-Oct-16	2.3	0.20	0.18	13.2
24-Oct-16	2.9	0.19	0.18	13.8
25-Oct-16	7.4	0.21	0.19	12.6
26-Oct-16	36.3	0.21	0.19	46.6
27-Oct-16	19.5	0.22	0.19	63.2
28-Oct-16	3.7	0.22	0.19	59.5
29-Oct-16	2.7	0.21	0.19	25.9
30-Oct-16	4	0.21	0.21	10.4
31-Oct-16	2	**0.21**	**0.21**	8.7
01-Nov-16	2.8	**0.21**	**0.21**	8.8
02-Nov-16	6.5	**0.21**	**0.21**	11.3
03-Nov-16	**58.9**	**0.21**	**0.21**	68.2
04-Nov-16	28.7	**0.21**	**0.21**	**94.1**
05-Nov-16	15.7	**0.21**	**0.21**	**103.3**
06-Nov-16	0.7	**0.21**	**0.21**	45.1
07-Nov-16	1.6	**0.15**	**0.15**	18
08-Nov-16	**46.7**	**0.15**	**0.15**	49
09-Nov-16	26.7	**0.15**	**0.15**	**75**
10-Nov-16	0.2	**0.15**	**0.15**	**73.6**
11-Nov-16	0.1	**0.15**	**0.15**	27
12-Nov-16	10	**0.15**	**0.15**	10.3
13-Nov-16	7	**0.15**	**0.15**	17.1

Flow meter malfunctioned losing continuous discharge data from Oct 31st through Nov 20th, 2016

Bold Red indactes the discharge was recorded in the field book from the flow meter

Bold Black indcates discharge was inferred based on daily observation and daily flow rates

Exceeding 2 Yr 24 Hr

Exceeding 5 Yr 24 Hr

Exceeding 2 Yr 72 Hr

Exceeding 5 Yr 72 Hr

Exceeding 10 Yr 72 Hr

Exceeding 100 Yr 72 Hr

During the period where TSS was elevated (November 1st-13th) the mine experienced periods where 2 and 5 year, 24 hour precipitation events were exceeded and again 2, 5 and 10 year, 72 hour rainfall return periods were exceeded. These events have been significant and increased the water levels underground, specifically 2-North. The rise in water levels flushed the oxidized exposed mine walls releasing iron in its ferrous state (Fe2+) into the water column and was pumped to surface into Brinco Brook which flows into Settling Pond # 4. Once exposed to oxygen, the iron changed oxidation state from ferrous iron (Fe^{2+}) to a ferric iron (Fe^{3+}) precipitate that contributed to the already elevated load of suspended solids at the settling pond.

This process of fluctuating water levels underground and mobilized local materials increased suspended solids at the settling pond to levels above the permit limit for TSS of 25 mg/L. It is important to keep in mind that the maximum concentration obtained from the 24 hour composite samples resulted in 39 mg/L from Nov 1-13th as displayed in Table 3 below.

Initial Response/Actions taken & Monitoring Conducted: PEP was notified upon receipt of results. An internal investigation was initiated with downstream monitoring conducted and a rush analysis requested on samples. Total and dissolved metals analysis was requested from water collected at Settling Pond 4 on Nov. 6th, 10th and 13th and key monitoring locations downstream at WC, which monitors water quality prior to entering Middle Quinsam Lake near the inlet on Nov. 14th and samples were also collected from Middle Quinsam Lake Inlet and the centre of Middle Quinsam Lake on Nov. 17th.

Dissolved iron and TSS resulted in low concentrations at all sites downstream. As suspected total iron was elevated at Settling Pond 4 with concentrations of dissolved iron at or just above detection levels; low levels of total iron were reported downstream and in the receiving environment (Middle Quinsam Lake). A 96-Hr LC- 50 (100% Survival) Rainbow Trout Bioassay was performed on Nov. 22, 2016 on the water quality at WC in order to demonstrate that there was minimal effect on aquatic organisms downstream in the receiving environment resulting from these events. The results of the bioassay have not been received from the laboratory. Results can be submitted upon receipt of analysis from the laboratory and all results will be found in the 3rd quarterly report.

Table 3: Concentrations of Iron and Total Suspended Solids in Water Quality

Parameter	Date	Settling Pond #4	North Pit Culvert (WC)	Mid Quinsam Lake Inlet (MQLI)	Mid Quinsam Lake 1 M	Mid Quinsam Lake 4 M	Mid Quinsam Lake 9 M	Mid Quinsam Lake 1m from bottom	Mid Quinsam Lake Outlet (WB)
Fe-D	11-Oct-16	-	0.0102	-	-	-	-	-	-
Permit Limit	12-Oct-16	-	-	-	-	-	-	-	0.0245
0.3 mg/L	18-Oct-16	-	-	-	-	-	-	-	0.0568
WQG-Max	26-Oct-16	-	-	-	-	-	-	-	0.0504
0.35 mg/L	27-Oct-16	-	-	-	0.0309	0.0299	0.0310	0.0323	-
	31-Oct-16	-	-	-	-	-	-	-	0.0393
	06-Nov-16	0.0075	-	-	-	-	-	-	-
	09-Nov-16	-	-	-	0.0149	0.0148	0.0137	0.0163	-
	10-Nov-16	<0.0050	-	-	-	-	-	-	0.0172
	13-Nov-16	<0.0050	-	-	-	-	-	-	-
	14-Nov-16	-	0.0095	-	-	-	-	-	-
	17-Nov-16	-	-	0.0156	0.0155	0.0154	0.0157	0.0173	-
Average		0.0058	0.0099	0.0156	0.0204	0.02	0.0201	0.022	0.0376
Count		3	2	1	3	3	3	3	5
Minimum		<0.0050	0.0095	0.0156	0.0149	0.0148	0.0137	0.0163	0.0172
Maximum		0.0075	0.0102	0.0156	0.0309	0.0299	0.031	0.0323	0.0568

Parameter	Date	Settling Pond #4	North Pit Culvert (WC)	Middle Quinsam Lake Inlet (MQLI)	Mid Quinsam Lake 1 M	Mid Quinsam Lake 4 M	Mid Quinsam Lake 9 M	Mid Quinsam Lake 1m from bottom	Mid Quinsam Lake Outlet (WB)
Fe-T	11-Oct-16	-	0.039	-	-	-	-	-	-
	12-Oct-16	-	-	-	-	-	-	-	0.061
	18-Oct-16	-	-	-	-	-	-	-	0.089
WQG-Max	26-Oct-16	-	-	-	-	-	-	-	0.099
1.00 mg/L	27-Oct-16	-	-	-	0.051	0.051	0.0560	0.049	-
	31-Oct-16	-	-	-	-	-	-	-	0.072
	06-Nov-16	9.11	-	-	-	-	-	-	-
	09-Nov-16	-	-	-	0.053	0.048	0.035	0.037	-
	10-Nov-16	9.21	-	-	-	-	-	-	0.052
	13-Nov-16	8.87	-	-	-	-	-	-	-
	14-Nov-16	-	0.451	-	-	-	-	-	-
	17-Nov-16	-	-	0.031	0.03	0.029	0.032	0.03	-
Average		9.06	0.245	0.031	0.045	0.043	0.041	0.039	0.075
Count		3	2	1	3	3	3	3	5
Minimum		8.87	0.039	0.031	0.03	0.029	0.032	0.03	0.052
Maximum		9.21	0.451	0.031	0.053	0.051	0.056	0.049	0.099

Parameter	Date	Settling Pond #4	North Pit Culvert (WC)	Mid Quinsam Lake Outlet (WB)
TSS	17-Oct-16	<4.0	<4.0	-
Permit Limit	18-Oct-16	<4.0	-	<4.0
25 mg/L	19-Oct-16	<4.0	-	-
WQG-Av	20-Oct-16	<4.0	-	-
25 mg/L	21-Oct-16	<4.0	-	-
	22-Oct-16	16.8	-	-
	23-Oct-16	27.3	-	-
	24-Oct-16	20.5	-	-
	25-Oct-16	21	-	-
	26-Oct-16	14.0	-	<4.0
	27-Oct-16	18.5	-	-
	28-Oct-16	19.0	-	-
	29-Oct-16	21.5	-	-
	30-Oct-16	15.8	-	-
	31-Oct-16	21.3	-	<4.0
	01-Nov-16	13.5	<4.0	-
	02-Nov-16	24.3	-	-
	03-Nov-16	11.8	-	-
	04-Nov-16	32.8	-	-
	05-Nov-16	35.0	-	-
	06-Nov-16	29.0	-	-
	07-Nov-16	32.8	-	-
	08-Nov-16	39.0	-	-
	09-Nov-16	36.8	-	-
	10-Nov-16	32.8	-	<4.0
	11-Nov-16	33.5	-	-
	12-Nov-16	32.0	-	-
	13-Nov-16	31.0	-	-
	14-Nov-16	16.0	<4.0	-
	15-Nov-16	15.5	-	-
	16-Nov-16	15.0	-	-
	17-Nov-16	<4.0	-	-
	18-Nov-16	6.0	-	-
	19-Nov-16	7.5	-	-
	20-Nov-16	8.0	-	-
Average		15.1	4	4
Count		48	4	5
Minimum		<4.0	<4.0	<4.0
Maximum		39	4	4

Future Action Items: Further observations with respect to dewatering system operation, TSS and metal concentrations, pond turbidity and precipitation will be recorded and used to develop and employ best practices. Turbidity or floating silt curtain has been considered for Settling Pond #4 if this problem persists. This curtain is a flexible sediment control barrier designed to prevent the spread of silt and sediment in lakes and other water bodies during times of high turbidity. Constructed of permeable or non-permeable material, the turbidity curtain is suspended vertically in the water with a flotation material enclosed in the top pocket and a ballast chain enclosed in the lower pocket. This would allow the water to meander through the settling pond and increase retention time.

All of the presented information indicates the situation was attributed to extreme storm events and as stated in Section 2.1.7 of the Effluent Permit**,** Effluent Characteristics (for Total Suspended Solids) specifically the statement *(Variances may be allowed by the Director for higher discharge rates. The Director may as well, in the future, establish a maximum level for total suspended solids during extreme storm events)* it is the intention of Quinsam Coal to contact the Direct in order to establish a maximum level for TSS during extreme storm events.

Once again due diligence was carried out by Quinsam Environmental Department to ensure that the risk to the aquatic receptors was minimal. If there is any further inquiries into these events please contact myself at the below contact information.

Contact information:

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Environmental Coordinator
QUINSAM COAL
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E-mail: kar@quinsam.com

Culvert (WC)

Wetland

Drop Inlet Pipe

Quinsam River

Middle Quinsam Lake Inlet Sampling Site

Setting Pond 4 (WD)

Access Road Culvert

Brinco Brook

10" pipline from deepwells

2-North Pag-CCR Sump

Surface Pump 6"x6" high volume diesel to settling pond 4

8", 10" and 12" pipelines from underground

Surface Pump 6"x4" high volume diesel to Brinco Brook

2-North 5-Mains Deepwells 1 x 200hp pumps to Brinco Brook

Middle Quinsam Lake

Plant Site and Coal Stockpiles

Offices

Maintenance

2-North Portals

1-Mains, 1x-cut Underground Pumping - 1 x 22hp to Brinco Brook

3-Mains Dam Underground Pumping - 2 x 250hp to Brinco Brook

1-Mains/4-Mains Underground Pumping - 5 x 58hp to 3-Mains Dam - 58hp-to-250hp to Brinco Brook

Tailings Storage Facility

Middle Quinsam Lake Sampling Site

2-North 1-Mains Deepwells 2 x 200hp pumps to Brinco Brook

Quinsam River

Pond

BACKFILLED 2N PIT

Middle Quinsam Lake Outlet Sampling Site (WB)

Quinsam River

QUINSAM COAL

2-North to Settling Pond 4 Pumping

(November, 2016)

Scale: 1 : 10,000

FIGURE:

Maxxam
A Bureau Veritas Group Company

RESULTS OF RAINBOW TROUT SINGLE CONCENTRATION-100%

Success Through Science®

Client : 9239 QUINSAM COAL CORPORATION, Campbell River Job Number: B6A5191

Client Project Name & Number: - TOXICITY SAMPLES

Test Result:

96 hrs Mortality % 0 Statistical Method: Visual

Sample Name : WC

Description:	yellow, clear			Sample Number:	QC6147-01
Sample Collected:	Nov 22, 2016 03:00 PM	Sampling Method :	Grab	Site Collection:	N/A
Sample Collected By:	N/A	Volume Received:	20 x 1LP	Temp.Upon Arrival: 9 °C	Storage: 2-6°C
Sample Received:	Nov 23, 2016 11:35 AM	pH:	8.0	Dissolved Oxygen:	11.0 mg/L
Analysis Start :	Nov 24, 2016 12:14 PM	Temperature :	14 °C	Sample Conductance:	996 µS/cm

Concentration	Temperature (°C)	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	pH	pH	Conductivity (uS/cm)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)
% vol/vol	Initial	96 hrs	Initial	96 hrs	Initial	96 hrs	Initial	96 hrs	96 hrs	96 hrs
0	14	15	10.1	10.0	7.2	6.9	36	0	0	0
100	14	15	10.7	10.0	8.1	8.3	994	0	0	0

Comments : All fish appeared and behaved normally during the test.

Culture/Control/Dilution Water Burnaby Municipal Dechlorinated Water

Hardness: 18 mg/L $CaCO_3$ Other parameters available on request.

Test Conditions Test concentration : 0,100 (% vol/vol)

Organisms per Vessel :	10	Test Temperature :	15 ± 1 °C	Solution Depth :	>15 cm
Total # of Organisms Used :	20	Pre-aeration Time :	120 min.	Rate of Aeration	6.5±1 mL/min/L
Test Volume :	18 L	Vessel Volume :	20L	Test pH Adjusted:	No
Loading Density :	0.4 g/L	Photoperiod :	16:8 (light: dark)		

Test Organism : Rainbow Trout *(Oncorhynchus mykiss)* Source : Lyndon Fish Hatcheries Inc.

Culture Temperature :	15 ± 2 °C	Weight (Mean) +- SD :	0.68 ± 0.17 g	Length (Mean) +- SD :	4.34 ± 0.28 cm
Culture Water Renewal :	≥ 1L/min/kg fish	Weight (Range) :	0.50 – 0.98 g	Length (Range) :	4.00 – 4.80 cm
Culture Photoperiod :	16:8 (light: dark)			% Mortality within 7 days :	0%
Feeding rate and frequency :	daily: 1-5% biomass of trout.			Acclimation Time:	>14 days

Reference chemical: Zinc Test Date: Nov 23, 2016

Test Endpoint 96 hrs LC50 (95% confidence interval) : 0.12 (0.09, 0.16)mg/L Statistical Method : Probit

Historical Mean LC50 (warning limits) : 0.11 (0.05, 0.23) mg/L Concentration : 0,0.04,0.08,0.16,0.32,0.64 mg/L

Test Method Maxxam's BBY2SOP-00004 is based on the latest versions of EPS 1/RM/9, EPS 1/RM/13, and EPS 1/RM/50.

Method Deviations : None.

Note: The results contained in this report refer only to the testing of the sample submitted. This report may not be reproduced, except in its entirety, without the written approval of the laboratory.

Analyst : Marie-Eve O'Toole

Verified By : Kimberly Tamaki, Scientist, Ecotoxicology Date: Dec 06, 2016 12:21 PM

MINISTRY OF ENVIRONMENT REGIONAL OPERATIONS BRANCH

NON-COMPLIANCE REPORTING MAILBOX NOTIFICATION

To: EnvironmentalNonCompliance@gov.bc.ca

Subject: Permit non-compliance report for settling pond 7SSD EMS # E292069, authorization # 7008. Equipment malfunction resulting in non-compliance for 24-hour composite total suspended solids (TSS) samples required from discharge at E292069 occurred on 2016-10-14 & 2016-10-15.

Attention: *Non-compliance report for Authorization # 7008. Quinsam Coal Corporation*
Equipment malfunction of composite sampler required for 24 hour TSS samples at settling pond E292069.

Date of Non-compliance: 2016-10-14 to 2016-10-15 midnight to midnight both days.

Location of Non-compliance [5800 Argonaut Main, Quinsam Coal Mine Site]

Nature of Non-compliance: Equipment malfunction of ISCO composite sampler. Equipment maintenance was performed on the sampler on Thursday including replacing the battery & connecting it to the solar panel, calibrating the sampler, running a diagnostics, checking distributer arm, replacing suction lines and pump tubing. The sampler drained the battery within 24hrs causing the system to fail over Friday and Saturday resulting in missed composite samples.

Initial Response/Actions taken: A new sampler has been ordered and a larger 12kW pump hard powered, with generator backup, has been brought to the site to eliminate future non-compliances with battery failure and sampler malfunctions. The objective of the pump is to reduce the volume of water entering 7SSD which will reduce discharge. This is achieved by redirecting water entering the pre-setting pond at 7SSD to the portal pond, then underground 5-South.

Monitoring conducted: Regular daily composite and weekly sampling required by permit has been conducted including a 96-hr Rainbow trout toxicity test from discharge at 7SSD and a 7-day *Ceridaphnia dubia* chronic toxicity test from the downstream site 7S, Stream 1 (EMS # E292109). Both of the aforementioned samples were collected on Oct 17th with optimal (100%) specimen survival rates.

Future action items: Environmental personnel inspect the system Monday through Thursday to ensure it was functioning correctly, batteries are changed and TSS samples collected. This is routine; however, the system failed regardless of the maintenance preformed. Weekend pump checks are also performed by surface personal. The composite sampler has had limited use as most water is pumped to the containment pond, alleviating discharge from the settling pond. The new sampler and larger pumping capacity will aid in eliminating future non-compliances of this nature.

Contact information:
Kathleen Russell, Environmental Coordinator 250-286-3224 EXT 225
kar@quinsam.com.

Gary Gould, General Manager 250-286-3224 EXT 227
gbg@hillsboroughresources.com

To: EnvironmentalNonCompliance@gov.bc.ca

Subject: 2016-11-29 Authorization #7008 equipment malfunction causing a loss of continuous discharge data at Settling Pond #4 (EMS ID: E207409).

Attention: *Non-compliance Report for Authorization #7008. Continuous flow monitoring instrument (Ultrasonic flow meter 4210) malfunctioned causing a loss of continuous flow data at settling Pond #4 for 19 days.*

Date of Non-compliance: 2016-10-30 12:00am to 2016-11-20 12:00am

Location of Non-compliance: [5800 Argonaut Main, Quinsam Coal Mine Site]

Nature of Non-compliance: Equipment malfunction occurred at Settling Pond #4 for 19 days where continuous flow monitoring at the discharge is required.

Initial Response/Actions Taken: The flow meter history is downloaded every 3rd week. The meter was downloaded on October 31st. The equipment is checked Monday through Thursday to ensure it is functioning properly. On Tuesday, November 1st the equipment failed, erasing all flow information recorded and had reset back to factory default settlings. A new flow meter was ordered with a rush delivery requested to the site. The flow meter took two weeks to be delivered. In the meantime the manufacturer was contacted for technical support and the flow meter was reset and reconfigured to monitor flow again. An ISCO technical service representative happened to be onsite on November 2nd but could not diagnose the issue.

A new internal battery was installed, and the external power source was changed, the flow meter was functioning normally once again. However, the power sources were not the issue as the flow meter was operating normally and the problem reoccurred on Monday, November 14th, erasing all flow information and resetting to factory default settings again during download. The flow meter was checked daily and the level of the pond was recorded intermittently throughout these events. The rate of discharge was recorded weekly at the settling pond.

The discharge rate did not fluctuate considerably throughout this time therefore the daily average flow information is estimated and carried through the missing days; Table 1 below displays this information. A Signature Portable Ultrasonic Flow Meter with an ultrasonic level sensor was purchased and installed on November 21st. The system has been functioning normally since.

Monitoring Conducted: The settling pond, settling ponds decant, flow meter, composite sampler and external power sources are inspected Monday through Thursday. The discharge was recorded on 4 separate occasions throughout this event on October 31st, November 7th, 10th and 16th. The daily composite sampler collected 24-hour composite samples. The settling pond discharge experienced permit limit exceedances for total suspended solids (TSS) above 25 mg/L due to extreme storm events. All events were reported and Provincial Emergency Program (PEP) was contacted.

Future Action Items: For contingency measures the old flow meter (Ultra Sonic 4210) will be repaired and used as a backup. A new composite sample was ordered and installed as well. The mine will now have a backup flow meter and composite sampler on hand.

If any further information is required please contact one of the undersigned.

Contact Information:

Kathleen Russell, Environmental Coordinator
250-286-3224 Ext 225
kar@quinsma.com

Josh Fry, Environmental Technician
250-286-3224 Ext 231
jaf@quinsam.com

CC
Gary Gould, General Manager
250-286-3224 Ext 227
gbg@hillsboroughresources.com

Table 1: Daily Precipitation and Discharge at Settling Pond # 4 Compared to 24-hr & 72 hr Rainfall

Date	Precip. (mm)	Settling Pond #4 Max. Discharge	Settling Pond #4 Av. Discharge	72 Hr Rainfall Depth (mm)
01-Oct-16	0	0.082	0.0764	
02-Oct-16	11.4	0.082	0.0755	
03-Oct-16	2.8	0.075	0.0692	14.2
04-Oct-16	0	0.061	0.0458	14.2
05-Oct-16	18.4	0.056	0.0463	21.2
06-Oct-16	19.1	0.117	0.0473	37.5
07-Oct-16	**52.9**	0.167	0.1441	**90.4**
08-Oct-16	13.7	0.180	0.1742	**85.7**
09-Oct-16	11.6	0.168	0.1450	**78.2**
10-Oct-16	0.1	0.143	0.1301	25.4
11-Oct-16	0.1	0.130	0.0993	11.8
12-Oct-16	0.1	0.120	0.0999	0.3
13-Oct-16	6.8	0.135	0.1156	7
14-Oct-16	33.7	0.174	0.1549	40.6
15-Oct-16	42.5	0.202	0.1656	**83**
16-Oct-16	**45**	0.207	0.1822	**121.2**
17-Oct-16	1.4	0.191	0.1770	**88.9**
18-Oct-16	4	0.172	0.1529	50.4
19-Oct-16	0.3	0.143	0.1334	5.7
20-Oct-16	7.6	0.130	0.1187	11.9
21-Oct-16	2.3	0.172	0.1326	10.2
22-Oct-16	8.6	0.201	0.1888	18.5
23-Oct-16	2.3	0.201	0.1776	13.2
24-Oct-16	2.9	0.194	0.1809	13.8
25-Oct-16	7.4	0.214	0.1879	12.6
26-Oct-16	36.3	0.214	0.1900	46.6
27-Oct-16	19.5	0.215	0.1924	63.2
28-Oct-16	3.7	0.217	0.1901	59.5
29-Oct-16	2.7	0.214	0.1944	25.9
30-Oct-16	4	0.209	0.2054	10.4
31-Oct-16	2	**0.209**	**0.2090**	8.7
01-Nov-16	2.8	**0.209**	**0.2090**	8.8
02-Nov-16	6.5	**0.209**	**0.2090**	11.3
03-Nov-16	**58.9**	**0.209**	**0.2090**	68.2
04-Nov-16	28.7	**0.209**	**0.2090**	**94.1**
05-Nov-16	15.7	**0.209**	**0.2090**	**103.3**
06-Nov-16	0.7	**0.209**	**0.2090**	45.1
07-Nov-16	1.6	**0.150**	**0.1500**	18
08-Nov-16	**46.7**	**0.150**	**0.1500**	49
09-Nov-16	26.7	**0.150**	**0.1500**	**75**
10-Nov-16	0.2	**0.150**	**0.1500**	**73.6**
11-Nov-16	0.1	**0.150**	**0.1500**	27
12-Nov-16	10	**0.150**	**0.1500**	10.3
13-Nov-16	7	**0.150**	**0.1500**	17.1
14-Nov-16	17.1	0.150	0.1486	34.1
15-Nov-16	0.9	0.150	0.1493	25
16-Nov-16	7.9	**0.150**	**0.1500**	25.9
17-Nov-16	1.4	**0.150**	**0.1500**	10.2
18-Nov-16	0.1	**0.150**	**0.1500**	9.4
19-Nov-16	1.8	**0.150**	**0.1500**	3.3
20-Nov-16	14.9	**0.150**	**0.1500**	16.8
21-Nov-16	12.2	0.202	0.1964	28.9
22-Nov-16	0	0.236	0.1838	27.1
23-Nov-16	26.6	0.217	0.1712	38.8
	Total 651.7	**Max 0.236**	**Average 0.1538**	-

Flow meter malfunctioned losing continuous discharge data from Oct 31st through Nov 20th, 2016

Bold Red indactes the discharge was recorded in the field book from the flow meter

Bold Black indcates discharge was inferred based on daily observation and daily flow rates

Exceeding 2 Yr 24 Hr

Exceeding 5 Yr 24 Hr

Exceeding 2 Yr 72 Hr

Exceeding 5 Yr 72 Hr

Exceeding 10 Yr 72 Hr

Exceeding 100 Yr 72 Hr

To: EnvironmentalNonCompliance@gov.bc.ca

Subject: Permit non-compliance report for Settling Pond #4, EMS # E207409 and authorization # 7008. Non-compliance for 10 total suspended solid (TSS) 24 hour composite samples required from discharge E207409 occurring from 2016-11-4 to 2016-11-13. Provincial Emergency Program (PEP) was informed with spill reports generated for Nov. 4th through 6th (DGI 162328) and Nov 7th through 13th (DGI 162403).

Attention: *Non-compliance report for Authorization # 7008. Quinsam Coal Corporation TSS results from 2016-11-4 to 2016-11-13 at Settling Pond #4, EMS # E207409.*

Date of Non-compliance: *2016-11-4 to 2016-11-13*

Location of Non-compliance: [5800 Argonaut Main, Quinsam Coal Mine Site]

Nature of Non-compliance: The TSS exceedances resulted from extreme storm events (high precipitation) resulting in increased water levels in the surrounding area and including underground (2-North mine). From October 1st through November 23rd the mine has received 651.7 mm of precipitation with 363.2 mm received during the month of October and more specifically 205.6 mm received from November 1 through 13th. Table 1 display's the 24-hour and 72-hour Rainfall Return Periods specifically derived for the mine site by Golder Associates in 2016. Table 2 below, displays precipitation and discharge at Settling Pond #4 and highlights the 24-hour and 72-hour rainfall return periods exceeding 2, 5, 10 & 100 year events associated with Table 1. As depicted in the tables the mine has experienced record rainfall events exceeding 100 year 72-hour events on Oct 14th through 16th with 121.23 mm of rain received.

Table 1: 24-hour and 72 hour Rainfall Return Periods

Return Period (Years)	24-hour Rainfall Depth (mm)	72-hour Rainfall Depth (mm)
2	44.2	69.6
5	55.1	87.1
10	61.6	96.8
25	68.9	107
50	73.8	114
100	78.3	120
200	82.3	125
500	87.2	131
1000	90.5	134
PMP*	260	386

*Probable Maximum Precipitation=PMP

Golder Associates 2016

Exceeding 2 Yr 24 Hr

Exceeding 5 Yr 24 Hr

Exceeding 2 Yr 72 Hr

Exceeding 5 Yr 72 Hr

Exceeding 10 Yr 72 Hr

Exceeding 100 Yr 72 Hr

Table 2: Daily Precipitation and Discharge at Settling Pond # 4 Compared to 24-hr & 72 hr Rainfall				
Date	Precip. (mm)	Settling Pond #4 Max. Discharge	Settling Pond #4 Av. Discharge	72 Hr Rainfall Depth (mm)
01-Oct-16	0	0.08	0.08	
02-Oct-16	11.4	0.08	0.08	
03-Oct-16	2.8	0.08	0.07	14.2
04-Oct-16	0	0.06	0.05	14.2
05-Oct-16	18.4	0.06	0.05	21.2
06-Oct-16	19.1	0.12	0.05	37.5
07-Oct-16	**52.9**	0.17	0.14	**90.4**
08-Oct-16	13.7	0.18	0.17	**85.7**
09-Oct-16	11.6	0.17	0.14	**78.2**
10-Oct-16	0.1	0.14	0.13	25.4
11-Oct-16	0.1	0.13	0.10	11.8
12-Oct-16	0.1	0.12	0.10	0.3
13-Oct-16	6.8	0.14	0.12	7
14-Oct-16	33.7	0.17	0.15	40.6
15-Oct-16	42.5	0.20	0.17	**83**
16-Oct-16	**45**	0.21	0.18	**121.2**
17-Oct-16	1.4	0.19	0.18	**88.9**
18-Oct-16	4	0.17	0.15	50.4
19-Oct-16	0.3	0.14	0.13	5.7
20-Oct-16	7.6	0.13	0.12	11.9
21-Oct-16	2.3	0.17	0.13	10.2
22-Oct-16	8.6	0.20	0.19	18.5
23-Oct-16	2.3	0.20	0.18	13.2
24-Oct-16	2.9	0.19	0.18	13.8
25-Oct-16	7.4	0.21	0.19	12.6
26-Oct-16	36.3	0.21	0.19	46.6
27-Oct-16	19.5	0.22	0.19	63.2
28-Oct-16	3.7	0.22	0.19	59.5
29-Oct-16	2.7	0.21	0.19	25.9
30-Oct-16	4	0.21	0.21	10.4
31-Oct-16	2	**0.21**	**0.21**	8.7
01-Nov-16	2.8	**0.21**	**0.21**	8.8
02-Nov-16	6.5	**0.21**	**0.21**	11.3
03-Nov-16	**58.9**	**0.21**	**0.21**	68.2
04-Nov-16	28.7	**0.21**	**0.21**	**94.1**
05-Nov-16	15.7	**0.21**	**0.21**	**103.3**
06-Nov-16	0.7	**0.21**	**0.21**	45.1
07-Nov-16	1.6	**0.15**	**0.15**	18
08-Nov-16	**46.7**	**0.15**	**0.15**	49
09-Nov-16	26.7	**0.15**	**0.15**	**75**
10-Nov-16	0.2	**0.15**	**0.15**	**73.6**
11-Nov-16	0.1	**0.15**	**0.15**	27
12-Nov-16	10	**0.15**	**0.15**	10.3
13-Nov-16	7	**0.15**	**0.15**	17.1

Flow meter malfunctioned losing continuous discharge data from Oct 31st through Nov 20th, 2016

Bold Red indactes the discharge was recorded in the field book from the flow meter

Bold Black indcates discharge was inferred based on daily observation and daily flow rates

Exceeding 2 Yr 24 Hr

Exceeding 5 Yr 24 Hr

Exceeding 2 Yr 72 Hr

Exceeding 5 Yr 72 Hr

Exceeding 10 Yr 72 Hr

Exceeding 100 Yr 72 Hr

During the period where TSS was elevated (November 1st-13th) the mine experienced periods where 2 and 5 year, 24 hour precipitation events were exceeded and again 2, 5 and 10 year, 72 hour rainfall return periods were exceeded. These events have been significant and increased the water levels underground, specifically 2-North. The rise in water levels flushed the oxidized exposed mine walls releasing iron in its ferrous state (Fe2+) into the water column and was pumped to surface into Brinco Brook which flows into Settling Pond # 4. Once exposed to oxygen, the iron changed oxidation state from ferrous iron (Fe^{2+}) to a ferric iron (Fe^{3+}) precipitate that contributed to the already elevated load of suspended solids at the settling pond.

This process of fluctuating water levels underground and mobilized local materials increased suspended solids at the settling pond to levels above the permit limit for TSS of 25 mg/L. It is important to keep in mind that the maximum concentration obtained from the 24 hour composite samples resulted in 39 mg/L from Nov 1-13th as displayed in Table 3 below.

Initial Response/Actions taken & Monitoring Conducted: PEP was notified upon receipt of results. An internal investigation was initiated with downstream monitoring conducted and a rush analysis requested on samples. Total and dissolved metals analysis was requested from water collected at Settling Pond 4 on Nov. 6th, 10th and 13th and key monitoring locations downstream at WC, which monitors water quality prior to entering Middle Quinsam Lake near the inlet on Nov. 14th and samples were also collected from Middle Quinsam Lake Inlet and the centre of Middle Quinsam Lake on Nov. 17th.

Dissolved iron and TSS resulted in low concentrations at all sites downstream. As suspected total iron was elevated at Settling Pond 4 with concentrations of dissolved iron at or just above detection levels; low levels of total iron were reported downstream and in the receiving environment (Middle Quinsam Lake). A 96-Hr LC- 50 (100% Survival) Rainbow Trout Bioassay was performed on Nov. 22, 2016 on the water quality at WC in order to demonstrate that there was minimal effect on aquatic organisms downstream in the receiving environment resulting from these events. The results of the bioassay have not been received from the laboratory. Results can be submitted upon receipt of analysis from the laboratory and all results will be found in the 3rd quarterly report.

Table 3: Concentrations of Iron and Total Suspended Solids in Water Quality

Parameter	Date	Settling Pond #4	North Pit Culvert (WC)	Mid Quinsam Lake Inlet (MQLI)	Mid Quinsam Lake 1 M	Mid Quinsam Lake 4 M	Mid Quinsam Lake 9 M	Mid Quinsam Lake 1m from bottom	Mid Quinsam Lake Outlet (WB)
Fe-D	11-Oct-16	-	0.0102	-	-	-	-	-	-
Permit Limit	12-Oct-16	-	-	-	-	-	-	-	0.0245
0.3 mg/L	18-Oct-16	-	-	-	-	-	-	-	0.0568
WQG-Max	26-Oct-16	-	-	-	-	-	-	-	0.0504
0.35 mg/L	27-Oct-16	-	-	-	0.0309	0.0299	0.0310	0.0323	-
	31-Oct-16	-	-	-	-	-	-	-	0.0393
	06-Nov-16	0.0075	-	-	-	-	-	-	-
	09-Nov-16	-	-	-	0.0149	0.0148	0.0137	0.0163	-
	10-Nov-16	<0.0050	-	-	-	-	-	-	0.0172
	13-Nov-16	<0.0050	-	-	-	-	-	-	-
	14-Nov-16	-	0.0095	-	-	-	-	-	-
	17-Nov-16	-	-	0.0156	0.0155	0.0154	0.0157	0.0173	-
Average		0.0058	0.0099	0.0156	0.0204	0.02	0.0201	0.022	0.0376
Count		3	2	1	3	3	3	3	5
Minimum		<0.0050	0.0095	0.0156	0.0149	0.0148	0.0137	0.0163	0.0172
Maximum		0.0075	0.0102	0.0156	0.0309	0.0299	0.031	0.0323	0.0568

Parameter	Date	Settling Pond #4	North Pit Culvert (WC)	Middle Quinsam Lake Inlet (MQLI)	Mid Quinsam Lake 1 M	Mid Quinsam Lake 4 M	Mid Quinsam Lake 9 M	Mid Quinsam Lake 1m from bottom	Mid Quinsam Lake Outlet (WB)
Fe-T	11-Oct-16	-	0.039	-	-	-	-	-	-
	12-Oct-16	-	-	-	-	-	-	-	0.061
	18-Oct-16	-	-	-	-	-	-	-	0.089
WQG-Max	26-Oct-16	-	-	-	-	-	-	-	0.099
1.00 mg/L	27-Oct-16	-	-	-	0.051	0.051	0.0560	0.049	-
	31-Oct-16	-	-	-	-	-	-	-	0.072
	06-Nov-16	9.11	-	-	-	-	-	-	-
	09-Nov-16	-	-	-	0.053	0.048	0.035	0.037	-
	10-Nov-16	9.21	-	-	-	-	-	-	0.052
	13-Nov-16	8.87	-	-	-	-	-	-	-
	14-Nov-16	-	0.451	-	-	-	-	-	-
	17-Nov-16	-	-	0.031	0.03	0.029	0.032	0.03	-
Average		9.06	0.245	0.031	0.045	0.043	0.041	0.039	0.075
Count		3	2	1	3	3	3	3	5
Minimum		8.87	0.039	0.031	0.03	0.029	0.032	0.03	0.052
Maximum		9.21	0.451	0.031	0.053	0.051	0.056	0.049	0.099

Parameter	Date	Settling Pond #4	North Pit Culvert (WC)	Mid Quinsam Lake Outlet (WB)
TSS	17-Oct-16	<4.0	<4.0	-
Permit Limit	18-Oct-16	<4.0	-	<4.0
25 mg/L	19-Oct-16	<4.0	-	-
WQG-Av	20-Oct-16	<4.0	-	-
25 mg/L	21-Oct-16	<4.0	-	-
	22-Oct-16	16.8	-	-
	23-Oct-16	27.3	-	-
	24-Oct-16	20.5	-	-
	25-Oct-16	21	-	-
	26-Oct-16	14.0	-	<4.0
	27-Oct-16	18.5	-	-
	28-Oct-16	19.0	-	-
	29-Oct-16	21.5	-	-
	30-Oct-16	15.8	-	-
	31-Oct-16	21.3	-	<4.0
	01-Nov-16	13.5	<4.0	-
	02-Nov-16	24.3	-	-
	03-Nov-16	11.8	-	-
	04-Nov-16	32.8	-	-
	05-Nov-16	35.0	-	-
	06-Nov-16	29.0	-	-
	07-Nov-16	32.8	-	-
	08-Nov-16	39.0	-	-
	09-Nov-16	36.8	-	-
	10-Nov-16	32.8	-	<4.0
	11-Nov-16	33.5	-	-
	12-Nov-16	32.0	-	-
	13-Nov-16	31.0	-	-
	14-Nov-16	16.0	<4.0	-
	15-Nov-16	15.5	-	-
	16-Nov-16	15.0	-	-
	17-Nov-16	<4.0	-	-
	18-Nov-16	6.0	-	-
	19-Nov-16	7.5	-	-
	20-Nov-16	8.0	-	-
Average		15.1	4	4
Count		48	4	5
Minimum		<4.0	<4.0	<4.0
Maximum		39	4	4

Future Action Items: Further observations with respect to dewatering system operation, TSS and metal concentrations, pond turbidity and precipitation will be recorded and used to develop and employ best practices. Turbidity or floating silt curtain has been considered for Settling Pond #4 if this problem persists. This curtain is a flexible sediment control barrier designed to prevent the spread of silt and sediment in lakes and other water bodies during times of high turbidity. Constructed of permeable or non-permeable material, the turbidity curtain is suspended vertically in the water with a flotation material enclosed in the top pocket and a ballast chain enclosed in the lower pocket. This would allow the water to meander through the settling pond and increase retention time.

All of the presented information indicates the situation was attributed to extreme storm events and as stated in Section 2.1.7 of the Effluent Permit**,** Effluent Characteristics (for Total Suspended Solids) specifically the statement *(Variances may be allowed by the Director for higher discharge rates. The Director may as well, in the future, establish a maximum level for total suspended solids during extreme storm events)* it is the intention of Quinsam Coal to contact the Direct in order to establish a maximum level for TSS during extreme storm events.

Once again due diligence was carried out by Quinsam Environmental Department to ensure that the risk to the aquatic receptors was minimal. If there is any further inquiries into these events please contact myself at the below contact information.

Contact information:

Kathleen Russell BSc.
Environmental Coordinator
QUINSAM COAL
Ph: (250) 286-3224 ext. 225
E-mail: kar@quinsam.com

To: EnvironmentalNonCompliance@gov.bc.ca

Subject: 2017-01-22 Authorization # 07008 Total Suspended Solid (TSS) Permit Limit Exceedance from discharge at E207409. Report Number DGI 163158.

Date of Non-compliance: 2017-01-22

Location of Non-compliance [5800 Argonaut Main, Quinsam Coal Mine Site]

Nature of Non-compliance: 2017-01-22 composite daily TSS sample resulted in 51.5 mg/L at Settling Pond #4 (SP4).

Initial Response/Actions Taken: Provincial Emergencies Response was notified and a DGI number was generated (DGI 163158). The laboratory was contacted and the sample was reanalyzed with the results confirmed. The laboratory was requested to visually inspect the sample for debris and make observation about the filter. All subsequent results remained low at SP4 and downstream at WC.

Monitoring Conducted: All regular daily composite TSS sampling and weekly sampling required by permit has been conducted. The TSS exceedance may have been a result of a combination of rain fall that occurred over a Jan 17th - 19th (68.2 mm) and fluctuating pond water levels. The fluctuating water levels in the pond and runoff from the surrounding area and banks could have caused mobilization of sediment, increasing TSS. At this time underground pumping rates remained at normal rates of (0.1143 m^3/s). Figure 1 displays the average daily discharge, 2-North dewatering rate, TSS and precipitation at Settling Pond 4. As depicted in Figure 1 the water level in the pond declined as TSS increased over January 21st through 22nd.

The observations made by the analyst (laboratory technician that filtered the sample) recalled seeing “white flakes on the filter and some fine yellow powder.” This would suggest that there may have been a calcium build up either in a bottle or in the suction line upon start-up of the composite sampler. The sampler was not running during the freezing weather and grab samples were collected from all ponds instead of composite samples. Composite samplers were reprogramed to begin sampling on January 18th. The bottles were cleaned and the clear suction line was observed to be clean therefore it was not changed. Table 1 displays the grab and composite TSS samples obtained from Settling Pond 4 during January.

All proceeding results (Jan 23rd to 25th) indicate low TSS in the water quality with results ranging from <4.0 mg/L to 8.3 mg/L. Downstream TSS results at WC collected on January 24th resulted in <4.0 mg/L. With the exception of TSS at the settling pond, all other permitted parameters have met permit limits.

Mitigation Measures Taken: The pond water levels and dam stability are checked daily by QCC employees. Environmental personal inspect the system Monday through Thursday to ensure it is functioning correctly and collect TSS samples. Environmental personnel have removed any obvious debris around the decant riser including a small amount of macrophyte growth and debris on the edge of the banks. The composite sampler suction line has been cleaned and the weight on the end of the suction line has been changed.

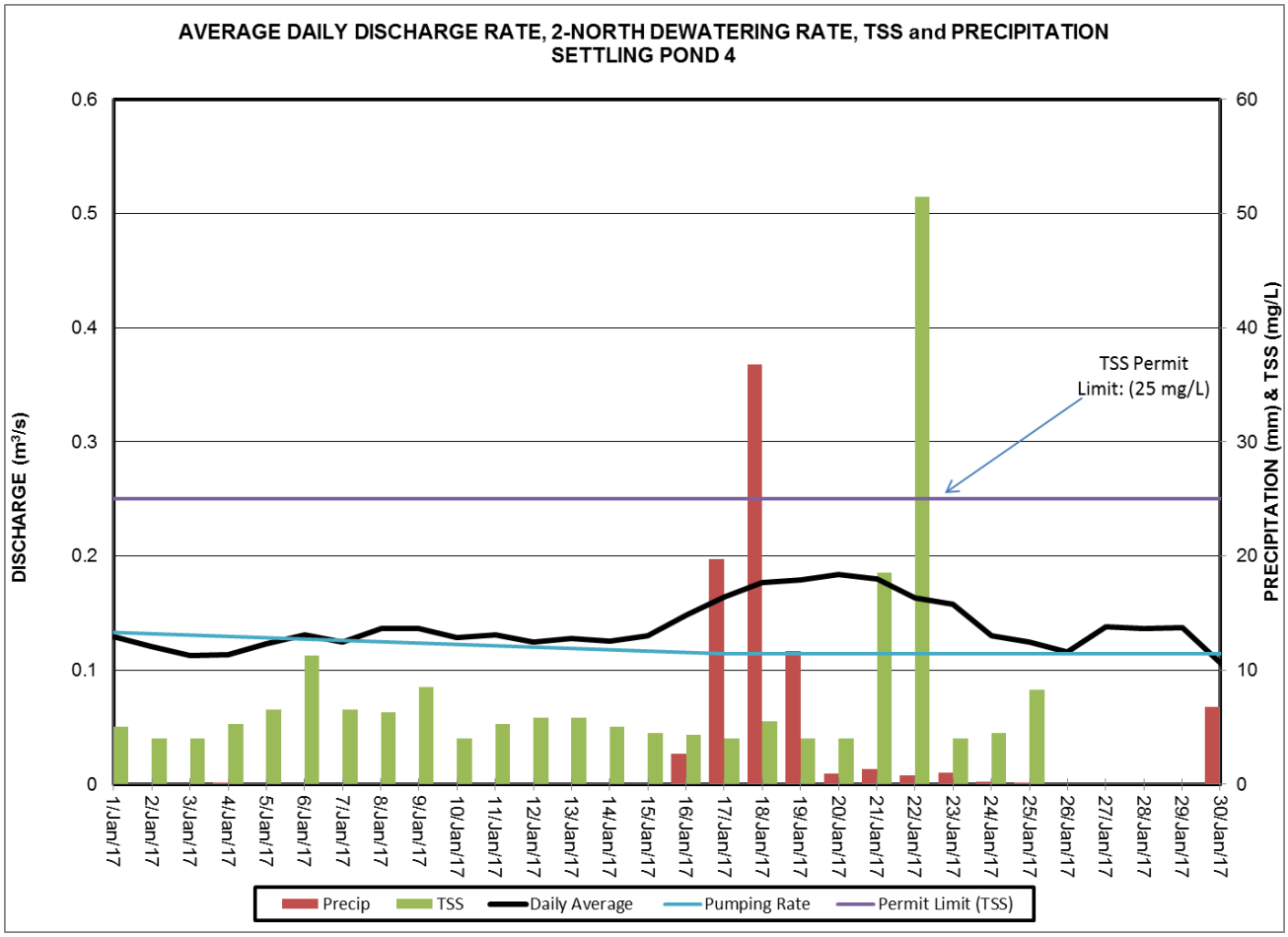


Figure 1: Average Daily Discharge, 2-North Dewatering Rate, TSS and Precipitation at Settling Pond 4

Table 1: Settling Pond 4- TSS Samples

Parameter Name	Date	GRAB	COMP
TSS	1-Jan-17	5.0	
	2-Jan-17	<4.0	
	3-Jan-17	<4.0	
	4-Jan-17	5.3	
	5-Jan-17	6.5	
	6-Jan-17	11.3	
	7-Jan-17	6.5	
	8-Jan-17	6.3	
	9-Jan-17	8.5	
	10-Jan-17	<4.0	
	11-Jan-17	<5.3	
	12-Jan-17	5.8	
	13-Jan-17	5.8	
	14-Jan-17	5.0	
	15-Jan-17	4.5	
	16-Jan-17	4.3	
	17-Jan-17	<4.0	
	18-Jan-17		5.5
	19-Jan-17		<4.0
	20-Jan-17		4.0
	21-Jan-17		18.5
	22-Jan-17		**51.5**
	23-Jan-17		<4.0
	24-Jan-17		4.5
	25-Jan-17		8.3
Average		**5.7**	**12.5**
Count		**17**	**8**
Minimum		**<4.0**	**<4.0**
Maximum		**11.3**	**51.5**

Contact information:
Kathleen Russell, Environmental Coordinator 250-286-3224 EXT 225
kar@quinsam.com.

Josh Fry, Environmental Technician 250-286-3224 EXT 231
jaf@quinsam.com

To: EnvironmentalNonCompliance@gov.bc.ca

Date: February 20, 2017

Subject: Permit non-compliance report for Settling Pond #4, EMS # E207409 and authorization #07008.

Attention: *Quinsam Coal Corporation Total Suspended Solids (TSS) exceedance at Settling Pond #4, EMS #E207409. Non-compliance for 1 TSS 24 hour composite sample required from discharge E207409 occurring from 2017-1-30. Provincial Emergency Program (PEP) was informed with a spill report generated* ***(DGI-163326).***

Date of Non-compliance: *2017-01-30 (24-hour period).*

Location of Non-compliance: [5800 Argonaut Main, Quinsam Coal Mine Site]

Nature of Non-compliance: The TSS exceedance was thought to be attributed to ferrous iron (Fe^{2+}) in the water column oxidizing to a ferric iron (Fe^{3+}) precipitate that contributed to the elevated load of suspended solids in the composite sample. However, after receiving the metals analysis from the analytical laboratory; the results for total iron (0.958 mg/L) and dissolved iron (0.847 mg/L) indicate the TSS exceedance of 58.5 mg/L was not largely influenced by iron precipitate. Upon further investigation of the metals analysis, concentrations of hardness as calcium carbonate ($CaCO_3$) are thought to be the main source of this exceedance. The results indicate that the concentrations of total hardness of 419 mg/L and dissolved hardness of 365 mg/L are elevated when comparing other metals samples at Settling Pond #4. The portion that cannot pass through a 45 µm filter (particulate) resulted in a calculated 54 mg/L of hardness. The particulate was calculated by subtracting the dissolved portion from the total: (419 – 365 =54 mg/L). Therefore it is inferred that hardness particulate (expressed as $CaCO_3$) contributed 54mg/L to the composite sample of TSS. Other parameters that may have contributed are sulphur and sodium both had a calculated particulate of 32 mg/L and 19 mg/L, respectively.

Precipitation and fluctuating pumping rates did not contribute to this event as only 6.8 mm fell within a 24 hour period (Figure 2). The quantity discharged on January 30th, 2017 was 9148.5 m^3.

Freezing conditions at the site may have attributed to the elevated hardness concentrations reported in the TSS sample. The composite sample was frozen in the sampler and then thawed, as evidenced by the temperature of the previous day and remnants of ice within the sample upon collection. As displayed in Figure 1, the temperature dropped to below freezing during January 30th through February 1st when the sample was collected. The (Fe^{2+}) oxidized to (Fe^{3+}) in the sample bottle and precipitated out, settling in the bottom of the composite sample. Upon collection the frozen sample was agitated and the abrasive ice would have scrapped any build-up of hardness as $CaCo_{3,}$ sulphur and sodium on the side of the bottle. The bottles are rinsed with the ponded water and checked for debris each time a sample is collected. They are brought into the office monthly acid rinsed and cleaned.

Initial Response/Actions Taken & Monitoring Conducted: The results were received and an internal investigation was initiated with a rush metals analysis requested for the January 30th sample from Setting Pond #4. PEP was notified upon receipt of results. The composite sampler suction line was inspected once again. All bottles were cleaned with salt (used as an abrasive cleaner) acid rinsed and the suction line was changed. The position of the suction line was repositioned so it is closer to the surface of the water and at the same elevation of the decant riser. The suction line may have been positioned too deep and may have been collecting suspended solids as they settle in the deeper water column. The suction line was last inspected with the weight changed and repositioned including all bottles cleaned on February 6th after the January 22nd TSS exceedance (51.5 mg/L) results were received. The January 22nd, 2017 TSS exceedance may have been attributed to the same type of events i.e. freezing conditions and a frozen composite sample (Figure 1).

The analytical laboratory was requested to take pictures of the sample from January 30th including the 45 µm filter used to measure TSS and add a rush analysis for a full metals scan to this sample. Figure's 3, 4 and 5 display the sample, the bottom of the sample with the ferric iron precipitate and the filter. However, after filtering the sample this portion of iron would have only contributed 0.847 mg/L of iron to the total concentration of TSS.

On February 1, 2017 monthly sampling occurred at the Settling Pond and downstream location Wetland Culvert (WC). All results were returned in low concentrations at the Settling Pond and at WC. The Settling Pond discharge flows through ~600m of wetland to the downstream monitoring station WC and then continues through another ~500m of wetland prior to entering the Middle Quinsam Lake.

Table 1 display's the concentrations of TSS and metals at Settling Pond #4 and WC and

compares the results to permit limits applied to Settling Pond #4 and B.C. Water Quality Guidelines for the Protection of Aquatics Life (used for comparison purposes only). All results were below permit limits and water quality guidelines with the exception of TSS on January 30th at Settling Pond #4. The February 1st sampling event at Settling Pond #4 and WC did not display elevated concentrations of metals, in particular iron or TSS. The analytical results demonstrate that there was minimal effect on aquatic organisms downstream in the receiving environment resulting from these events.

Future Action Items: Further observations with respect to dewatering system operation, TSS and metal concentrations, pond turbidity, climate & precipitation will be recorded and used to develop and employ best practices. At this time Quinsam is investigating the best solution to increase settling time in the pond and reduce the occurrences of TSS exceedances that have occurred.

Once again due diligence was carried out by the Quinsam Environmental Department to ensure that the risk to the aquatic receptors was minimal. If there are any further inquiries into these events please contact myself at the below contact information.

Contact information:

Kathleen Russell BSc.
Environmental Coordinator

Ph: (250) 286-3224 ext. 225
E-mail: kar@quinsam.com

Table 1. Analytical Results

Sampling Date	30-Jan-17	1-Feb-17	1-Feb-17	Lab Detection Limit	Permit Limits	Water Quality Guidelines
Site Name	Settling Pond #4	Settling Pond #4	WC			
Parameter	Results (mg/L)	Results (mg/L)	Results (mg/L)			
Total Suspended Solids	58.5	<4.0	<4.0	4.0	25.0	5
Acidity (pH 4.5)	-	<0.50	-	0.50	-	-
Acidity (pH 8.3)	-	2.28	-	0.50	-	-
Alkalinity (PP as CaCO3)	-	<0.50	-	0.50	-	-
Alkalinity (Total as CaCO3)	-	387	-	0.50	-	-
Dissolved Aluminum (Al)	0.0056	0.0081	0.0117	0.0030	0.5	0.1
Total Aluminum (Al)	0.0377	0.0141	0.0136	0.0030	-	-
Dissolved Antimony (Sb)	<0.00050	<0.00050	<0.00050	0.00050	-	-
Total Antimony (Sb)	<0.00050	<0.00050	<0.00050	0.00050	-	-
Dissolved Arsenic (As)	0.0014	0.00181	0.00059	0.00010	-	-
Total Arsenic (As)	0.00324	0.00248	0.00065	0.00010	-	0.005
Dissolved Barium (Ba)	0.0178	0.0155	0.0130	0.0010	-	-
Total Barium (Ba)	0.0222	0.0157	0.0124	0.0010	-	-
Dissolved Boron (B)	1.04	0.747	0.742	0.050	-	-
Total Boron (B)	1.25	0.799	0.679	0.050	-	-
Dissolved Cadmium (Cd)	0.0000056	0.0000050	0.0000060	0.0000050	-	0.000017
Total Cadmium (Cd)	0.000025	<0.000010	<0.000010	0.000010	-	-
Dissolved Calcium (Ca)	119	99.4	93.1	0.050	-	-
Total Calcium (Ca)	141	101	97.3	0.050	-	-
Carbonate (CO3)	-	<0.50	-	0.50	-	-
Dissolved Chromium (Cr)	<0.0010	<0.0010	<0.0010	0.0010	-	-
Total Chromium (Cr)	<0.0010	<0.0010	<0.0010	0.0010	-	-
Dissolved Cobalt (Co)	<0.00050	<0.00050	<0.00050	0.00050	-	-
Total Cobalt (Co)	0.00119	<0.00050	<0.00050	0.00050	-	0.11
Dissolved Copper (Cu)	0.00076	0.00043	0.00050	0.00020	0.02	-
Total Copper (Cu)	0.00423	0.00055	0.00056	0.00050	-	0.007
Total Hardness (CaCO3)	419	304	291	0.50	-	-
Dissolved Hardness (CaCO3)	365	300	284	0.50	-	-
Dissolved Iron (Fe)	0.111	0.0143	0.0102	0.0050	0.3	0.35
Total Iron (Fe)	0.958	0.285	0.132	0.010	-	1
Dissolved Lead (Pb)	<0.00020	<0.00020	<0.00020	0.00020	0.1	-
Total Lead (Pb)	<0.00020	<0.00020	<0.00020	0.00020	-	0.005
Dissolved Lithium (Li)	0.0148	0.0091	0.0090	0.0050	-	-
Total Lithium (Li)	0.015	0.0097	0.0078	0.0050	-	-
Dissolved Magnesium (Mg)	16.4	12.6	12.5	0.050	-	-
Total Magnesium (Mg)	16.4	12.8	11.7	0.050	-	-
Dissolved Manganese (Mn)	0.029	0.131	0.0373	0.0010	-	-
Total Manganese (Mn)	0.115	0.137	0.0417	0.0010	-	0.8
Dissolved Nickel (Ni)	0.0017	0.0013	0.0018	0.0010	-	-
Total Nickel (Ni)	0.0028	0.0013	0.0020	0.0010	-	0.025
Dissolved Potassium (K)	4.17	2.55	2.69	0.050	-	-
Total Potassium (K)	4.79	2.68	2.67	0.050	-	-
Dissolved Selenium (Se)	<0.00010	<0.00010	<0.00010	0.00010	-	-
Total Selenium (Se)	0.00012	<0.00010	<0.00010	0.00010	-	-
Dissolved Silicon (Si)	3.73	2.87	2.89	0.10	-	-
Total Silicon (Si)	4.18	3.13	3.13	0.10	-	-
Dissolved Silver (Ag)	<0.000020	<0.000020	<0.000020	0.000020	-	-
Total Silver (Ag)	<0.000020	<0.000020	<0.000020	0.000020	-	0.0001
Dissolved Sodium (Na)	353	262	258	0.050	-	-
Total Sodium (Na)	372	261	237	0.050	-	-
Dissolved Strontium (Sr)	1.35	0.887	0.915	0.0010	-	-
Total Strontium (Sr)	1.46	0.878	0.894	0.0010	-	-
Dissolved Sulphate (SO4)	-	464	529	5.0	-	-
Dissolved Sulphur (S)	256	174	173	3.0	-	-
Total Sulphur (S)	288	172	180	3.0	-	-
Dissolved Tin (Sn)	<0.0050	<0.0050	<0.0050	0.0050	-	-
Total Tin (Sn)	<0.0050	<0.0050	<0.0050	0.0050	-	-
Dissolved Titanium (Ti)	<0.0050	<0.0050	<0.0050	0.0050	-	-
Total Titanium (Ti)	<0.0050	<0.0050	<0.0050	0.0050	-	-
Dissolved Uranium (U)	<0.00010	<0.00010	<0.00010	0.00010	-	-
Total Uranium (U)	<0.00010	<0.00010	<0.00010	0.00010	-	-
Dissolved Zinc (Zn)	<0.0050	<0.0050	<0.0050	0.0050	0.1	-
Total Zinc (Zn)	<0.0050	<0.0050	<0.0050	0.0050	-	0.03
Total Mercury (Hg)	-	<0.0000020	<0.0000020	0.0000020	-	0.00001
Dissolved Mercury (Hg)	-	<0.0000020	<0.0000020	0.0000020	-	-

Figure 1: Temperature Compared to Grab & Composite TSS Samples at Settling Pond #4.

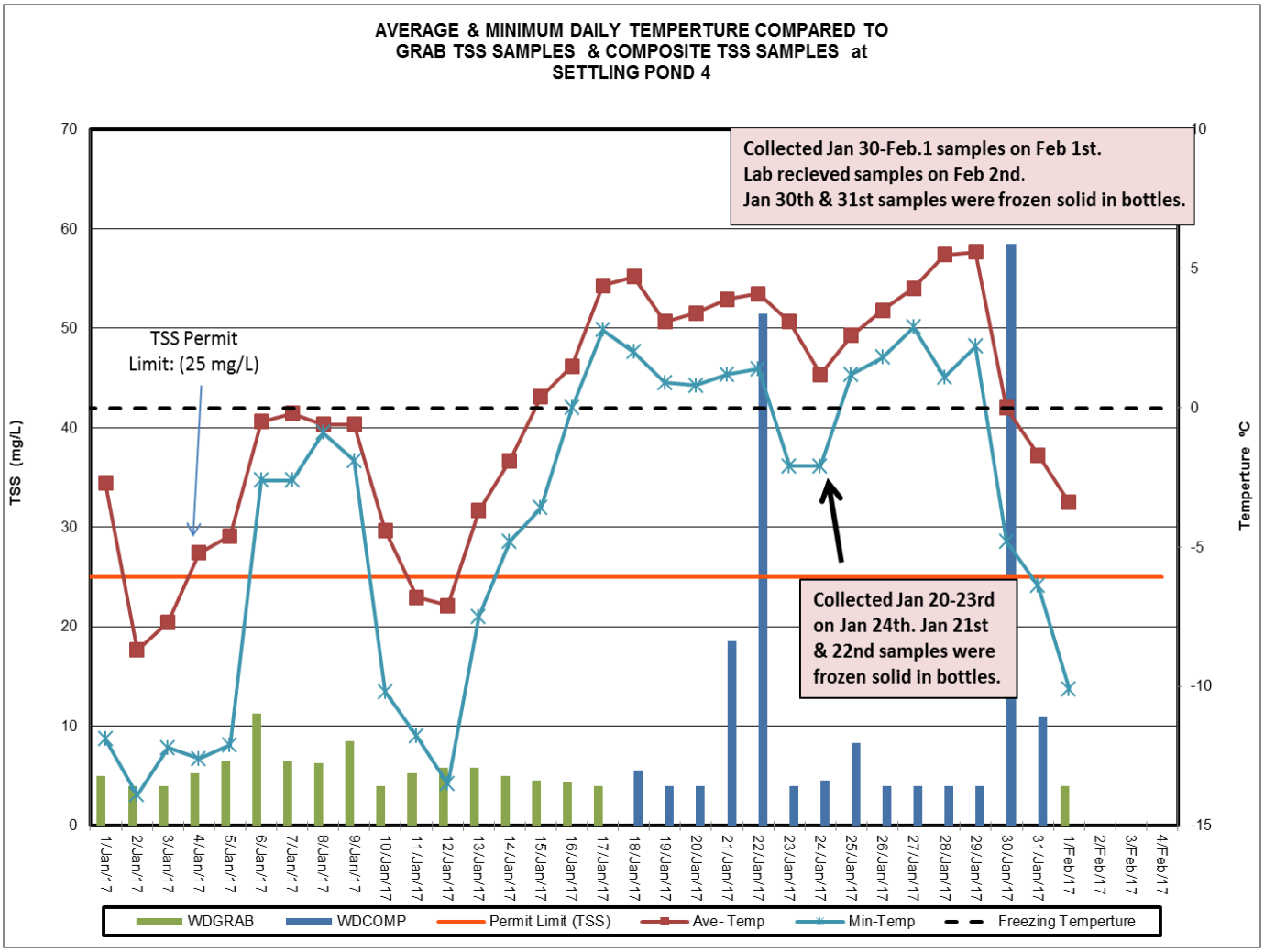


Figure 2: Discharge Pumping Rates, TSS and Precipitation at Settling Pond #4

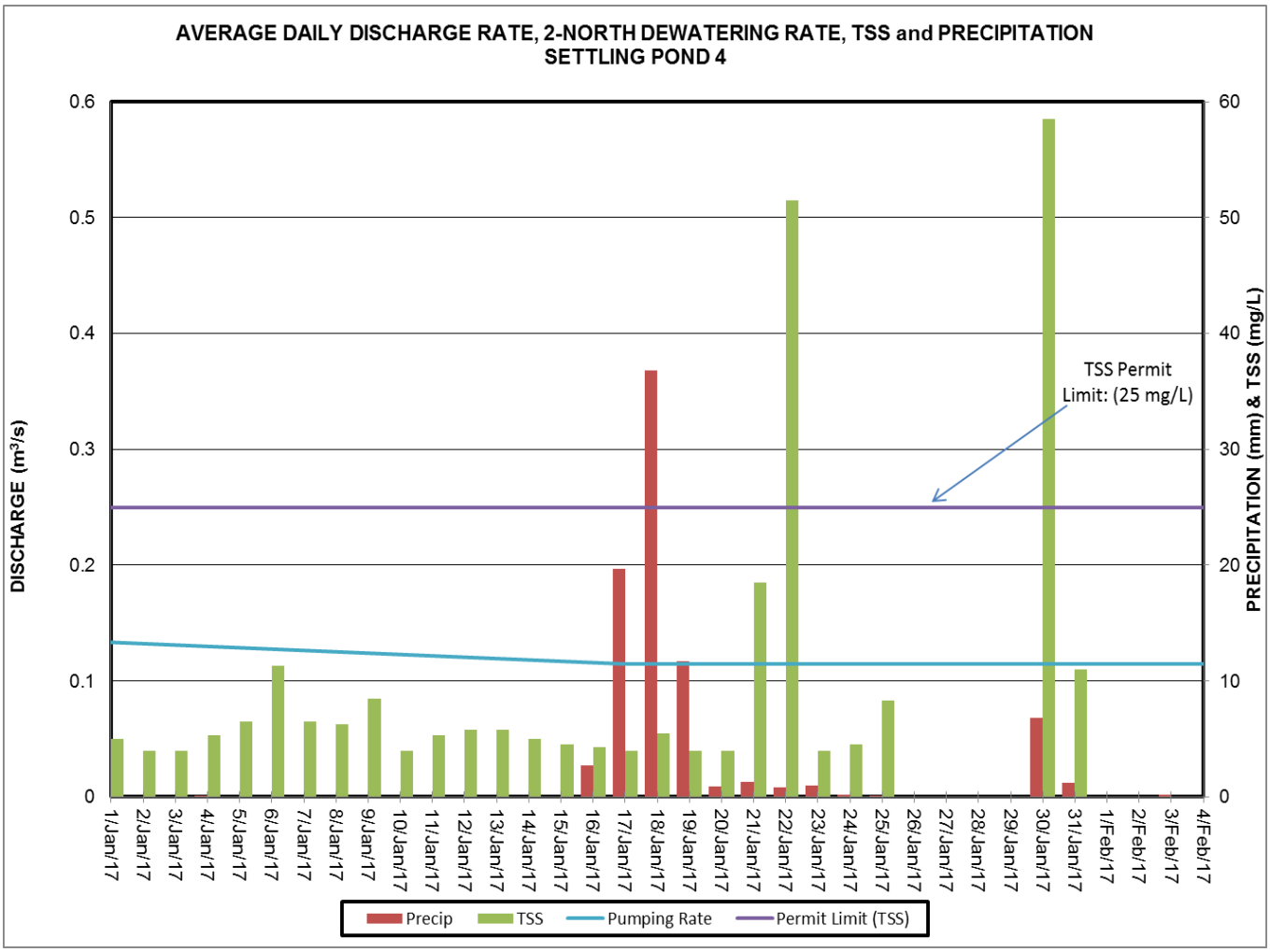


Figure 3: Failed Composite TSS Sample from January 30, 2017 at Settling Pond # 4 (WD).

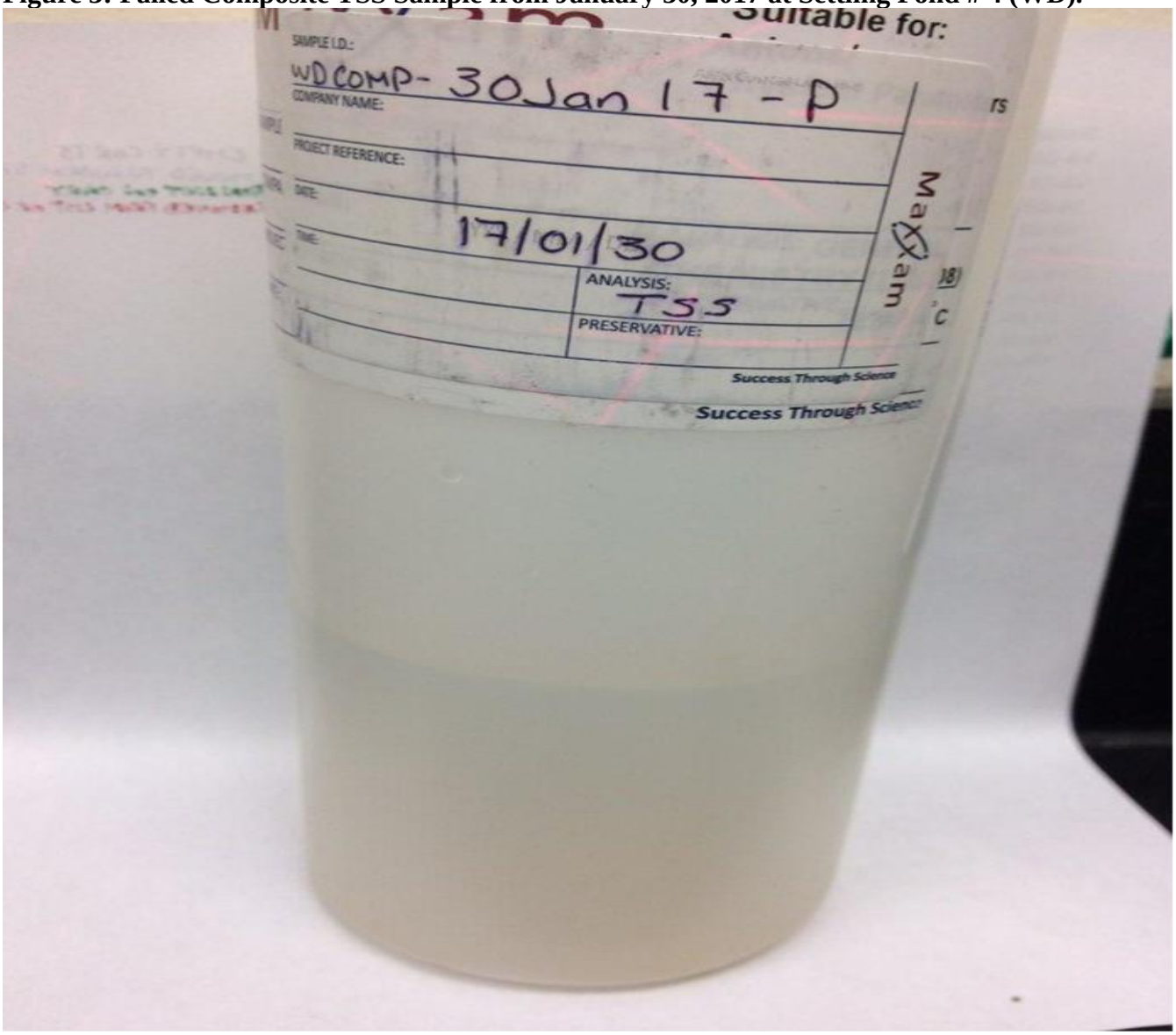
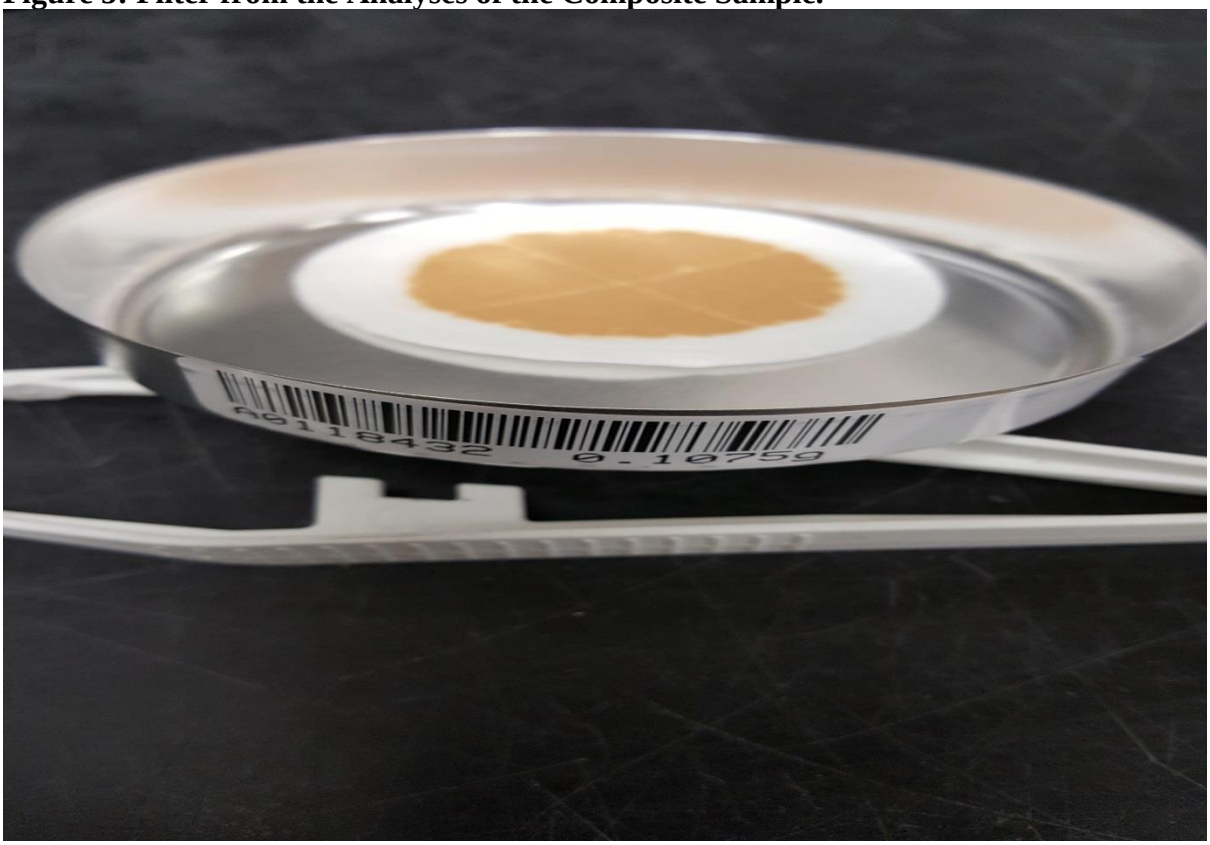


Figure 4: Ferric Iron (Fe^{3+}) Precipitate Settled at the Bottom of the Sample.

Figure 5: Filter from the Analyses of the Composite Sample.



QUINSAM COAL
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Campbell River, BC V9W 8A3
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Fax:(250) 286-9727

MEMORANDUM

To: Jennifer McConnachie, Ministry of Energy and Mines, Senior Reclamation Officer

Copy to: Kim Bellefontaine, Ministry of Energy and Mines
Gerry Barcelonia, Ministry of Energy and Mines
Kathleen Russell, Quinsam Coal
Josh Fry, Quinsam Coal

From: Gary Gould, Quinsam Coal, General Manager

Date: December 14, 2016

Re: Non-compliance Report (Effluent Permit PE:07008) for Total Suspended Solids

The following responses are provided to the December 2, 2016 e-mail with questions regarding the November 4 to 13, 2016 total suspended solids (TSS) exceedances reported at Settling Pond #4 (SP4).

1. Do you have the data available to provide a time series of the precipitation and underground dewatering pumping volumes, with the TSS data on the same time series?

The chart below provides the time series (from October 1 through to November 31, 2016) of daily precipitation, the estimated dewatering pumping volumes, the discharge from SP4 and TSS at the SP4 discharge. Key notes regarding the information on this chart follow.

Precipitation

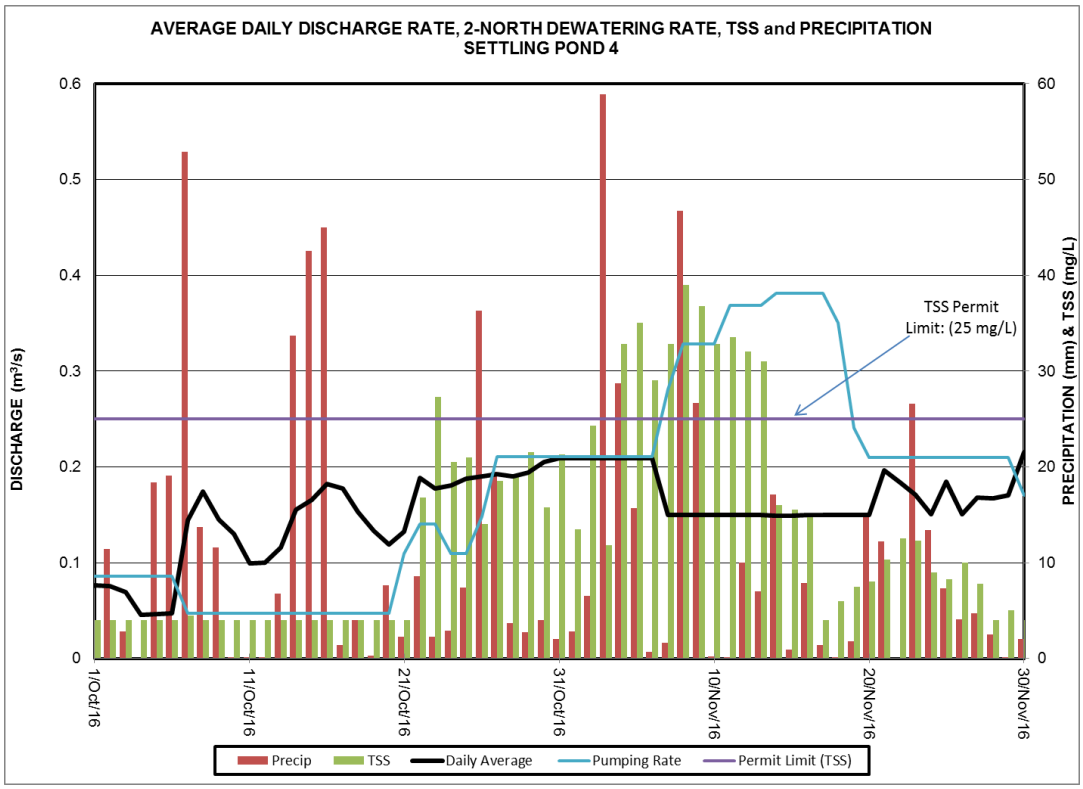
- The October 7th, October 16th and November 8th rainfalls exceeded the 2-Year (return period), 24-hour rainfall depth,
- The November 3rd rainfall exceeded the 5-Year, 24-hour rainfall depth,
- The October 5th to 7th and November 2nd to 4th rainfalls exceeded the 5-Year, 72-hour rainfall depth, and
- The October 14th to 16th rainfall exceeded the 100-Year, 72-hour rainfall depth.

Estimated Dewatering Pumping Volumes

Background: Dewatering of the 2-North mining area (surface and underground) during the 2-month period (October and November) shown on the chart involved three systems (refer to the attached plan view drawing titled "*2-North to Settling Pond 4 Pumping*"):

1) The 2-North 1-Mains and 5-Mains deepwells; which consists of three wells into the underground workings at the down-dip extent of mining in 1-Mains (two wells) and 5-Mains (1-well). Each well has a 200HP submersible pump tied into a common 250mm diameter surface pipeline that conveys water to Brinco Brook. This system of pumps provides the base load pumping from the 2-North underground workings. At the beginning of October one of the two pumps in 1-Mains was out of service and on October 7th the second pump failed. One 1-Mains pump went back into service on October 26.

2) The 2-North underground pumping system established to handle peak inflows during the current care-and maintenance period. At the beginning of October this system consisted of a bank of four 58HP pumps located at the 1-Mains/4-Mains intersection, stage pumping up to the 3-Mains dam from where two 250HP pumps pump water up to Brinco Brook through a 300mm diameter pipeline. The water level in the mine reached these pumps (four x 58HP) on October 21, initially needing only one pump running but all four by October 27 as the water level continued to rise. A second system: 58HP-to 250HP- to Brinco Brook through a 200mm diameter pipeline was added on November 7th and a fifth 58HP was added to the bank of four on November 11th. Water levels in the mine started dropping on November 12th.



3) The 2-North surface pumping system, was added during the second week of November to manage the high water levels behind the South Dam (a "*Very High"* consequence classified dam above the 2-North portal entries) and in the 2-North PAG-CCR Sump. All of the water pumped from the underground workings is directed into Brinco Brook (a wetland area above the 2-North open pit highwall), with the flow from Brinco Brook to SP4 controlled by a culvert though the mine access road. During this period of high rainfalls and pumping, the culvert became submerged allowing the water level in Brinco Brook to rise to the point where it spills over into the 2-North PAG-CCR sump, which in-turn increased the water level behind the South Dam. A diesel pump was installed on November 8th to pump from the PAG-CCR sump directly to SP4 and a diesel pump was installed to pump from the South Dam riser pipe to Brinco Brook on November 14th. At this time the water elevation behind the South Dam was 305.25 masl and in the PAG-CCR sump 306.85 masl. The recommended (by the design engineer) maximum allowable pond elevation behind the South Dam is 305.3 masl.

Discharge from SP4

The outlet structure at SP4 is a 600mm diameter drop inlet pipe topped with a 375mm diameter orifice plate. The orifice plate controls the flow below the permitted maximum flow rate of 0.32m^3/s. The time series for the discharge indicates that during the first three weeks of October, discharge was driven by the rainfall events, but from late October through November by pumping rates and the flow from Brinco Brook to SP4

2. *Can you please provide a map or annotated photo with the monitoring locations described in the report?*

The accompanying plan view drawing indicates the sampling locations.

3. *When will the sediment curtain be installed at settling pond 4? Have other options been considered (e.g., settling aids)?*

As noted in the non-compliance report a turbidity curtain is being considered. At this point in time it has not been determined if a curtain would be of benefit (based on the size and shape of the pond the flow path). Chemical settling aids can be highly toxic if not managed properly and were not recommended option as per a discussion with MOE while on site Nov 24th, 2016.

4. *Are there other potential sources to the TSS loading that could be controlled besides the iron precipitation process described in the report? Is it possible to modify the discharge structure to increase residence time?*

Yes, there are other sources of TSS contributing to the load. These sources include runoff into Brinco Brook; which is a natural stream that is considerably influenced during times of precipitation, and runoff from the surrounding area.

Modifying the discharge structure (drop inlet pipe) is not seen as an option. Increasing the height of the pipe would reduce the freeboard to the emergency spillway and would not change the flow path distance.

5. *Please provide an update when you receive the bioassay results.*

The results are attached with 100% survival rate.

6. *Also please let us know how your discussions with MOE go regarding development of event-based discharge limits.*

There was a telephone conference held on December 5th, 2016 with QCC and MOE. The subject was briefly discussed and it was decided that QCC will have to include this clause in an effluent permit amendment. This will be communicated to MEM with final approval of the PE: 07008 Effluent permit amendment.

Gary Gould, General Manager

Culvert (WC)

Wetland

Drop Inlet Pipe

Quinsam River

Middle Quinsam Lake Inlet Sampling Site

Setting Pond 4 (WD)

Access Road Culvert

Brinco Brook

10" pipline from deepwells

2-North Pag-CCR Sump

Surface Pump 6"x6" high volume diesel to settling pond 4

8", 10" and 12" pipelines from underground

Surface Pump 6"x4" high volume diesel to Brinco Brook

2-North 5-Mains Deepwells 1 x 200hp pumps to Brinco Brook

Middle Quinsam Lake

Plant Site and Coal Stockpiles

Offices

Maintenance

2-North Portals

1-Mains, 1x-cut Underground Pumping - 1 x 22hp to Brinco Brook

3-Mains Dam Underground Pumping - 2 x 250hp to Brinco Brook

1-Mains/4-Mains Underground Pumping - 5 x 58hp to 3-Mains Dam - 58hp-to-250hp to Brinco Brook

Tailings Storage Facility

Middle Quinsam Lake Sampling Site

2-North 1-Mains Deepwells 2 x 200hp pumps to Brinco Brook

Quinsam River

Pond

BACKFILLED 2N PIT

Middle Quinsam Lake Outlet Sampling Site (WB)

Quinsam River

QUINSAM COAL

2-North to Settling Pond 4 Pumping

(November, 2016)

Scale: 1 : 10,000

FIGURE:

Maxxam
A Bureau Veritas Group Company

RESULTS OF RAINBOW TROUT SINGLE CONCENTRATION-100%

Success Through Science®

Client : 9239 QUINSAM COAL CORPORATION, Campbell River Job Number: B6A5191

Client Project Name & Number: - TOXICITY SAMPLES

Test Result:

96 hrs Mortality % 0 Statistical Method: Visual

Sample Name : WC

Description:	yellow, clear			Sample Number:	QC6147-01
Sample Collected:	Nov 22, 2016 03:00 PM	Sampling Method :	Grab	Site Collection:	N/A
Sample Collected By:	N/A	Volume Received:	20 x 1LP	Temp.Upon Arrival: 9 °C	Storage: 2-6°C
Sample Received:	Nov 23, 2016 11:35 AM	pH:	8.0	Dissolved Oxygen:	11.0 mg/L
Analysis Start :	Nov 24, 2016 12:14 PM	Temperature :	14 °C	Sample Conductance:	996 µS/cm

Concentration	Temperature (°C)	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	pH	pH	Conductivity (uS/cm)	Mortality (#)	Mortality (%)	Atypical Behaviour (#)
% vol/vol	Initial	96 hrs	Initial	96 hrs	Initial	96 hrs	Initial	96 hrs	96 hrs	96 hrs
0	14	15	10.1	10.0	7.2	6.9	36	0	0	0
100	14	15	10.7	10.0	8.1	8.3	994	0	0	0

Comments : All fish appeared and behaved normally during the test.

Culture/Control/Dilution Water Burnaby Municipal Dechlorinated Water

Hardness: 18 mg/L $CaCO_3$ Other parameters available on request.

Test Conditions Test concentration : 0,100 (% vol/vol)

Organisms per Vessel :	10	Test Temperature :	15 ± 1 °C	Solution Depth :	>15 cm
Total # of Organisms Used :	20	Pre-aeration Time :	120 min.	Rate of Aeration	6.5±1 mL/min/L
Test Volume :	18 L	Vessel Volume :	20L	Test pH Adjusted:	No
Loading Density :	0.4 g/L	Photoperiod :	16:8 (light: dark)		

Test Organism : Rainbow Trout *(Oncorhynchus mykiss)* Source : Lyndon Fish Hatcheries Inc.

Culture Temperature :	15 ± 2 °C	Weight (Mean) +- SD :	0.68 ± 0.17 g	Length (Mean) +- SD :	4.34 ± 0.28 cm
Culture Water Renewal :	≥ 1L/min/kg fish	Weight (Range) :	0.50 – 0.98 g	Length (Range) :	4.00 – 4.80 cm
Culture Photoperiod :	16:8 (light: dark)			% Mortality within 7 days :	0%
Feeding rate and frequency :	daily: 1-5% biomass of trout.			Acclimation Time:	>14 days

Reference chemical: Zinc Test Date: Nov 23, 2016

Test Endpoint 96 hrs LC50 (95% confidence interval) : 0.12 (0.09, 0.16)mg/L Statistical Method : Probit

Historical Mean LC50 (warning limits) : 0.11 (0.05, 0.23) mg/L Concentration : 0,0.04,0.08,0.16,0.32,0.64 mg/L

Test Method Maxxam's BBY2SOP-00004 is based on the latest versions of EPS 1/RM/9, EPS 1/RM/13, and EPS 1/RM/50.

Method Deviations : None.

Note: The results contained in this report refer only to the testing of the sample submitted. This report may not be reproduced, except in its entirety, without the written approval of the laboratory.

Analyst : Marie-Eve O'Toole

Verified By : Kimberly Tamaki, Scientist, Ecotoxicology Date: Dec 06, 2016 12:21 PM

APPENDIX VIII

Permit 7008 Environmental Technical Review Committee Action Item & Outcome Tracking Table									
Items	Meeting Type (Agency, Stakeholder)	ETRC Member or Stakeholder Responsible	Type	Context	Description	Date of Advice	Target Completion Date	Description of Follow -up	Status
1	**Agency**	QCC	Action Item	Agenda Item 2.2 -Site activities, including reclamation and water management	As per recent reclamation activities at 242: - Sample at the 242 portal sump to review current water quality, review historical water quality. Obtain the depth of the sump. Review historical flooded 242 portal water quality. Iron River sump remediation this fall/winter. Keep MOE informed on progress.	September 29, 2016	Fall/Winter 2017	Sump sampled in spring 2016, depth monitoring also completed. Data analysis to be included in 2016/17 Annual Report.	0n-going
2	**Agency**	QCC	Outcome	Agenda Item 2.2 -Site activities, including reclamation and water management	Future groundwater reports are to be contained within the Annual Water Quality Report.	September 29, 2016	June 30, 2017	Planned for 2016/17 Annual Report	0n-going
3	**Agency**	MEM	Action Item	Agenda Item 3.1 -Data site update (QCC)	DH review MEM website to ensure the QCC Reclamation Reports are posted.	September 29, 2016	N/A	MEM has a database that is currently being updated with historical and current information on all mine's in B.C.	Closed
4	**Agency**	QCC	Action item	Agenda Item 3.1 -Data site update (QCC)	Continue to post all current environmental reports to website (Groundwater and Reclamation Reports). Add a link to the MEM B.C. mining website on the QCC website. (https://mines.empr.gov.bc.ca/)	September 29, 2016	N/A	QCC now has a public website that posts all current reports.	Closed
5	**Agency**	QCC	Action Item	Agenda Item 3.1 -Data site update (QCC)	Provide DH with access to QCC website	September 29, 2016	December 31, 2016	QCC provided public access to the website.	Closed
6	**Agency**	QCC	Outcome	Agenda Item 3.2 -Public notice – way forward (MOE)	QCC to post public notice in the newspaper to notify the public when the Annual Report is available (i.e. public library and a link to the QCC and MEM websites). Share MEM website at Stakeholder meeting.	September 29, 2016	December 31, 2016	The public notice was printed in the Dec. 16th & 23rd Campbell River Mirror in the legal section of classified.	Closed
7	**Agency**	MOE	Action Item	Agenda Item 3.3 -Revised terms of reference (MOE)	Circulate draft Terms of Reference (TOR)	September 29, 2016	January 31, 2017	Draft terms of Reference (TOR) were distributed to members and stakeholders Dec 15, revisions were incorporated and the final TOR were sent out April 5, 2017 .	Closed
8	**Agency**	QCC	Action Item	Agenda Item 4.0 - Report out on actions taken as a result of the 2015/16 meetings (QCC/MOE)	3S77: Historical data review pre/post development of the 3S77 bulk sample pit. When did SO4 start to rise in Long Lake? Historical data: MEM & Environment Canada baseline reports & MESL report. Compile for stakeholder meeting.	September 29, 2016	November 23, 2016	This information was presented at the Stakeholder meeting.	Closed
9	**Agency**	MEM	Position	Agenda Item 4.0 - Report out on actions taken as a result of 2015/16 meetings	AECOM - 7S Area 5 Report recommendations were advice to the MEM; conditions were included in the Mines Act permit where appropriate.	September 29, 2016	March 1, 2017	**N/A**	**N/A**
10	**Agency**	MOE	Action Item	Agenda Item 5.0 - Compliance with permit requirements (MOE). There was discussion around the MOE inspection that occurred in the summer, and how the MOE Compliance team had not yet submitted a report to QCC	Follow-up on MOE inspection Report	September 29, 2016	December 31, 2016	On Nov. 17th, 2016 MOE submitted their "On Site" inspection report from July 6th inspection of QCC'S landfill, authorized under Environmental Management Act refuse discharge permit 15827(Permit) and a Hazardous Waste Inspection. The 2015/16 Annual Water Quality Monitoring Report has not been reviewed yet. April 5/17 update - MOE compliance section indicates the inpsection report for the effluent permit can be expected within a few weeks.	0n-going
11	**Agency**	QCC	Outcome	Agenda Item 5.0 - Compliance with permit requirements (MOE)	If pond concentrations exceed discharge limits, this should not be described as a non-compliance if there is no discharge.	September 29, 2016	June 30, 2017	Sampling from 7SSD pond when there is no discharge; the legal limit only applies when discharging.	0n-going
12	**Agency**	QCC	Action Item	Agenda Item 6.1 - Iron River baseline study and mitigation activities	Request in writing to reduce monitoring on the Iron River from monthly to 5 in 30 schedule.	September 29, 2016	March 31, 2017	This will be part of the upcoming effluent permit amendment	0n-going
13	**Agency**	QCC	Action Item	Agenda Item 6.1 - Iron River baseline study and mitigation activities	Review dissolved fraction of Arsenic in IRS1.	September 29, 2016	November 23, 2016	This was presented at the Stakeholder meeting.	
14	**Agency**	QCC	Action Item	Agenda Item 6.2 - Long Lake entry (LLE) water quality and follow up from the Lorax LLE/4S study	4-South Loading: Report out on study once data has been compiled from Lorax for finalization.	September 29, 2016	March 31, 2017	This was presented at the Stakeholder meeting. Final report submitted, dated April 2017	Closed
15	**Agency**	QCC	Action Item	Agenda Item 6.8 - Lower Quinsam Lake iron exceedances and thermocline relationship	LQL sediment: The sediment benthic program currently underway should determine how or if invertebrates are affected by low DO and elevated iron in lakes. This should be part of the discussion in the final report.	September 29, 2016		The relationship between elevated Iron concentrations and low DO was discussed in detail at the stakeholder meeting.	
16	**Agency**	MOE	Action Item	Agenda Item 6.9 - No Name Lake historical data review (conductivity, sulphate, pH) and discussion on its use as a reference lake	NNL- MOE to review NNL data in light of presentation and to discuss internally whether the lake can be regarded as a reference site.	September 29, 2016		QCC presented the NNL data at the stakeholder meeting. MOE also reviewed the data and concludes that it appears NNL has received some mine drainage in the past and therefore it cannot be considered a true reference lake. However, current NNL sulphate levels are reasonably close to baseline, and there are no new mining activities planned in the area, therefore, NNL is a useful lake for comparison to MQL and LL.	Closed
17	**Agency**	MEM	Action Item	Agenda Item 7.0 - Any additional discussion topics (all)	DH to look into a potential MDRC for review of QCC's 2016 Closure Plan	September 29, 2016	unknown	April 5/17 update - MEM email to MOE indicates an MDRC will be struck for review of the 2016 Closure Plan.	0n-going

Permit 7008 Environmental Technical Review Committee Action Item & Outcome Tracking Table									
Items	Meeting Type (Agency, Stakeholder)	ETRC Member or Stakeholder Responsible	Type	Context	Description	Date of Advice	Target Completion Date	Description of Follow -up	Status
18	**Stakeholder**	QCC	Outcome	Agenda Item 3.1 - Data site - QCC's website for environmental reports was discussed. LA asked where she could find the groundwater reports.	Continue to post current environmental reports to website, including groundwater reports.	November 23, 2016	December 31, 2016		On-going
19	**Stakeholder**	QCC	Action Item	Agenda item 3.3 - Public Notice. MOE discussed the public notice, saying that going forward, QCC would publish a notification in the Campbell River newspaper stating the Annual Report was available and providing a web address where it can be found.	Stakeholders requested the public notice include: -a direct link to the report -contact info for the mine -information about the hardcopy (this should still go to the library)	November 23, 2016	December 31, 2016	Public notice published Dec 16/16. Contained link to electronic version and information about how to access the hardcopy	Closed
20	**Stakeholder**	MOE	Action Item	Agenda Item 3.4 - Revised Terms of Reference (TOR); MOE described the ETRC TOR changes, made to reflect the change in administrative roles, better clarify the goals, objectives and responsibilities, and distinguish between ETRC functions	FJ requested a revision to the Terms of Reference (TOR) Section 11 to include direction or approach to take if there is a disagreement, identifying that issues will be dealt with independently with the relevant parties. This was removed from the previous version, but is useful to include.	November 23, 2016	December 31, 2016	Section 11 was updated. Final TOR were distriubted to members and stakeholders April 5, 2017.	Closed
21	**Stakeholder**	QCC	Action Item	Agenda Item 3.5 -Tracking of Action Items. The new tracking table for action items was introduced and discussed.	Future tracking tables to include a 'context' column to show what the outcome / action item is referring to, for example the agenda item and/or a reference to a slide and presentation where applicable. Tracking table also to include new columns for timeline for completion and status.	November 23, 2016	December 31, 2016	Tracking table updated for the 2016 stakeholder meeting minutes.	Closed
22	**Stakeholder**	QCC	Action Item	Agenda Item 3.5 -Tracking of Action Items. There was discussion around the format of the tracking table that is disseminated to committee members and stakeholders.	Format for ETRC meeting minutes to be submitted in excel and PDF. Includes agenda, tracking table i.e. (Action items and outcomes) and presentations.	November 23, 2016	December 31, 2016	Completed	Closed
23	**Stakeholder**	QCC / MEM	Action Item	Agenda Item 4 - Report out on actions taken as a result of 2015/16 meetings. There was discussion around the AECOM Report, as this action item was not completed last year.	(AECOM - 7S Area 5 Report) QCC to prepare a table summarizing the recommendations in the December 2013 AECOM report and showing how each has been addressed (for example as permit conditions in the Mines Act permit). MEM to support QCC on this. Final table to be sent to CREC.	November 23, 2016	March 1, 2017	QCC sent this out via email Feb 8/17.	Closed
24	**Stakeholder**	QCC	Action item	Agenda Item 4 - Report out on actions taken as a result of 2015/16 meetings. There was discussion around MOE's inspection reports included in the Annual Report (Appendix V). Stakeholders voiced confusion around the date of the inspection report, and which year's annual report was reviewed as part of the inspection.	Appendix V of Annual Report should clearly state the year of the MOE inspection report included in this section so there is no confusion. QCC to provide CREC with inspection reports for the effluent permit, when received from MOE.	November 23, 2016	March 1, 2017	To be reflected in 2016/17 Annual Report.	On-going
25	**Stakeholder**	MOE	Action Item	Agenda Item 6.10 - Iron River baseline study - QCC described the results of the study in slides 50 to 59 of presentation.	MoE to follow up with QCC on the Iron River sump and inform CREC of outcomes.	November 23, 2016	December 31, 2016	Dec 13/17 - MOE sent a letter to QCC (with cc to CREC) requesting they keep us informed on mitigation and monitoring at the Iron River sump. Mar 17/17 - MOE followed up with QCC to verify 1) monthly monitoring of the sump is on-going and 2) whether additional mitigation efforts have been attempted. QCC indicated they weren't able to access the area in some months in winter because of the high flow and snow cover, but are otherwise continuing monthly sampling and are hoping to plug the borehole later in the spring. Mar 22/17 - MOE had a call with CREC (Leona) discussing Iron River water quality, Iron River sump, and 242 adit.	On-going
26	**Stakeholder**	CREC	Action Item	CREC stated they had new members, and would like to bring them up to the mine. Specifically John Lewis is now a member of CREC and the Haig-Brown Institute.	CREC to arrange with QCC in order for John Lewis to have a site tour.	November 23, 2016	December 31, 2016		On-going

Quinsam Coal Mine
2016 Environmental Technical Review Committee Meeting

Date: September 29, 2016
Time: 9:00am – 3:00pm
Location: MOE Office, 2080 Labieux Rd, Nanaimo
Also available via video conference using Lync (see invite), and/or:
Dial-in to: 1-877-353-9184; Conference ID: 8715421 #

Attendees	Initials	Position	Agency
Andrea Doll MASc, PAg	AD	Senior Environmental Protection Officer, Mining Operations	Ministry of Environment (MoE), Nanaimo
Jillian Tamblyn R.P. Bio., RPP	JT	Environmental Impact Assessment Biologist	MoE, Penticton
Diane Howe M.A.Sc., P.Geo	DH	Deputy Chief Inspector of Mines, Reclamation and Permitting	Ministry of Energy and Mines (MEM), Victoria
Terry Martin B.Sc., R.P.Bio.	TM	Environmental Specialist	City of Campbell River (CoCR)
Gary Gould P.Eng	GG	General Manager of Quinsam Coal Mine and Vice President of Hillsborough Resources	Quinsam Coal Mine (QCC)
Kathleen Russell B.Sc	KR	Environmental Coordinator	QCC
Josh Fry	JF	Environmental Technician	QCC

Purpose: To review the Quinsam Coal Corporation 2015/16 Annual Monitoring Report, identify issues and potential changes to the monitoring program and agree on possible recommendations to be made to the Regional Director of Environmental Protection.

Agenda Items:

1. Meeting opening (MOE)
    - 1.1 Meeting objective and introductions
    - 1.2 Review agenda
2. Overview of status and activities over the preceding year and plans for the coming year (QCC)
    - 2.1 Mine and ownership status
    - 2.2 Site activities, including reclamation and water management
    - 2.3 Bond update
3. ETRC administration
    - 3.1 Data site update (QCC)
    - 3.2 Public notice – way forward (MOE)
    - 3.3 Revised terms of reference (MOE)
    - 3.4 Tracking of action items (MOE)
4. Report out on actions taken as a result of the 2015/16 meetings (QCC/MOE)
5. Compliance with permit requirements (MOE)
6. Highlights from the Annual Monitoring Report (QCC)
    - 6.1 Iron River baseline study and mitigation activities
    - 6.2 Long Lake entry (LLE) water quality and follow up from the Lorax LLE/4S study
    - 6.3 Middle Quinsam Lake sulphate levels
    - 6.4 Long Lake water quality
    - 6.5 LLM sulphate levels, treatment system and seep monitoring
    - 6.6 LLM manganese vs DO
    - 6.7 Lower wetland outlet (LWO) exceedances
    - 6.8 Lower Quinsam Lake iron exceedances and thermocline relationship
    - 6.9 No Name Lake historical data review (conductivity, sulphate, pH) and discussion on its use as a reference lake
7. Any additional discussion topics (all)
8. Round table for minutes: action items, outcomes and positions (all)
9. Meeting closing

Quinsam Coal Mine

2016 Stakeholder Meeting with the Environmental Technical Review Committee

Date: November 23, 2016

Time : 10am-3pm

Location: Campbell River Enterprise Center, 900 Alder St.

Attendees	Initials	Position	Agency
Andrea Doll MASc, PAg	AD	Senior Environmental Protection Officer, Mining	Ministry of Environment (MoE), Nanaimo
Jillian Tamblyn RPBio, RPP	JT	Environmental Impact Assessment Biologist	MoE, Penticton
Mark Love P. Ag.	ML	Head Authorization for the Mining Team Mining	MoE, Smithers
Diane Howe M.A.Sc., P.Geo	DH	Deputy Chief Inspector of Mines, Reclamation	Ministry of Energy and Mines (MEM), Victoria
Terry Martin B.Sc., R.P.Bio.	TM	Environmental Specialist	City of Campbell River (CoCR)
Gary Gould P.Eng	GG	General Manager of Quinsam Coal Mine and	Quinsam Coal Mine (QCC)
Kathleen Russell B.Sc.	KR	Environmental Coordinator	QCC
Josh Fry	JF	Environmental Technician	QCC
Richard Hamilton	RH	President of Greenways Land Trust	Greenways Land Trust
Leona Adams	LA	President of Campbell River Environmental	CREC
Peter Winter	PW	Member of CREC	CREC
Frank Jamieson	FJ	Member of CREC	CREC
Leroy McFarlane	LM	Stakeholder	Saratoga Beach and Oyster River Association

Purpose: To review the Quinsam Coal Corporation 2015/16 Annual Monitoring Report, hear and respond to stakeholder concerns and agree on possible recommendations to be made to the Director of Environmental Protection, where warranted.

Agenda Items:

1. Meeting opening
   - 1.1 Meeting objective and introductions (MOE)
   - 1.2 Review agenda (MOE)
   - 1.3 Respectful workplace policy (MOE/CoCR)

2. Overview of status and activities over the preceding year and plans for the coming year (QCC)
   - 2.1 Mine and ownership status
   - 2.2 Site activities, including reclamation and water management

3. ETRC administration
   - 3.1 Data site update (QCC)
   - 3.2 BC Mine Information Website: https://mines.empr.gov.bc.ca/ (QCC/MEM)
   - 3.3 Public notice (MOE)
   - 3.4 Revised terms of reference (MOE)
   - 3.5 Tracking of action items (QCC)

4. Report out on actions taken as a result of the 2015/16 meetings (QCC/MOE)

5. Compliance with permit requirements (MOE)

Lunch - provided

6. Highlights from the Annual Monitoring Report (QCC)

North Water Management
   - 6.1 Middle Quinsam Lake sulphate levels

South Water Management
   - 6.2 Current Long Lake sulphate levels, treatment system and seep monitoring
   - 6.3 Historic Long Lake sulphate levels
   - 6.4 Long Lake manganese
   - 6.5 Long Lake entry (LLE) water quality and follow up from the Lorax LLE/4S study
   - 6.6 No Name Lake historical data review (conductivity, sulphate, pH) and discussion on its use as a reference lake

7-South Water Management
   - 6.7 7SSD and 7S reporting and discharge periods
   - 6.8 Lower wetland outlet (LWO) exceedances
   - 6.9 Lower Quinsam Lake iron exceedances and thermocline relationship

Iron River
   - 6.10 Iron River baseline study and mitigation activities

7. Any additional discussion topics (all)

8. Round table for minutes: action items, outcomes and positions (all)

APPENDIX IX

2016-2017 Annual Groundwater Monitoring Report

Pertaining to the Mines Act Permit C-172 & Effluent Permit PE: 7008

Submitted to: Ministry of Energy and Mines & Ministry of Environment

Prepared by:
Quinsam Coal Corporation
Environmental Department

Table of Contents

1 Introduction 1
2 Groundwater Monitoring Regime 3
2.1 Hydrogeological Setting 5
2.1.1 Underground PAG-CCR Storage in the River Barrier Pillar 7
2.1.2 Down Gradient of Subaqueous Disposal of Fine Tailings in 2-North and 3-North 7
2.1.3 2-North Coal Processing Plant and Coal Pad 8
2.1.4 4-South Water Chemistry 8
2.1.5 5-South Mine Void 9
2.1.6 2-South – 3-South Area 10
2.1.7 7-South Down Gradient of Subaqueous Disposal of PAG-CCR in 7-South 11
2.1.8 Baseline/Background 11
2.1.9 Mine Pools, Underground Sumps and Mine Water Pumped to Surface 12
3 Methods and Procedures for Monitoring Groundwater 12
3.1 Sampling Techniques 12
3.1.1 Inertial Lift Sampling 13
3.1.2 Peristaltic Sampling 13
3.1.3 Bladder Pumps 14
3.2 Parameters Monitored 14
3.3 Quality Assurance/Quality Control 16
3.3.1 Results of Field Replicates 16
4 Results and Discussion 18
4.1 References for Water Quality Data 18
4.2 Key Observations and Conclusions 20
4.2.1 North Mining Area 20
4.2.2 River Barrier Pillar Area 29
4.2.3 North Mining Area Plant Monitoring Wells 34
4.2.4 5-South Mine Void 37
4.2.5 7-South 39
4.2.6 2/3 South Monitoring Wells 47
4.2.7 4-South Mine Area 52
4.2.8 242 Mine 60
4.2.9 7-South Area 5 Baseline Monitoring 61
5 Summary 61

List of Figures

Figure 1: General Stratigraphic Column - Quinsam Mine 6
Figure 2: In-Situ 2N Monitoring Wells - Dissolved Sulphate 23
Figure 3: Water Elevations at QU10-13 D 24

Figure 4: Ex Situ 2-North Monitoring Wells - Dissolved Arsenic 27
Figure 5: Ex-Situ 2N Monitoring Wells – Dissolved Sulphate 28
Figure 6: Ex-Situ 2N Monitoring Wells - Sulphide as H_2S 29
Figure 7: Ex-Situ River Barrier Pillar Monitoring Wells – Dissolved Sulphate vs. Water Elevation 32
Figure 8: Groundwater Transport in RBP and Vicinity 34
Figure 9: Plant Monitoring Wells – Dissolved Arsenic 36
Figure 10: Plant Monitoring Wells – Dissolved Sulphate 37
Figure 11: 7-South In-Situ Monitoring Wells - Dissolved Arsenic 41
Figure 12: 7-South In-Situ Monitoring Wells - Dissolved Iron 42
Figure 13: 7-South In-Situ Monitoring Wells - Dissolved Sulphate 42
Figure 14: 7-South In-Situ Monitoring Wells - Sulphide as H_2S 43
Figure 15: 7-South Ex-Situ Monitoring Wells - Dissolved Sulphate 45
Figure 16: 7S Ex-Situ Monitoring Wells - Dissolved Arsenic 46
Figure 17: 7S Ex-Situ Monitoring Wells - Sulphide as H_2S 47
Figure 18: In-Situ 2S Monitoring Wells - Dissolved Sulphate 48
Figure 19: In-situ 2-South Monitoring Wells - Dissolved Iron 49
Figure 20: 2-South Groundwater and Mine Pool Water Elevations 49
Figure 21: Ex-Situ 2/3 South Monitoring Wells - Dissolved Sulphate 51
Figure 22: Ex-Situ 2/3 South Monitoring Wells – Dissolved Iron 52
Figure 23: 4-South Mine Pool Water Elevation at QU11-01 54
Figure 24: In-Situ 4-South Monitoring Wells - Dissolved Arsenic 55
Figure 25: In-Situ 4-South Monitoring Wells - Dissolved Iron 56
Figure 26: In-Situ 4-South Monitoring Wells - Dissolved Sulphate 56
Figure 27: In-Situ 4-South Monitoring Wells – Sulphide as H_2S 57
Figure 28: Ex-Situ 4-South Monitoring Wells - Dissolved Arsenic 58
Figure 29: Ex-Situ 4S Monitoring Wells - Dissolved Sulphate 59
Figure 30: Ex-Situ 4- South Monitoring Wells - Sulphide as H_2S 60

List of Tables

Table 1: Groundwater Wells & Sumps Monitored in 2016-2017 3
Table 2: Sulphate Water Quality Guideline (mg/L) - Based on Water Hardness (mg/L) Categories 15
Table 3: Replicates & Relative Percent Difference Greater than 20% 17
Table 4: CSR-AW Standards 19
Table 5: CSR-AW Exceedances in Ex-Situ Groundwater Wells 20
Table 6: Source Terms Comparison for 2/3 North Mine Void 21
Table 7: Source Terms Comparison for 2-North Mine Water with 7-South Tailings 25
Table 8: Source Terms Comparison for RBP with 7-South CCR and Averages 31
Table 9: Source Terms Comparison for 5-South Mine Water 39
Table 10: Source Terms Comparison for 7-South with PAG-CCR 41
Table 11: Source Terms Comparison of Flooded 4-South Mine Void Mature Mine Pool 53

List of Appendices:

Appendix A: Site Map
Appendix B: Tables
Appendix C: Borehole Development Logs
Appendix D: Graphs

1 Introduction

Quinsam Coal Corporation, as part of the requirements under Mines Act Permit C-172 (administered by the Ministry of Energy and Mines) and Effluent Permit PE-7008 (administered by the Ministry of Environment), conducts a comprehensive groundwater monitoring program to characterize water quality associated with mining development. Previous editions of this report covered a 12 month period spanning from January 1 to December 31 and were not synchronized with the surface water monitoring report. This edition covers a 16 month period and interprets the results from January 1, 2016 to March 31 2017 to synchronize with the surface water monitoring report and relate to the effluent permit. This monitoring period change allows future groundwater monitoring reports to follow the same reporting period as surface water (April 1st to March 31st).

Prior to 2012, the groundwater monitoring program was executed by external consultants. In 2012, in an effort to reduce costs and improve the logistics of the program, Quinsam Coal internalized the groundwater monitoring program. Methodology of sampling followed the procedures developed in the Lorax Hydrogeological Assessment and the *British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emissions, Water, Wastewater, Soil Sediment, and Biological Field Sampling 2013 Edition.* The groundwater program has been defined through work performed by Quinsam Coal and Lorax Environmental on the hydrogeology of the respective mining areas, which governs the sampling locations, methods and frequency with consideration of their relationship to mining.

As in previous reports, groundwater wells have been categorized as either ‘in-situ’ or ‘ex-situ’; the definition for each is as follows:

- In-situ: groundwater wells located within the mine workings (disturbance footprint) and therefore represent water accumulated within the mining void. In the absence of groundwater well samples, underground sump samples are used for comparison.

- Ex-situ: groundwater wells located outside the mine workings (disturbance footprint) which reflect water quality flowing from the mine void towards the receiving environment. This also includes baseline and background (up-gradient of workings) groundwater wells.

The groundwater wells outside the mine footprint (ex-situ) are compared to the British Columbia Contaminated Site Regulation (CSR) (BC reg.37/96. O.C. 1480/96), including the amendments (343/2008 January 1, 2009) describing water quality standards for fresh water Aquatic Life (AW). The aquatic life standard assumes that a minimum 1:10 dilution is available for groundwater discharged to a freshwater system; together, they are referred to as CSR-AW.

The parameters of interest (POI) captured under the CSR-AW and applied to Quinsam include: arsenic (As), cobalt (Co), copper (Cu), fluoride (F), iron (Fe), sulphate (SO_4), sulphide (as H_2S) and zinc (Zn). Section 4.1 compares sampling results performed during this program to the CSR-AW standards (by development area).

Derived from numerous studies, POI source terms have been developed by Lorax Environmental for various areas, including: geochemical characterization of the 4-South mine pool, laboratory kinetic testing conducted on the 7-South coarse coal reject, 7-South formation water and 2-North, 3-North and 5-South mine water and formation water samples collected from underground mine dewatering. It is therefore important to consider water captured and stored within the mine workings (in-situ) to ascertain potential discharge (through existing water management structures) and seepage water quality. Accordingly, groundwater wells that are located within a mine void are sampled as part of the monitoring program with results being compared to source terms developed for each respective area.

2 Groundwater Monitoring Regime

Throughout the 2016-2017 monitoring period, Quinsam Coal monitored 37 groundwater sites within the vicinity of the mine footprint. These sites consisted of 23 ex-situ wells, 11 in-situ wells and 3 in-situ underground sumps as illustrated in Table 1 below.

Table 1: Groundwater Wells & Sumps Monitored in 2016-2017

Area	In-Situ Sumps	In-situ Wells	Ex-Situ Wells	
2-North Ground Water Monitoring	6M2N	1M2N 5M#2 QU10-13 D	QU08-21G S QU10-10 S QU10-11 S	QU08-21G D QU10-10 D QU10-11 D
River Barrier Pillar		QU11-09 M	QU11-05 S QU11-09 S	QU11-05 D
2-North Plant Monitoring Wells			MW00-1 S MW00-6 S	MW00-1 D MW00-6 D
7-South Groundwater Monitoring	1M7S	QU14-10	QU08-10 D QU08-13 B	QU08-13 A
7-South Area 5, 242 Portal Area		242-D		
5-South Monitoring	5SXC	5SMW		
4-South Monitoring Wells		QU11-01 QU78-161	QU10-07 D QU10-09 S	QU10-08 D QU10-09 D
2/3 South Monitoring Wells		QU11-11 MW00-4	MW00-2 MW12-24	MW12-23

Appendix A, Site Plan, presents a map of the groundwater sampling sites with respect to underground workings and disturbed areas. Appendix B, Table 1 describes the groundwater well locations and monitoring frequency followed in 2016-17. The groundwater well monitoring frequency and wells listed in Appendix B, Table 1 are regularly evaluated and modified in order to best monitor groundwater and potential impacts from mining. The areas encompassed in this monitoring program include: 2/3-North, the River Barrier Pillar (RBP), 2-South, 3-South, 4-South, 5-South, 7-South; and the now reclaimed 242 portal area.

The monitoring wells have been selected as they relate to:

- hydrogeology of the area
- groundwater regime
- stratigraphy and geologic structure
- formation groundwater
- mine pool water
- past and present mining conditions
- underground PAG–CCR storage
- fine tailings storage

Appendix B, Tables 2-14 display the groundwater quality results for the 2016-17 monitoring year. Completion logs for the well installations listed in Table 1 can be found in Appendix C, and a further discussion of these wells can be found in Mine Permit (C-172) Amendment: 7-South Development Volume 3: Appendix I through J and Volume 4: Appendix K. Lorax Environmental Services was retained by Quinsam Coal to perform a hydrogeological investigation in these areas. The wells are a combination of nested wells, single wells and boreholes. The nested wells include a deep well and a shallow well that are screened in zones of interest. The deeper wells are generally drilled into the lowest coal seam and the shallower wells represent other zones of interest which may include shallower coal seams, or areas of increased permeability (Lorax, 2011).

Five wells listed for 7-South Area 5 (7SA5) baseline monitoring in the previous report were removed in 2016-17 as mining in 7SA5 has been postponed at this time. The results of the baseline 7SA5 groundwater monitoring were evaluated and reported on in response to condition D.3 (a) of the Mine Permit amendment approving mining 7SA5. This condition requires an update to the surface water and groundwater monitoring plan prior to initiation of mining in 7SA5. The only groundwater monitoring site reported on during this period in the 7SA5 area was 242-D. This location was reclaimed in mid-2016 and was monitored until the completion of that

process. A new location to monitor 242 mine water has been proposed internally and is expected to be drilled when 7S - Area 5 is developed and with installation of a sampling well location.

2.1 Hydrogeological Setting

Groundwater wells relating to mining voids or defined as ‘down gradient’ from mine development zones have been established to characterize water quality for each respective area. The water chemistry is compared to source terms for parameters of interest established through:

- Sulphur distribution in the proposed workings
- Solid phase and leaching characteristics of CCR and tailings from the 7-South areas and disposed in mined out workings
- Geochemical characterization of the hanging wall strata over the mine area
- Formation groundwater characteristics

The information pertaining to column leach testing and derivation of source terms can be found in the application for 7-South Development Mine Permit Amendment (C-172) Volume 3: Appendix J and Volume 4, Appendix K (Lorax[(1)], 2011).

Figure 1 below displays the stratigraphic column at the Quinsam mine.

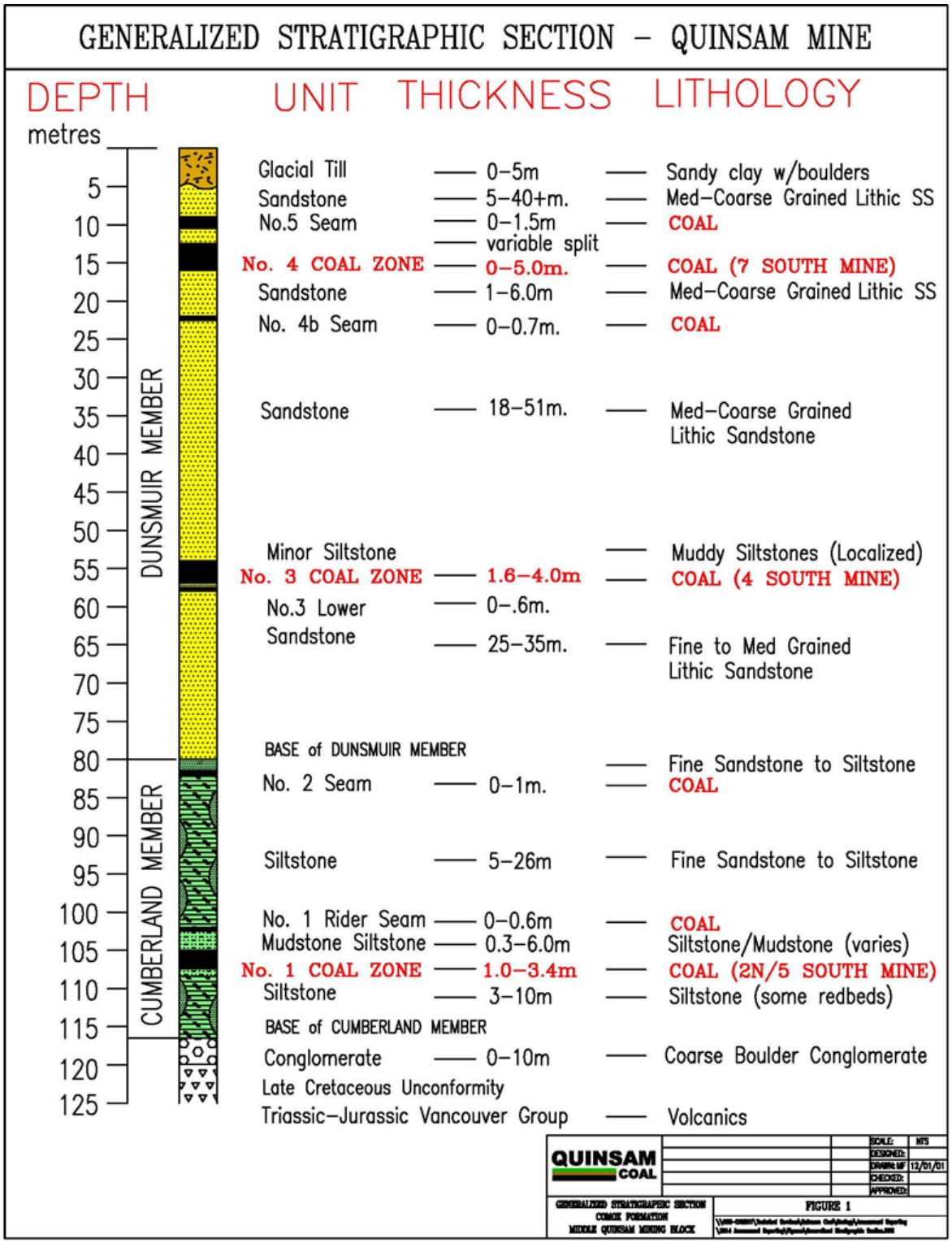


Figure 1: General Stratigraphic Column - Quinsam Mine

2.1.1 Underground PAG-CCR Storage in the River Barrier Pillar

Coarse coal reject (CCR) material produced from the processing of raw No. 1 seam coal is defined as potentially acid generating material (PAG) when the sulphur content exceeds 1.3 %. As development of the 5-South mine progressed, inherent sulphur levels found in the #1 coal zone progressively increased above 1.3% sulphur. The run of mine coal processed through the Coal Preparation Plant and the resultant waste materials (fine tailings and CCR) were therefore classified as PAG. To mitigate potential metal leaching/acid rock drainage, Quinsam Coal established a sub-aqueous PAG-CCR disposal facility within the mine workings known as 87 Panel River Barrier Pillar (RBP). This disposal method was used as a pilot project for future PAG-CCR storage of material from the then proposed 7-South mine. Accordingly, groundwater monitoring at this facility has been a crucial part of Quinsam's past and current groundwater monitoring program with wells installed within, and outside the RBP. Wells used to monitor the seepage of groundwater are QU11-05 (S and D) and QU11-09 S while in-situ waters are monitored using well QU11-09 M.

2.1.2 Down Gradient of Subaqueous Disposal of Fine Tailings in 2-North and 3-North

The 2-North mine has been a subaqueous disposal site of fine tailings from processing of the 7-South coal since 2012. Fine tailings were pumped underground into 2-North 1 Mains until early 2015 when the line was relocated due to retreating underground operations. Pumping was redirected into the 5 Mains mining void of the 2-North mine. The wells installed in these areas initially supported a hydrogeological investigation performed by Lorax. The 2-North, 3-North and 5-South mine waters and formation waters have been defined as: mine water, #1 coal seam groundwater, and Dunsmuir sandstone groundwater. In these areas, the mine water is classified as circum-neutral with a distinct sulphate geochemical signature that can be used to trace the flow paths of mine water (Lorax [(1)], 2011).

Groundwater wells QU10-10 (S and D), and QU10-11 (D) have been installed down gradient of the 2-North subaqueous disposal areas and measure formation water quality and hydraulic head downstream of the 2-North mine workings. Quinsam originally drilled QU08-21G in the 2-North

area as a geotechnical hole, and this drill hole was later converted into monitoring wells QU08-21G S and QU08-21G D, to characterize water quality on the opposite side of the Forjan Fault in both the No. 1 coal zone (deep well) and the overlying Dunsmuir Sandstones in the area of the No. 4 coal zone (shallow well). QU10-13 D measures the hydraulic head above the 2-North mine (1 Mains) and fine tailings disposal. QU10-11 S monitors groundwater in the overlying Dunsmuir sandstones in a fracture zone. The in-situ waters in the 2-North mine pool are monitored at well locations 1Mains 2-North (1M2N), 5Mains #2 (5M#2) and QU10-13 D & the underground sump 6 Mains 2-North (6M2N) replaces the groundwater well QU11-03 as it was difficult to obtain a sample due to the depth of the well.

2.1.3 2-North Coal Processing Plant and Coal Pad

The coal processing plant is located east of Middle Quinsam Lake and lies at an elevation approximately 40 metres above the lake surface. Two nested groundwater wells MW00-6 (S and D) and MW00-1 (S and D) have been installed at the peripheries of a surface collection ditch formed as a catchment of groundwater and surface runoff from the coal processing plant and coal stockpile pad. These shallow and deep wells reflect groundwater quality in this area. The depth of the shallow wells MW00-1 S and MW00-6 S are 8.1 and 8.7 metres, respectively, with the deeper wells MW00-1 D and MW00-6 D measuring 29.8 and 18.0 metres, respectively. These wells monitor groundwater quality at different depths in the glacial till overburden, layered overtop of the bedrock.

2.1.4 4-South Water Chemistry

The 4-South mine is developed in the #3 coal zone. The #3 coal zone lies within the Dunsmuir Member of the Comox Formation. The Dunsmuir Member consists of thick-bedded medium to coarse grained arkosic sandstones containing localized silty interbeds. Lorax classified the groundwater in this area into two groups; formation groundwater with lower overall dissolved ion concentrations and mine pool water with higher dissolved ion levels. The mine pool water is elevated in sulphate and iron; this signature is used to assess the mine pool seepage rates and groundwater flow path.

Lorax's assessment of the area found that formation groundwater wells had water quality with a geochemical signature that suggested mine pool influence in the down gradient wells of the flooded 4–South Mine. In Volume 3, Appendix I, Section 4 of the 4-South Mine Groundwater Evaluation, Lorax concludes that "*The component of seepage from the shallow westernmost portion of the 4-South mine inferred to flow to Long Lake represent about 10% (0.14 m^3/day) of the 1.4 m^3/day, estimated to represent the total seepage from 4-South. All seepage is ultimately directed to the Quinsam River"* (Lorax[(2)], 2011).

The monitoring wells established in this area are located to intercept any groundwater transport that may occur from the 4-South mine pool. These wells include QU10-09 (S and D), QU10-08 D and QU10-07 D (Lorax. 2011). This reporting year, QCC has monitored all of these wells, despite Lorax describing QU10-07, located immediately down gradient of the mine void, as displaying a minimal influence from the mine waters geochemical signature. Monitoring was continued at this location as there is no other well immediately downstream of this portion of the mine workings. As more data is collected and any trending identified, a decision will be made whether to continue monitoring at this location. QU10-08 is located up gradient of the 4-South mine and displays minimal influence from the 4-South mine pool.

The monitoring wells dedicated to monitoring in-situ water of the flooded workings are wells QU11-01 and QU78-161. QU11-01 is situated in the depillared area of the mine while QU78-161 is located in open mine workings east of a large fault.

2.1.5 5-South Mine Void

The 5-South mine is located south of the Quinsam River and was developed in the same #1 coal seam as 2/3 North and 2 South. 5-South mine water is characterized by having sodium-sulphate type water with strong sulphate signatures. Mining operations in 5-South began in 2007 and completed in 2013 with some areas of the mine partially depillared. The 5-South mine receives water from local precipitation and subsequent infiltration along with pumping from the 7-South mine into the borehole QU05-13 W.

To isolate the 5-South workings from the 2-North workings, plugs were installed in 8-Mains to minimize the hydraulic connection. These plugs are designed to handle a of pressure differential of 72 metres between the two sides. To manage proper conditions, excess water from 5-South is directed to Settling Pond # 1 (SPD) via a pumping system. Water samples are obtained from two locations within 5-South: an in-situ sump (5SXC) and at the discharge line into SPD (5SMW).

2.1.6 2-South – 3-South Area

The 2-South – 3-South area consists of naturally flooded mine workings, the 2-South subaqueous PAG-CCR storage pit, the 3-South subaqueous PAG-CCR storage pit and other surface disturbances. Wells established in this location are used to determine if parameters of interest are emanating from the mine workings or the PAG-CCR storage pits towards the receiving environment.

The 2-South open pit area was engineered to contain PAG-CCR material and included a sand-bentonite liner to minimize seepage and to retain water necessary for cover. Backfilling of PAG-CCR was completed in summer 2015 and water cover has been maintained since late 2015 (subaqueous disposal). It was projected that approximately $50m^3$ of water will seep from the facility daily with 10% of the water reporting to No Name Lake. The wells MW12-23 and MW12-24 are designed to intercept any water transporting from the 2-South PAG-CCR storage towards the lake. The 3-South open pit development has been backfilled with PAG-CCR and was flooded to provide a full water cover; similar to the requirements of 2-South. A Groundwater well named MW00-2 was installed down gradient of this facility in shallow bedrock approximately 15 metres from the northeast corner to characterize seepage from 3-South. It is inferred that MW00-2 is hydraulically connected with the 3-South pit based on proximity and reported water quality (Golder Associates, 2006).

Groundwater wells MW00-4 and QU11-11 are used to monitor the 2-South mine pool and depillared areas. MW00-4 is located on the north-eastern margin of the 2-South mine in the depillared workings near Long Lake. QU11-11 is located at the deepest portion of the 2-South as it draws water from the underground mine pool for treatment in the Long Lake Seep Passive Treatment System (LLSTS). This well is monitored monthly to assess mine pool chemistry and

to assess the performance of sulphate reduction through the LLSTS. Historically, MW00-3 and MW00-5 were also monitored in this location, but are presently only used to monitor the water elevation in the mine pool. The underground workings in the 3-South pit area were developed and accessed by two portals located in the 2-South pit, with the 3-South Pit separated from the underground workings by intact bedrock. It is expected that the hydraulic connection between the flooded 3-South pit and the former 2-South underground workings are a result of bedrock fractures within the intact bedrock (Golder Associates. 2007).

2.1.7 7-South Down Gradient of Subaqueous Disposal of PAG-CCR in 7-South

The nested groundwater well QU08-13 (A & B) is situated topographically down gradient of the 7-South mine workings to intercept groundwater flow from the workings towards the Quinsam River. The well is located to monitor water quality and detect any seepage from the 7-South PAG-CCR underground disposal area in the 7-South mine at the stratigraphic level of the No. 4 coal zone (QU08-13 A) or as it rises through the stratigraphic column towards the Quinsam River (QU08-13 B). Source terms derived specifically for this development will be used as a comparison of water quality. Other groundwater wells within the 7-South area are used to monitor groundwater quality in relation to the seepage from the run of mine stockpile (QU08-10). At present, monitoring well QU14-10 is being used to measure water quality of the in-situ underground PAG-CCR subaqueous disposal. If the storage facility expands in future operations, drillholes QU08-07 and / or QU09-01 will be developed into monitoring wells and will also be used to measure in-situ underground water quality within the PAG-CCR storage facility.

2.1.8 Baseline/Background

Groundwater monitoring wells within areas without mine related impact or up gradient of the perceived flow path are established to identify baseline/background information on water quality for modeling purposes and when comparing/identifying sites encountering mining influence. Two primary areas of focus for collecting baseline groundwater quality during the 2015 program included 7-South Area 5 and the 4-South / 6-South area. During that year, the 4-South / 6-South baseline monitoring was deemed complete, and the 7-South Area 5 was near completion. In 2015, only 1 sampling event from 3 of the 7-South Area 5 monitoring wells (QU11-18 (S and D)

and QU11-36D) was completed as the baseline monitoring program for this area was put on hold and has now been permanently removed as the mine has transitioned into full closure.

2.1.9 Mine Pools, Underground Sumps and Mine Water Pumped to Surface

A mine pool is a flooded mine void or previously mined out area which may or may not be backfilled with waste material. Mine pools often exhibit elevated concentrations of metals and sulphate. Concentrations become increasingly elevated if mine pools have waste deposits present as constituents tend to dissolve and accumulate at depth. A chemical stratification occurs when there is limited mixing of the mine water and the heavily mineralized waters settle on the bottom of the water column while the lighter, less mineralized waters, concentrate in the upper portion.

In-situ mine pool monitoring locations include: 1M2N, 5M#2, and QU10-13 D in 2-North; 5SMW in 5-South; QU11-09 M in the RBP; QU14-10 in 7-South; QU78-161 and QU11-01 in 4-South; MW00-4 and QU11-11 in 2-South; and 242-D for the 242 mine. In addition to mine pool monitoring sites that are not accessible to monitoring personnel, underground sumps are used to characterize in-situ locations including: 1 Mains 7-South (1M7S), 6 Mains 2-North (6M2N) & 5-South 17 Cross Cut (5SXC).

3 Methods and Procedures for Monitoring Groundwater

During groundwater sampling, water is directed through a flow cell connected to a water quality sonde to instantaneously measure parameters such as pH, conductivity, temperature, oxidation reduction potential and dissolved oxygen. These data are used to identify when intercepted groundwater entering the column is consistent and representative of the targeted water based on the well design. Water samples are obtained for laboratory analysis when the appropriate volume of water has been purged, water levels have stabilized and the physical parameters listed above stabilize. Ultimately, the objective is to collect a sample that represents the ‘active’ groundwater in an area as opposed to stagnant water within a well.

3.1 Sampling Techniques

Generally, four methods/systems (dependent on groundwater setting) are employed for monitoring groundwater. These methods include:

- Inertial lift
- Peristaltic pumping
- Portable bladder pump
- Dedicated bladder pump

The most suitable sampling device is selected based on:

- Parameters being monitored
- Maximum efficiency
- Purging rate compared to well yield
- Well diameter
- Depth of well
- Sample collection point
- Ease of use of the sampling device

3.1.1 Inertial Lift Sampling

This method of sampling uses HDPE tubing fitted with an inert foot valve placed down the well casing at the desired depth. Oscillation of this tubing forces water up to surface while the foot valve prevents backflow on the downswing. This constant oscillation is achieved using a mechanical actuator known as a hydrolift. The hydrolift is attached to the tubing end on surface and cycles up and down to provide the motion needed to lift water. Flow rate is directly proportional to the speed of oscillation, well design and water level. Inertial lift sampling is appropriate in wells in which a high purge rate is required as flow rates can range from 0.5 to over 4 L/min.

3.1.2 Peristaltic Sampling

This method employs a peristaltic pump connected to tubing that is placed within the well casing at a desired depth. Peristalsis is a cyclic compression and decompression on the tubing to create a negative pressure point in which the water is drawn up the tubing. This method is employed at very shallow wells that can potentially have poor recharge rates.

3.1.3 Bladder Pumps

Bladder pumps are submerged to an appropriate level and operate by filling and discharging a bladder system inside a housing unit. Compressed gas (N_2) is supplied at surface and is pumped down the tubing to provide the compression and release of water within the bladder housing. Flow rate is controlled via timing cycles of recharge and discharge, air pressure and depth of water. Bladder pumps are used in deeper wells in which inertial lift and peristaltic pumping capabilities and efficiencies are not possible.

3.2 Parameters Monitored

The total metals suite was removed from the analytical requests in 2014 to eliminate the potential artifacts (associated with higher total suspended sediment) in sampling results. Since then, analytical results have included dissolved metals, total suspended solids (TSS), dissolved anions (i.e. bromide (Br^-), chloride (Cl^-), fluoride (F^-), sulphide (S^{2-}), sulphide as (H_2S), sulphate (SO_4), total dissolved nitrogen (TDN), dissolved organic carbon (DOC), total-alkalinity (Alk) and acidity. Furthermore, field measurements for pH, temperature, conductivity, oxidation reduction potential and dissolved oxygen continue to be part of the monitoring program.

Results for hydrogen sulphide are calculated using a gravimetric conversion factor (sulphide result multiplied by 1.063) as the laboratory only provides results as sulphide. This calculation is necessary to compare results to the CSR-AW standards as the standard is measured as H_2S (0.02 mg/L). In the past, sulphide results that were expressed as <MDL were calculated using the MDL value which was often 0.02 mg/L. For all previous results and results included in this reporting year that were <MDL, a value of half the MDL was used for calculation. This may eliminate past issues of false positive bias when the gravimetric conversion factor is applied.

In 2013 the Ambient Water Quality Guideline for dissolved sulphate was updated from an acute guideline of 100 mg/L to a chronic guideline based on a 30-day average. The new guideline is relative to background water hardness concentrations. As a result, sulphate water quality

guidelines for the protection of aquatic life were developed for different categories of water hardness as displayed in Table 2 below.

Table 2: Sulphate Water Quality Guideline (mg/L) - Based on Water Hardness (mg/L) Categories

Water Hardness* (mg/L)	Sulphate Guideline (mg/L)
Very Soft (0-30)	128
Soft to moderately soft (31-75)	218
Moderately soft/hard to hard (76-180)	309
Very hard (181-250)	429

*Water hardness categories adapted from the CCME.

** Toxicity tests on the early stage rainbow trout were only conducted up to a water hardness of 250 mg/L.

The BC Land Remediation Section develops the Contaminated Sites Regulations standards. As it is a regulation, standards do not change when a water quality guideline changes. As a result, the CSR-AW for sulphate was not updated when the BC Water Quality Guideline was revised. Currently, the CSR-AW standards are subject to revision, with the first step of the process being to review the policy (e.g. developing a CSR standard) and the second step applying the newly derived standard. These new guidelines derived from the Water Quality Guidelines are often a factor of the guideline (e.g. 10 times higher). The CSR-AW standard for dissolved sulphate of 1000 mg/L has been applied but this may change in the future.

In an effort to reduce costs, commencing March of 2015 all water samples were shipped to and analyzed by Maxxam Analytics (Maxxam). Prior to this point, ALS Environmental (ALS) provided all laboratory services. Overall, not all of the analysis methods were the same; however, the results with slightly varied detection limits have been consistent for all parameters except Sulphide as H_2S. The method used by both labs for this parameter is Total Sulphide Colorimetric (*SM 22 4500-S2-D m-Maxxam*, and *APHA 4500-S2 Sulphide-ALS*), which is the same method; however, there is a noticeable variation in Sulphide as H_2S results at ranges below 0.01 mg/L

3.3 Quality Assurance/Quality Control

Quality Assurance / Quality Control (QA/QC) for the Quinsam groundwater sampling program is conducted in accordance with *"The British Columbia Field Sampling Manual, For Continuous Monitoring and Collection of Air, Air-Emissions, Water, Wastewater, Soil, Sediment, and Biological Samples, 2013 Edition"* (MOE, 2013). During this reporting period, 18 replicate samples were collected across 13 sites, totaling 957 measurement pairs. Sites where replicate samples were obtained included: 242-D, QU11-11, MW00-1, MW00-2, MW00-4, MW00-6 D, QU10-07 D (x2), QU10-09 D, QU10-10 S, QU10-11 D, QU11-09 S, QU11-09 M (x2), and QU14-10 (x4).

Relative Percent Difference (RPD) values were calculated for the analytical results from the sample and its respective replicate. In accordance with the British Columbia Field-Sampling Manual, the calculation was applied as stated below:

$$RPD = Absolute \frac{(Sample\ Concentration - Replicate\ Concentration)}{\left(\frac{Sample\ Concentration + Replicate\ Concentration}{2}\right)}\ x\ 100\%$$

RPD calculations were only practical for results where concentrations were found at or greater than five times the reported detection limit (RDL) as there is considerable uncertainty at very low levels. In addition, mathematical calculations for RPD appear exaggerated with low values where absolute differences may be relatively low.

3.3.1 Results of Field Replicates

It is expected to see some variation between a sample and its respective field replicate for a number of reasons. Some considerations include: inconsistent sample stream at sampling locations; heterogeneity of water at sampling location; the possibility of minor contaminations; laboratory sample preparation and accuracy of analytical instrument to name a few. Taking these possibilities into consideration, RPD values less than 20% are deemed "acceptable" and indicate proper sampling methodology with representative results. It has been acknowledged that RPD values greater than 20% indicate a potential problem with sampling integrity whereas values greater than 50% indicate a definite problem. When taking a groundwater replicate during a sampling event, approximately 50 parameters are analyzed from the same set of samples. It is

common to have one or a select few of these parameters exceed an acceptable RPD threshold while the rest do not. Concerns over sampling integrity or methodology are raised when numerous results have high RPD values within the same sample.

Within the 18 replicate samples and 957 measurement pairs analyzed, 22 pairs had an RPD greater than 20% (2.30% of total), and 12 had an RPD greater than 50% (1.25% of total). Note that RPD results >20% that did not have at least one value >5X MDL were excluded. With such few RPD "failures" and no specific site, sampling method or parameter routinely failing, it is deemed that sampling protocol and QA/QC methods performed by Quinsam Coal and the precision shown by the analytical laboratory are acceptable practice.

Table 3: Replicates & Relative Percent Difference Greater than 20%

Station	Date	Parameter	Detection Limit	Detection Limit X5	Result1	Result2	RPD (%)
QU1007D	28/Sep/16	Carb	0.50	2.5	0.50	3.70	152.4
QU1007D	28/Sep/16	Alk-PP	0.5	2.5	0.50	3.08	144.1
QU1007D	14/Mar/17	Cd-D	0.000005	0.000025	0.0000306	0.00	143.8
QU1011D	9/Jan/17	Al-D	0.003	0.015	0.0215	0.004	137.3
QU1410	21/Jul/16	Cu-D	0.0002	0.001	0.00102	0.00	134.4
QU1109M	24/Mar/16	Acidity83	0.5	2.5	11.2	3.44	106.0
QU1009D	9/Mar/16	H_2S	0.005	0.025	0.18	0.063	96.3
QU1109S	24/Mar/16	H_2S	0.01	0.05	0.45	0.17	90.3
MW001S	8/Aug/16	Al-D	0.003	0.015	0.0194	0.0091	72.3
QU1010S	18/Oct/16	Al-D	0.003	0.015	0.0188	0.0367	64.5
QU1410	22/Feb/17	Acidity83	0.5	2.5	18.4	35.6	63.7
QU1007D	14/Mar/17	Al-D	0.003	0.015	0.103	0.0603	52.3
QU1410	21/Jul/16	P-D	0.002	0.01	0.0122	0.0186	41.6
MW002	6/Oct/16	DOC	0.5	2.5	2.35	3.53	40.1
QU1410	21/Jul/16	N-D	0.02	0.1	0.296	0.205	36.3
QU1410	24/Mar/16	P-D	0.002	0.01	0.0084	0.012	35.3
QU1410	21/Jul/16	Ni-D	0.001	0.005	0.0172	0.0121	34.8
MW002	6/Oct/16	Acidity83	0.5	2.5	21.3	15.5	31.5
QU1007D	28/Sep/16	DOC	0.5	2.5	3.64	4.77	26.9
QU1007D	14/Mar/17	SO4-D	0.5	2.5	3.21	2.47	26.1
QU1011D	9/Jan/17	TSS	32	160	1410	1090	25.6
INF	2/Jun/16	Fe-T	0.01	0.05	2.43	1.93	22.9

4 Results and Discussion

4.1 References for Water Quality Data

Geochemical source terms have been developed by Lorax as a conceptual model that represents the progression of mine pool geochemistry for all mine pool areas on the Quinsam Mine Site. This model is explained in detail in the 7-South Development Mine Permit Amendment Volume 3, Appendix I and Volume 4, Appendix K.

Geochemical source terms were developed for the anticipated mine plan in 2-North, 3-North and 5-South mine areas where 7-South tailings will be stored, as well as 2-/3-North, 4-South and 5-South flooded mine voids without PAG-CCR or fine tailings. Source terms provide an overview developed for each respective mine area compared to the measured water quality.

The source terms have been developed using a set of empirical data including the following:

- Water chemistry collected from underground mine dewatering and mine void,
- Kinetic saturated column leach tests performed on 7-South CCR and tailings,
- Sulphur distribution in the proposed workings.

Comparison of water quality data to source terms can be found in tables within each respective area in the discussion of results.

All water quality results for groundwater wells located between mine working(s) and the receiving environment have been compared to the CSR-AW. A groundwater map displaying the location of each well in relationship to the underground mine area is located in Appendix A,Site plan. Appendix B, Tables 2 through 14, display the analytical water quality results for 2016-2017. Graphical representations for parameters of interest observed to be elevated or trending can be found throughout the report for each respective area of the mine. Additional graphs are located in Appendix D. Numerical standards used for CSR-AW are described in Table 4 below.

Table 4: CSR-AW Standards

Parameter	CSR-AW (mg/L)	Parameter	CRS-AW (mg/L)
Dissolved Sulphate	1000	Dissolved Lead	*
Dissolved Chloride	1500	Dissolved Mercury	0.001
Dissolved Fluoride	*	Dissolved Molybdenum	10
Dissolved Silver	*	Dissolved Nickle	*
Dissolved Arsenic	0.05	Dissolved Antimony	0.2
Dissolved Barium	10	Dissolved Selenium	0.01
Dissolved Boron	50	Dissolved Thallium	0.003
Dissolved Beryllium	0.053	Dissolved Titanium	1
Dissolved Cadmium	*	Dissolved Uranium	3
Dissolved Chromium	0.01	Dissolved Zinc	*
Dissolved Cobalt	0.04	Sulphide as H_2S	0.02
Dissolved Copper	*		
***Indicates the Standard is hardness dependent**			

Table 5 below displays exceedances noted during the 2016-17 sampling program at the ex-situ wells compared to the CSR-AW.

Table 5: CSR-AW Exceedances in Ex-Situ Groundwater Wells

Area	Site ID	Parameter (mg/L)	CSR-AW Standard (mg/L)	Result (mg/L)	Sampling Events Exceeding Standard
2-North	Q08-21G S	As-D	0.05	0.215, 0.207, 0.212, 0.218 & 0.153	(5/5) Sampling Events
	Q08-21G S	H_2S	0.02	0.0658, 0.128, 0.0514, 0.130 & 0.0996	(5/5) Sampling Events
	Q08-21G D	As-D	0.05	0.146, 0.153, 0.111, 0.162 & 0.208	(5/5) Sampling Events
	Q08-21G D	H_2S	0.02	0.0973, 0.128, 0.0990, 0.115 & 0.140	(5/5) Sampling Events
	QU10-10 D	Cl-D	1500	3400 & 3500	(2/2) Sampling Events
	QU10-10 S	As-D	0.05	0.123 & 0.133	(2/2) Sampling Events
RBP	QU11-05 D	H_2S	0.02	1.41, 1.66, 5.43, 7.0 & 10.4	(5/5) Sampling Events
	QU11-05 S	As-D	0.05	0.0913, 0.0992 & 0.103	(3/5) Sampling Events
	QU11-05 S	H_2S	0.02	0.0313, 0.0296, 0.0454, 0.06 & 0.0539	(5/5) Sampling Events
	QU11-09 S	As-D	0.05	0.0799, 0.0771, 0.0952, 0.0668 & 0.0678	(5/5) Sampling Events
	QU11-09 S	H_2S	0.02	0.445, 0.166, 0.272, 1.18, & 1.11	(5/5) Sampling Events
2/3 South	MW00-2	SO4-D	1000	1220, 1240, 1290, 1320 & 1210	(5/5) Sampling Events
7-South	Q08-13 A	As-D	0.05	0.397, 0.425, 0.447, 0.405 & 0.429	(5/5) Sampling Events
	Q08-13 A	H_2S	0.02	0.135, 0.167, 0.167, 0.118 & 0.138	(5/5) Sampling Events
	Q08-13 B	As-D	0.05	0.455, 0.508, 0.528, 0.428 & 0.469	(5/5) Sampling Events
	Q08-13 B	H_2S	0.02	0.0201	(1/5) Sampling Events
4-South	QU10-07 D	As-D	0.05	0.0823, 0.108 & 0.0930	(3/3) Sampling Events
	QU10-07 D	H_2S	0.02	0.0658, 0.116 & 0.169	(3/3) Sampling Events
	QU10-08 D	As-D	0.05	0.168 & 0.161	(2/2) Sampling Events
	QU10-08 D	H_2S	0.02	0.392	(1/2) Sampling Events
	QU10-08 D	F	2	2.30 & 2.80	(2/2) Sampling Events
	QU10-09 S	As-D	0.05	0.0787, 0.0907 & 0.0829	(3/3) Sampling Events
	QU10-09 S	H_2S	0.02	0.0277	(1/3) Sampling Events
	QU10-09 D	As-D	0.05	0.118, 0.0977 & 0.100	(3/3) Sampling Events
	QU10-09 D	H_2S	0.02	0.108, 0266 & 0.133	(3/3) Sampling Events

4.2 Key Observations and Conclusions

4.2.1 North Mining Area

The North mining area represents the largest operation on the mine-site and has been the longest project at Quinsam Coal spanning nearly 30 years of mining. The North mining area is divided into 3 sections based on source terms; 2/3 North Mine Void, 2 North Mine Water with 7-South tailings, and North Mining Area Ex-Situ groundwater.

4.2.1.1 2/3 North Mine Void

Much of the mined out 2/3-North mine is allowed to naturally flood, and the mine pool water has been found to be circum-neutral with a unique sulphate geochemical characteristic. Water is

found to be oxic to strongly reducing in various locations in the mine. The source terms as established by Lorax (2011) are displayed in Table 6, with comparison to the results from the sample taken from a sump in 6-Mains (6M2N). This area is chosen as it absent of tailings storage and has no influence from tailings storage in other areas of the mine. Previous monitoring years used samples from a well named QU11-03 in the 3-North mine (10 Panel) to represent the 2/3-North mine void. Sampling at this well was discontinued as water samples were difficult to obtain and a local fault was thought to influence water in this area and give potentially unrepresentative results.

Three samples were obtained at 6M2N during this monitoring period with results averaged to compare to source terms. All parameters were below the expected value with many results well below. This is in contrast to the 2015 reported results where alkalinity, fluoride and boron were above expected values. Further monitoring on a frequent basis is required to accurately represent this location to ensure consistency and overall representation of this area.

Appendix B, Table 3 represents the in-situ raw data, while Table 6 below compares the expected and worst case scenarios with the actual results.

Table 6: Source Terms Comparison for 2/3 North Mine Void

Parameters	2N Mine Void		6M2N	Results obtained from one sample
	Expected	Worst Case		
Alkalinity (CaCO3)	450	-	448	Below Expected
Fluoride (F)	0.29	0.3	0.056	Below Expected
Sulphate (SO4)	278	1280	183	Below Expected
Dissolved Metals				
Aluminum (Al)	0.013	0.027	0.0057	Below Expected
Arsenic (As)	0.036	0.04	0.00153	Below Expected
Boron (B)	1.1	1.2	0.84	Below Expected
Cadmium (Cd)	0.00002	0.00008	<0.0000050	Below Expected
Cobalt (Co)	0.001	0.0035	<0.00050	Below Expected
Copper (Cu)	0.001	0.004	0.00048	Below Expected
Iron (Fe)	0.49	2.45	0.019	Below Expected
Manganese (Mn)	0.36	0.95	0.0584	Below Expected
Nickel (Ni)	0.001	0.008	<0.0010	Below Expected
Selenium (Se)	0.0002	0.001	0.00011	Below Expected
Zinc (Zn)	0.006	0.007	0.0056	Below Expected

All units are in mg/L

4.2.1.2 2-North Mine Water with 7-South Tailings

1 Mains 2-North (1M2N) is an area within the 2-North Mine that was mined, depillared and subsequently used as a sub-aqueous storage facility for fine tailings from the processing of 7-South coal. Prior to the injection of tailings into this area, this part of the naturally flooded workings was dewatered. The fine tailings were then pumped into the in-situ mine water, allowing for the tailings to settle out throughout 1 Mains until it was necessary to relocate the tailings line in early 2015 to accommodate underground operations. The 7-South fine tailings were then pumped into another area of the 2-North Mine, 5 Mains. For the purpose of this monitoring program, 1M2N has remained the sampling site for comparison to geochemical source terms and is expected to reflect those terms very closely. 1M2N was sampled four times during this reporting period.

The POI results from the four sampling events were averaged to an annual result, and are displayed in Table 7, below. As shown, the majority of the parameters average to below the expected values, with the exceptions of sulphate and manganese. Iron concentrations are reported suspiciously low and it is suspected that sampling technique may be responsible. As with 5-South sampling, 1M2N samples are obtained from a surface location in which filtering does not occur. Follow up testing comparing filtered and unfiltered samples will occur next time water is obtained from this location.

Sulphate was above the expected case, but is roughly half of the worst case value at 684 mg/L; similar to the reported 692 mg/L in 2015. There are seasonal trends with respect to sulphate concentrations (and manganese) that are directly related to precipitation, groundwater infiltration and ultimately mine pool water elevation. See Figure 2 for sulphate concentrations and Figure 3 for water elevations in the well QU10-13 D.

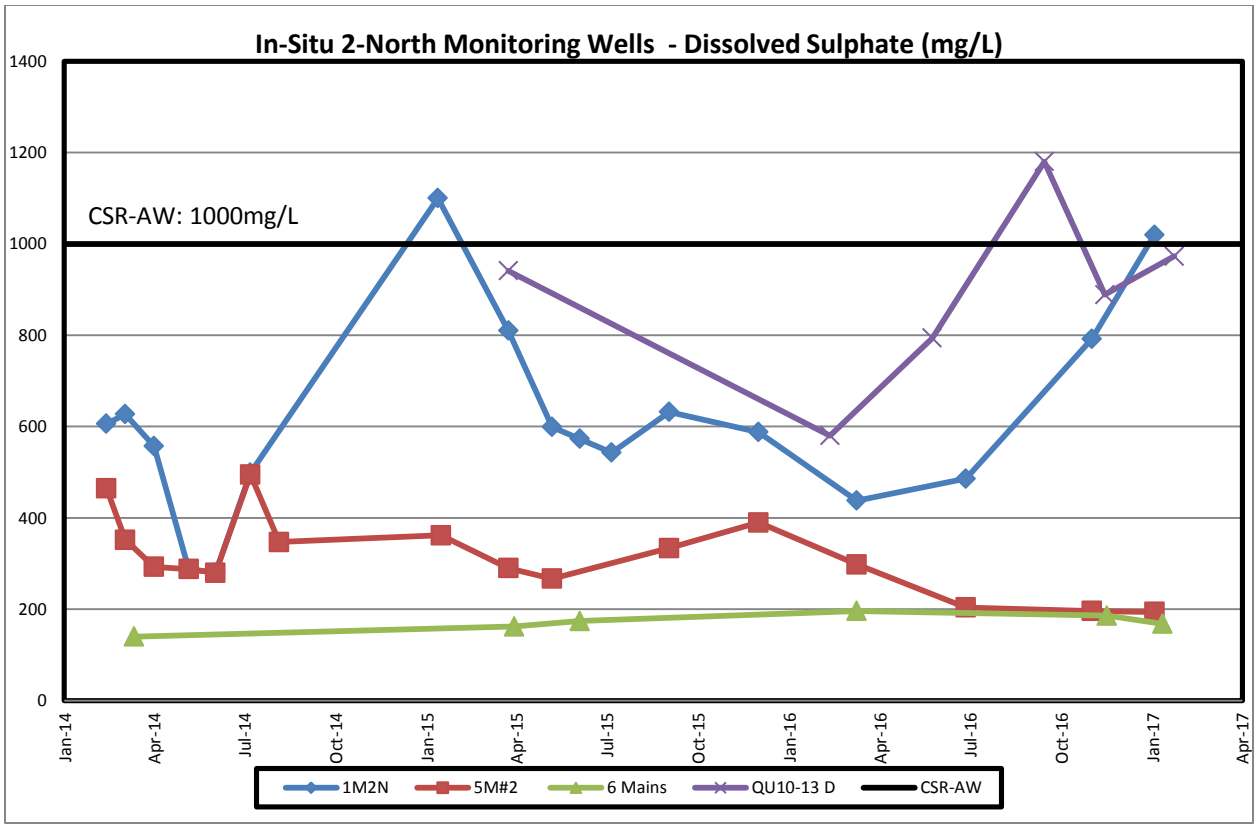


Figure 2: In-Situ 2N Monitoring Wells - Dissolved Sulphate

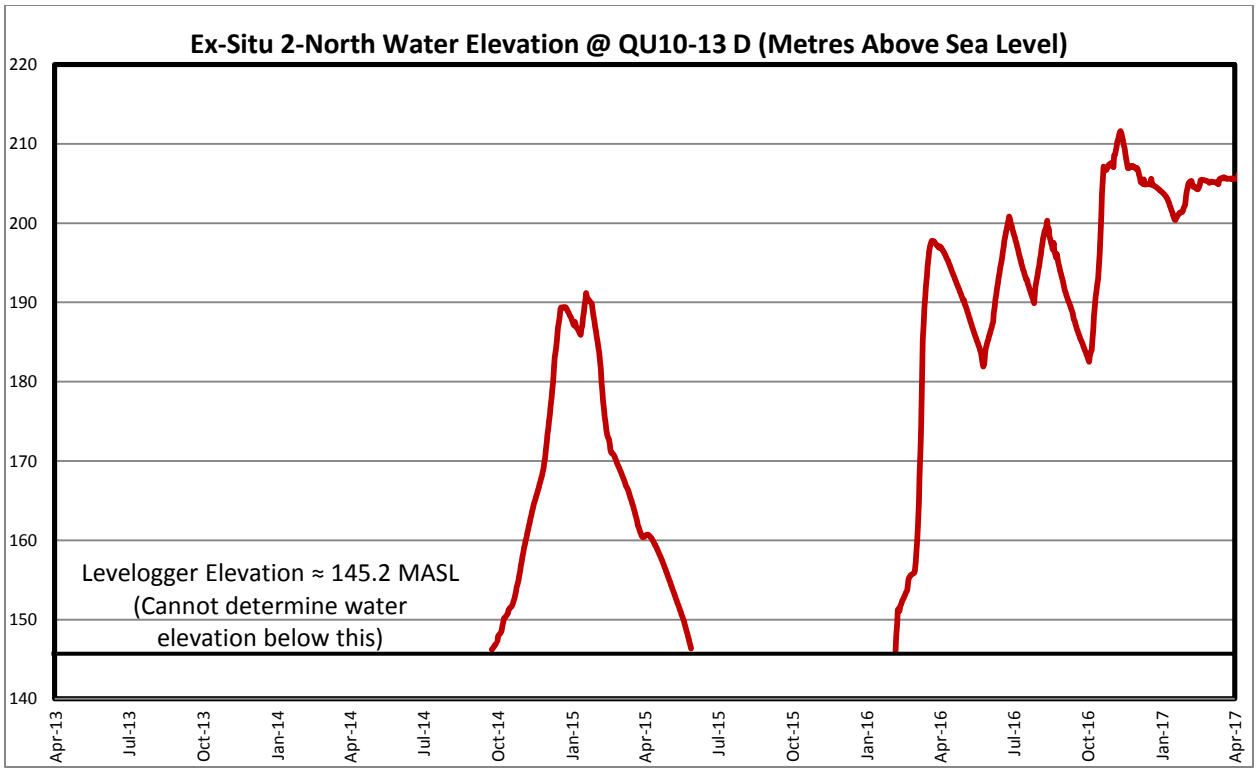


Figure 3: Water Elevations at QU10-13 D

Appendix B, Table 3 represents the 2016-17 in-situ raw data, Table 7 below displays the comparison of the 2016-17 results compared to those developed as the expected and worst case scenarios.

Table 7: Source Terms Comparison for 2-North Mine Water with 7-South Tailings

Parameters	2N w 7S Tailings		1M2N	Results
	Expected	Worst Case	Annual Average	
pH	8.1	-	7.3	Below Expected
Alkalinity (CaCO3)	450	-	418	Below Expected
Fluoride (F)	1.1	1.2	0.14	Below Expected
Sulfate (SO4)	278	1280	684	Above Expected
Dissolved Metals				
Aluminum (Al)	0.013	0.027	0.0032	Below Expected
Arsenic (As)	0.113	0.125	0.0048	Below Expected
Boron (B)	1.1	1.2	1.1	At Expected
Cadmium (Cd)	0.00002	0.00008	0.000005	Below Expected
Cobalt (Co)	0.001	0.023	0.0005	Below Expected
Copper (Cu)	0.001	0.004	0.0002	Below Expected
Iron (Fe)	0.49	2.902	0.0159	Below Expected
Manganese (Mn)	0.36	0.95	0.402	Above Expected
Nickel (Ni)	0.001	0.033	0.001	At Expected
Selenium (Se)	0.0002	0.007	0.0001	Below Expected
Zinc (Zn)	0.006	0.019	0.005	Below Expected

All units are in mg/L

4.2.1.3 North Mining Area Ex-Situ Groundwater

The parameters of interest in the In-situ 2-North mining area were previously identified by Lorax in the 2-North/3-North and 5-South groundwater evaluation and include: fluoride, sulphate, aluminum, arsenic, boron, cadmium, cobalt, copper, iron, manganese, nickel, selenium, and zinc (Lorax 2011). It is conceivable that these parameters may be found within Ex-Situ wells as water from the 2-North area transports outside the mine void.

Only those parameters that were observed to be trending high or displayed exceedances against the CSR-AW were graphed. The parameters included arsenic, sulphate, sulphide (as H_2S), iron, sodium and chloride. Appendix B, Tables 2 and 4, and Figures 4 through 6 below, represent the water quality results for these areas.

Notable observations for this area include:

- All POI were below the CSR-AW standards except dissolved arsenic, sulphide and chloride
- Dissolved arsenic concentrations exceeded the CSR-AW standard (0.05 mg/L) in all sampling events at QU10-10 S, Q08-21G (S and D)
- H_sS concentrations at QU08-21G (S and D) were found in excess of the CSR-AW standard (0.02 mg/L) in all sampling events
- Dissolved iron was found in highest concentration in the No. 1 coal seam (QU10-10 D) with a max concentration of 11.2 mg/L, consistent with previous years
- Chloride has been elevated well above the CSR-AW in all sampling events since 2014 at QU10-10 D and has shown moderate concentrations with fluctuations at QU08-21G D
- Sodium concentrations found within the Ex-Situ wells have shown similar profiles to that of chloride indicating the presence of salt
- An increased sulphate concentration was observed in the well QU10-10 S in fall 2016. This value is well below the CSR-AW and further sampling will indicate if this value is an outlier or driven by hydrogeological occurrences

Throughout the 2-North, 3-North, and RBP areas, wells located in the 'deep' Cumberland Member of the stratigraphic column, particularly #1 coal seam, have consistently reported low dissolved arsenic during all sampling events. Wells in 'shallower' Dunsmuir Member sandstones, particularly nested in the area of the #4 coal zone, reported arsenic values that were consistently elevated. The Dunsmuir sandstone member contains higher levels of arsenic and has been verified during drilling programs conducted by Quinsam Coal. These observations are consistent with the findings of Lorax (Lorax[(2)], 2011), who determined that elevated arsenic concentrations are found in formation waters of the Dunsmuir Formation including sandstone and the #3 and #4 coal zones. These results are in contrast of those found from formation waters of the #1 coal zone of the Cumberland Member. An exception to this observation is the monitoring well QU08-21G D. QU08-21G D is nested within the Cumberland Member on the Eastern side of the Forjan Fault, and while lower than those found in the Dunsmuir Member Sandstones and coal measures, all five sampling events during this reporting period exceeded the CSR-AW standards. Figure 4 displays arsenic concentrations in the 2-North area.

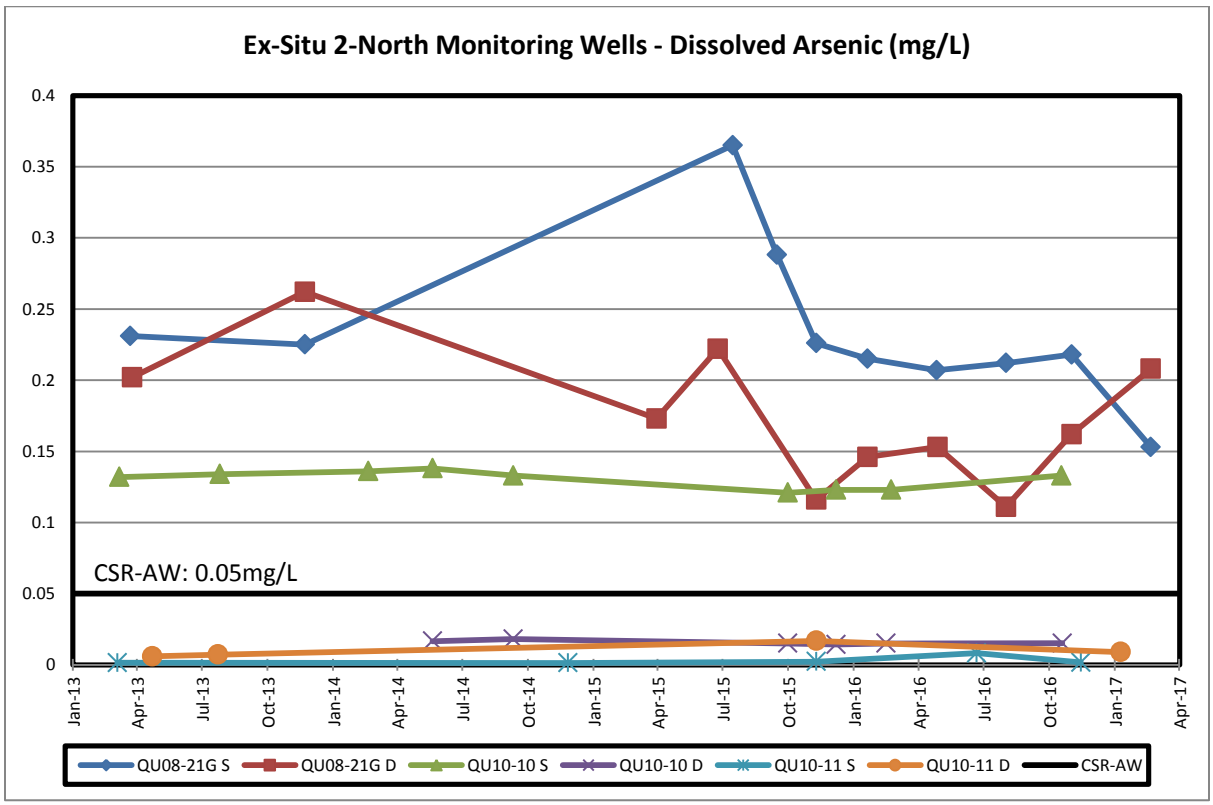


Figure 4: Ex Situ 2-North Monitoring Wells - Dissolved Arsenic

Concentrations of dissolved sulphate in the 2-North mine area outside of mine workings are low, frequently below detection levels (0.5 mg/L). A notably higher sulphate result was reported at the well QU 10-10S during heavy precipitation in October while water levels in the 2-North mine increased considerably. Additional sampling information is required to determine if this result is an outlier or if a persistent trend is developing. Aside from a minor decline in sulphate at QU10-11D, there is little trending or concerns with sulphate for the remainder of the 2-north ex-situ wells.

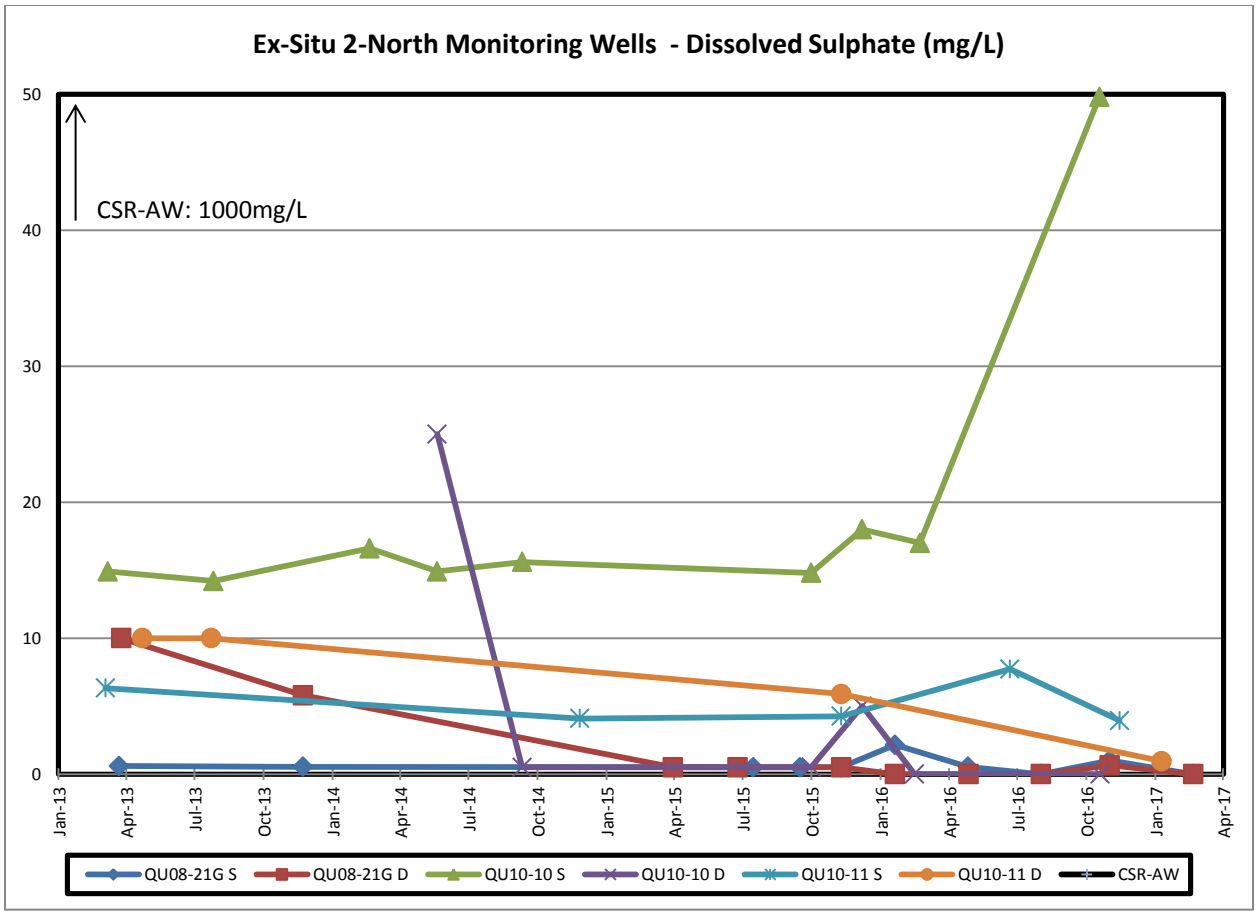


Figure 5: Ex-Situ 2N Monitoring Wells – Dissolved Sulphate

Sulphide has been found in elevated concentrations in many monitoring wells near the mine site. Sulphur is present in local geologic formations (particularly coal seams) and has been extensively documented by Quinsam Coal. As water interacts with sulphur bearing rock, leaching of the sulphur occurs and it can take many different forms dissolved into the water. Sulphide (as H_2S) occurs in groundwater with low dissolved oxygen and negative redox potentials. In the presence of oxygen, sulphur typical takes the form of a much less toxic sulphate. Figure 6 displays sulphide concentrations found with Ex-Situ 2-North wells. Sulphide is present in elevated concentrations in wells QU08-21 G (D&S). These wells intercept groundwater from the #1 and #4 coal seams, respectively and have been found to have low dissolved oxygen and negative redox potentials.

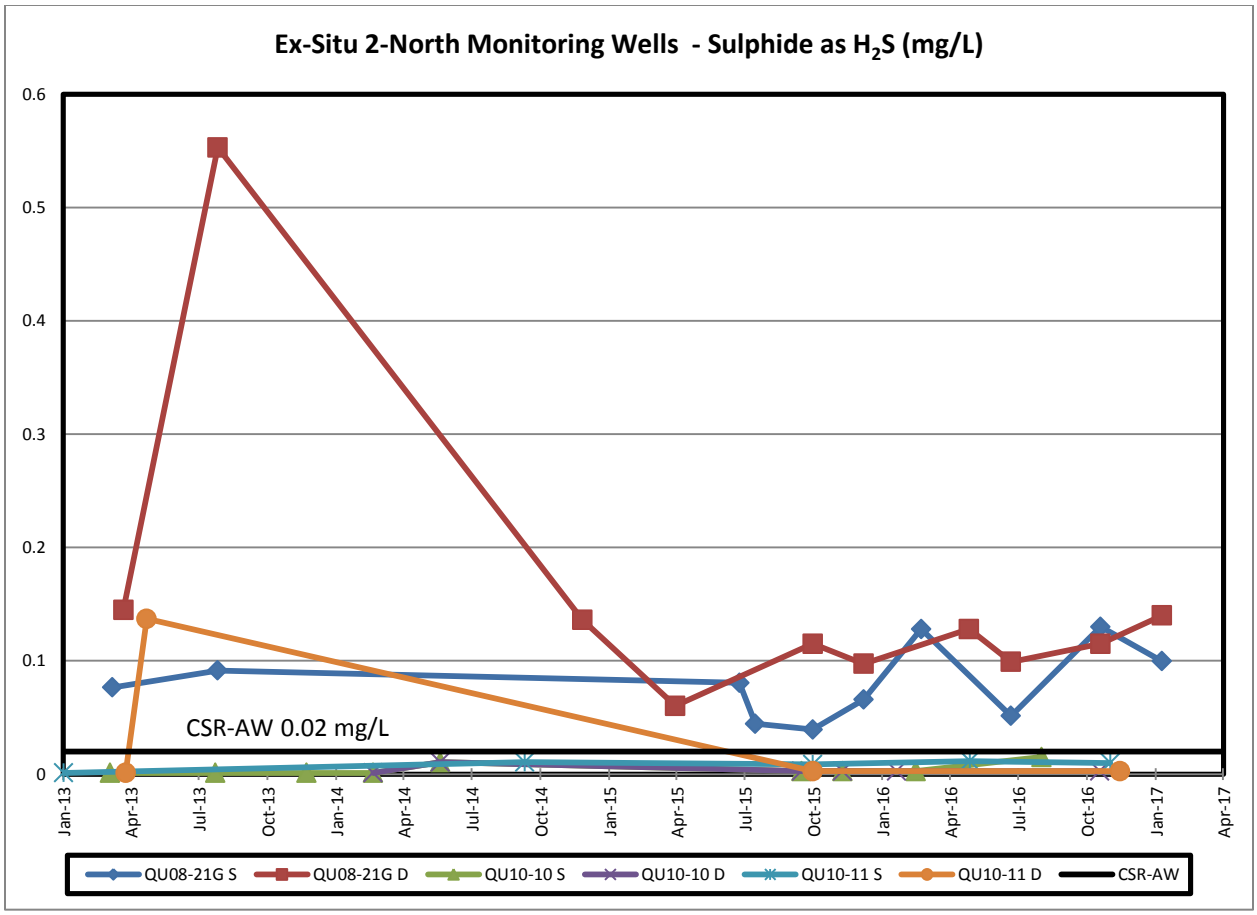


Figure 6: Ex-Situ 2N Monitoring Wells - Sulphide as H_2S

4.2.2 River Barrier Pillar Area

4.2.2.1 River Barrier Pillar with 5-South CCR

QU11-09 M represents water in the underground PAG-CCR disposal location at 87 Panel RBP. Disposing of PAG-CCR was completed in the RBP in September of 2012 with the PAG-CCR elevation at 153.5 m. The water level in QU11-09 M increased since 2012 from 145 m to 180 - 210 m dependent on groundwater influx and dewatering efforts in 2-North. Groundwater elevations will continue to be monitored to better understand the dynamics within the RBP with respect to historic mining operations.

Source terms for the River Barrier Pillar (RBP) with PAG-CCR were originally developed using 7-South CCR quality data. As mining operations progressed, a storage area for the existing 5-

South PAG-CCR was needed prior to mining 7-South. The RBP location was deemed suitable and excess 5-South PAG-CCR was backfilled in that location. In previous reports, the generated source terms (using 7-South PAG-CCR) were used for comparing and evaluating water quality results. As these source terms aren't necessarily applicable for water quality in this storage area, additional information including annual averages were used to help evaluate water quality.

As displayed in Table 8, source terms derived from 7-South PAG-CCR along with annual and cumulative averages have been calculated. Observations for each parameter are as follows:

- Alkalinity has shown a steady increase since initial flooding of the PAG-CCR
- Fluoride saw an increase after initial flooding in 2014 but has since declined
- Sulphate saw its highest concentrations during initial flooding; concentrations saw a steep decline in 2014 after water levels increased. Sulphate concentrations increased through 2015 and 2016 although they have begun to stabilize (Figure 7)
- Aluminum has generally trended downward since initial flooding
- Boron remained relatively stable after initial flooding
- Cadmium has been observed in low levels throughout monitoring
- Cobalt saw an increase after initial flooding and has since declined
- Iron has increased steadily since flooding
- Manganese has been relatively stable since flooding

Concentrations of H_2S and iron have been increasing since 2012, possibly magnified by the dissolution of PAG-CCR material and flushing of the oxidized mine walls. It is noted that concentrations of iron and H_2S have a direct positive correlation to water levels recorded in RBP.

Table 8: Source Terms Comparison for RBP with 7-South CCR and Averages

Parameters	RBP w/ 7S CCR		QU1109-M w/ 5S CCR		
	Expected	Worst Case	Annual Average		2013-2016 Average
Alkalinity ($CaCO_3$)	282		2013	380	445
			2014	405	
			2015	483	
			2016	512	
Fluoride (F)	0.71	1	2013	0.41	0.28
			2014	0.48	
			2015	0.12	
			2016	0.11	
Sulphate (SO_4)	396	1990	2013	1600	1264
			2014	1044	
			2015	1180	
			2016	1233	
Aluminum (Al)	0.02	0.05	2013	0.002	0.0059
			2014	0.0067	
			2015	0.0091	
			2016	0.0056	
Arsenic (As)	0.128	0.19	2013	0.003	0.0051
			2014	0.0046	
			2015	0.0068	
			2016	0.0058	
Boron (B)	0.71	1.88	2013	1.55	1.29
			2014	1.19	
			2015	1.25	
			2016	1.17	
Cadmium (Cd)	0.000017	0.000175	2013	0.000020	0.000018
			2014	0.000020	
			2015	0.000008	
			2016	0.000022	
Cobalt (Co)	0.005	0.148	2013	0.00542	0.00565
			2014	0.01485	
			2015	0.00180	
			2016	0.00051	
Copper (Cu)	0.001	0.001	2013	0.0004	0.0009
			2014	0.0007	
			2015	0.0023	
			2016	0.0002	
Iron (Fe)	0.805	33.5	2013	8.2	14.3
			2014	12.3	
			2015	18.0	
			2016	18.7	
Manganese (Mn)	0.14	2.89	2013	0.327	0.407
			2014	0.434	
			2015	0.447	
			2016	0.419	

4.2.2.2 *RBP Ex-Situ Groundwater*

Concentrations of dissolved sulphate measured in the ex-situ wells of the River Barrier Pillar area are low, but are elevated enough to assist with analysis of the groundwater paths exiting from the in-situ mine waters (Figure 7). Storage of the PAG-CCR derived from the processing of the higher sulphur 5-South #1 seam coal and subsequent flooding of the workings are inducing these high sulphate concentrations.

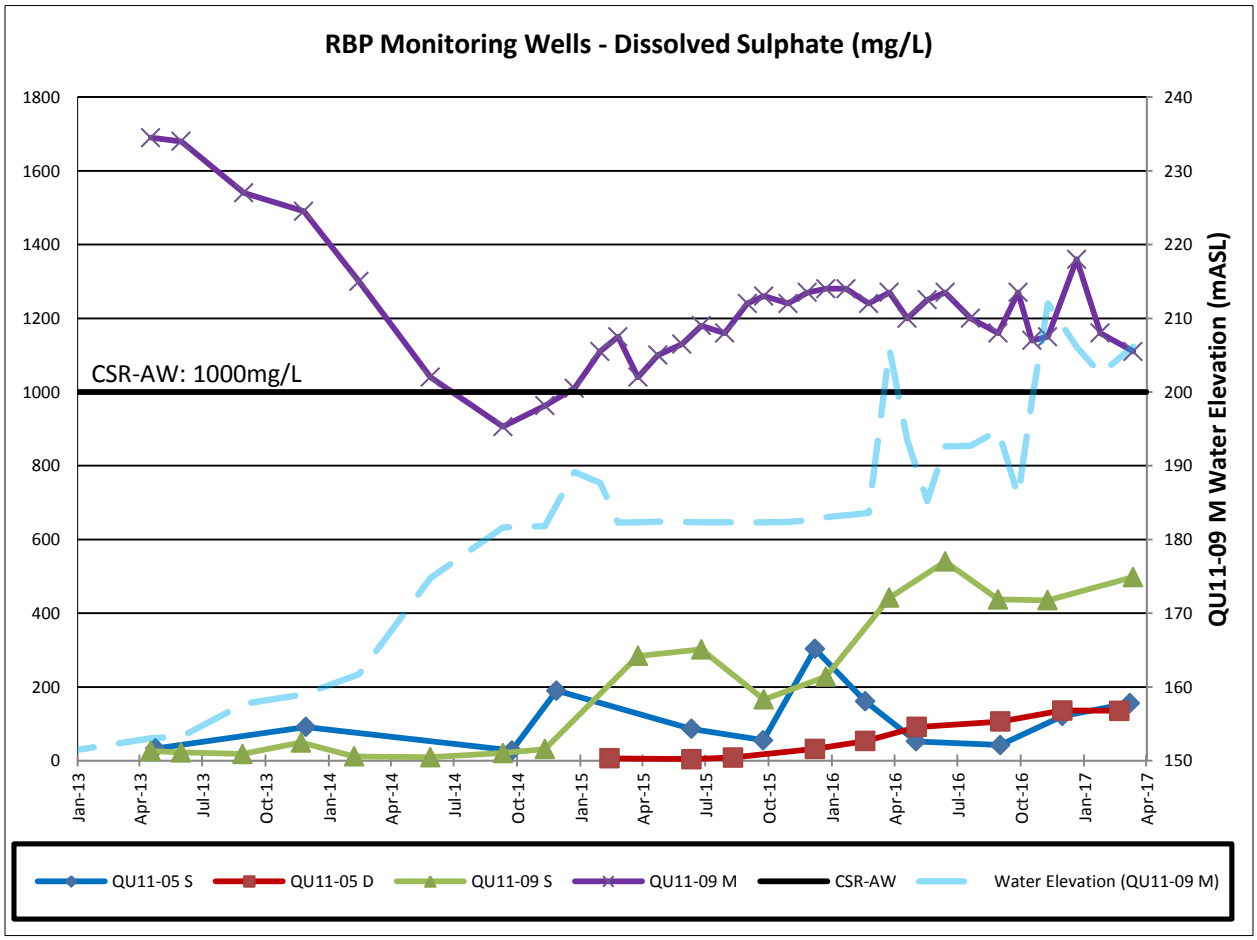


Figure 7: Ex-Situ River Barrier Pillar Monitoring Wells – Dissolved Sulphate vs. Water Elevation

QU11-05 D is nested down dip/gradient from the RBP PAG-CCR storage facility in the #1 coal seam, outside of the mine workings, and contains dissolved sulphate levels that have steadily increased from 6 mg/L in June 2015, to 135 mg/L in February 2017. These steadily increasing levels indicate water transport from either the RBP, 2 North workings, 5-South workings or a combination of all three. Another parameter that has shown a steep increase concurrent with

sulphate from June 2015 to February 2017 is sulphide as H_2S. The high depth of this well along with low dissolved oxygen indicates a favourable location to have high sulphide concentrations. It is important to note that water levels have generally risen in both the RBP and 2-North throughout these parameter increases although seasonal fluctuations and dewatering efforts have lowered the water levels at times.

QU11-05 S, nested stratigraphically above, but down gradient/dip from the RBP, has reported results that were still low, but elevated compared to other 2-North wells. The increases in sulphate concentrations occur as autumn precipitation bring large quantities of water to the mine site and water levels underground rise. The fluctuations aren't completely proportionate to underground water levels in either the RBP or 2-North mine pool; however, they provide some evidence that there is hydraulic conductivity or migration of groundwater across the stratigraphy.

QU11-09 S is a well nested in the stratigraphy directly above the RBP in-situ monitoring well, QU1109-M. Prior to 2015, sulphate concentrations at this well have ranged from approximately 20-50 mg/L when water levels were low in the PAG-CCR storage area below. Since early 2015, sulphate concentrations have fluctuated but have generally increased at this location ranging from 166-540 mg/L. As displayed in Figure 7, sulphate concentrations at QU11-09 S appear to be directly correlated to groundwater elevations in the PAG-CCR storage area. This increase indicates migrating in-situ waters up vertically, likely via the natural hydraulic conductivity of the geology, as well as structural conduits (fault and joint planes) encountered during mining. Based on observations, these increases occur when groundwater elevation in the well below rise above 181-185 MASL, the elevation at which the lithology transitions into the sandstone that hosts QU11-09 S. It can also be inferred that water migrating to this well is sourced from above the 5-South mine. See Figure 8 for groundwater migration paths (Lorax, 2011).

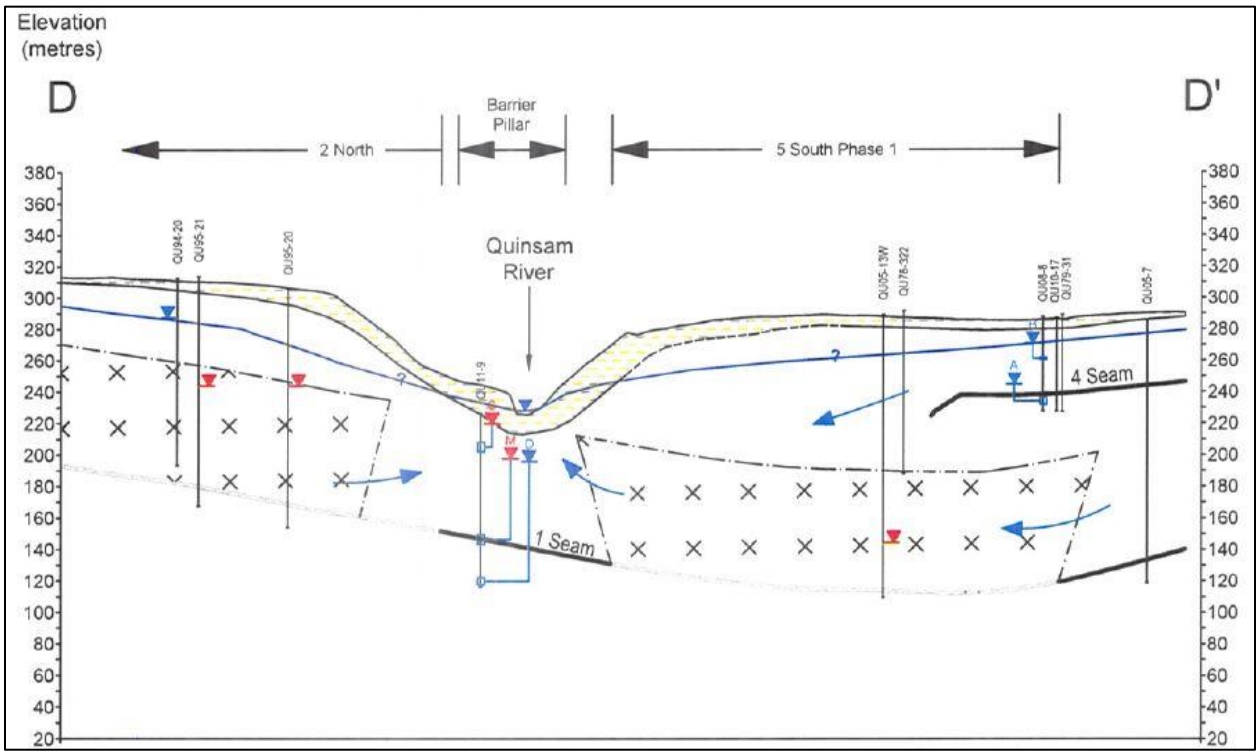


Figure 8: Groundwater Transport in RBP and Vicinity

Following the completion of the 8-Mains plugs (engineering control established to eliminate unnatural mixing of groundwater accumulated in the 5-South side of the mine, and the 2-North side of the mine) in February of 2014, the water levels in 5-South began to rise, increasing the hydraulic head pressure on the groundwater stored in 5-South and RBP. It is assumed that as the water level rose, the pressure on the groundwater flow path was increased, as shown by the increase of sulphate levels in QU11-09 S.

4.2.3 North Mining Area Plant Monitoring Wells

Two nested monitoring wells (MW00-6 and MW00-1) are located in the peripheries of a catchment drainage ditch located below the coal processing plant (CPP) and the clean coal pad. Both wells contain a “shallow” and “deep” groundwater intercept nested at different depths of the overburden till layer as shown in Appendix C.

Noted in the well installation completion log for MW00-1 (D&S), the ‘Shallow’ well was nested in a layer of the till that contained a larger percentage of cobbles and coarse gravels compared to the finer grained gravelly sands and clay materials noted surrounding the ‘Deep’ well. This is important to note, as observations made in the shallow groundwater wells compared to the deep wells include more conductive water that is higher in alkalinity and exhibits elevated concentrations of dissolved sulphate. This leads to the assumption that the shallow wells are getting direct communication from the CPP and clean coal pad via the aforementioned catchment drainage ditch, while the deeper wells are isolated from that groundwater due to some other control, possibly geologic control based on grain size differences in the till. However, while the differences between the groundwater results from the shallow and deep wells are obvious, any difference between the host till of the shallow and deep well located at MW00-6 were not noted in the completion log, and therefore cannot be easily explained by geologic control. MW00-1 D is nested significantly deeper in the till at 28 metres than MW00-6 D at 14 metres, although this doesn’t seem to affect any trends in the deep well data. Interestingly, MW00-6 is geographically closer (while only 15 metres) to the plant ditch and coal pad where all parameters should be observed in higher concentrations.

Historically, MW00-1 S displayed slightly acidic conditions, with the pH falling just below 6.4 on most occasions, while MW00-6 S was generally neutral. The deeper wells are more alkaline with pH ranging from 8.3-9.5. MW00-1 S displayed the highest concentrations of dissolved sulphate, hardness, iron, manganese and other constituents. The deeper wells (MW00-1 D and MW00-6 D) have low concentrations of metals and sulphate with alkaline pH and low conductivity. Since January of 2013, regardless of the variation of precipitation throughout the year, the groundwater maintains its natural path through the clean coal pad and its surroundings, into the ditch, and through the till substrates.

Consistent with past years, dissolved arsenic (Figure 9), aluminum and zinc are found in greater concentrations in the deeper wells than the shallow wells but remain at moderate concentrations and below CSR-AW standards. The main concern and objective of these wells is to intercept plant stockpile water to trace effects the coal pad may have near Middle Quinsam Lake.

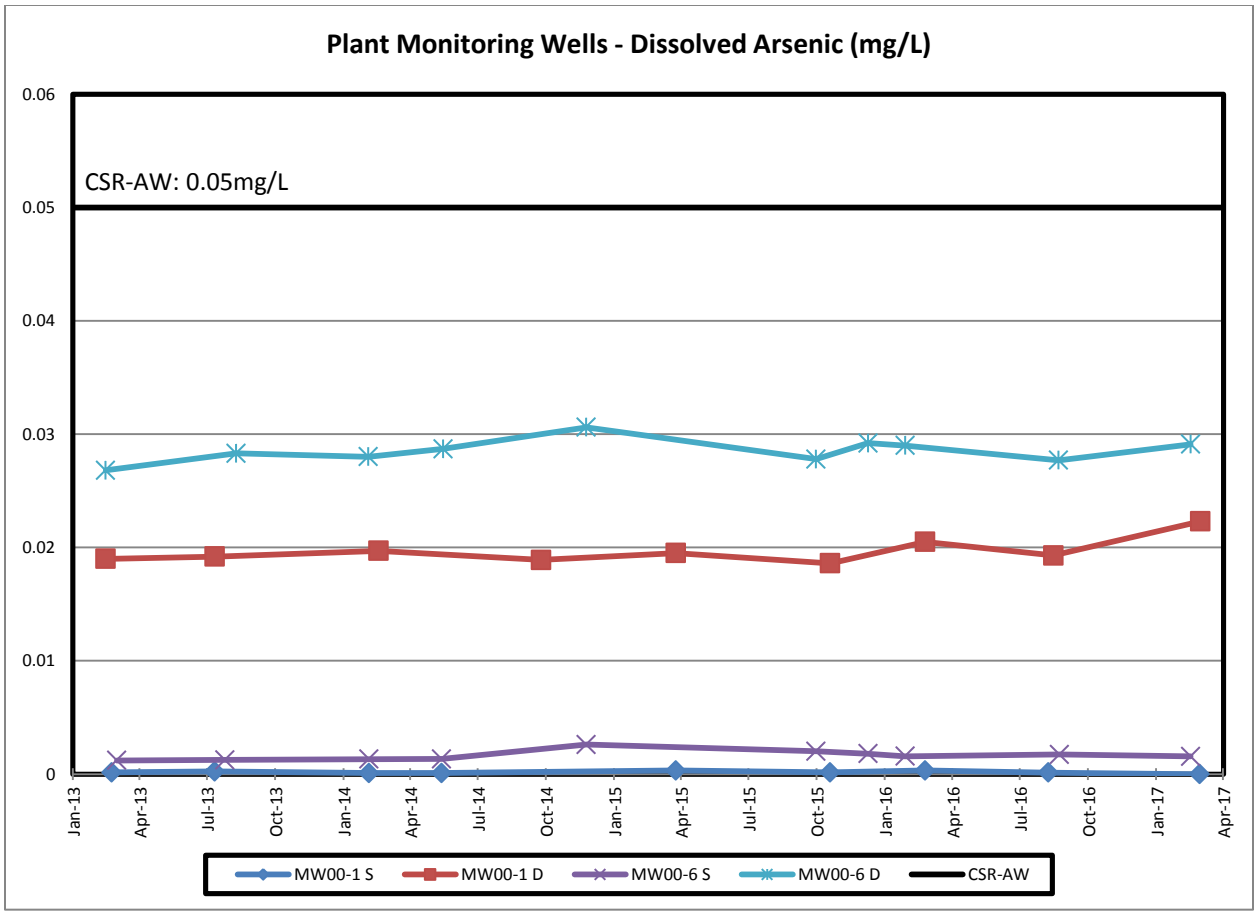


Figure 9: Plant Monitoring Wells – Dissolved Arsenic

Dissolved sulphate levels (Figure 10) in MW00-1 S exhibit a decreasing trend since mid-2013 with some apparent seasonal variation showing higher concentrations of sulphate throughout the drier season and lower concentrations through the rainy season. More sampling throughout different seasons is necessary to verify this observation. Concentrations through the three samples obtained during this reporting period ranged from 644-977 mg/L. It is to be noted that the concentration of 644 mg/L is the lowest value reported in the last four years. Dissolved sulphate concentrations at MW00-6 S have shown an obvious decrease over the last four years with little seasonal variation. This decrease indicates that the improved water management practices implemented have had positive effects on local groundwater as seepage from tailings have not been transported across the plant ditch into the 2N PAG-CCR storage facility.

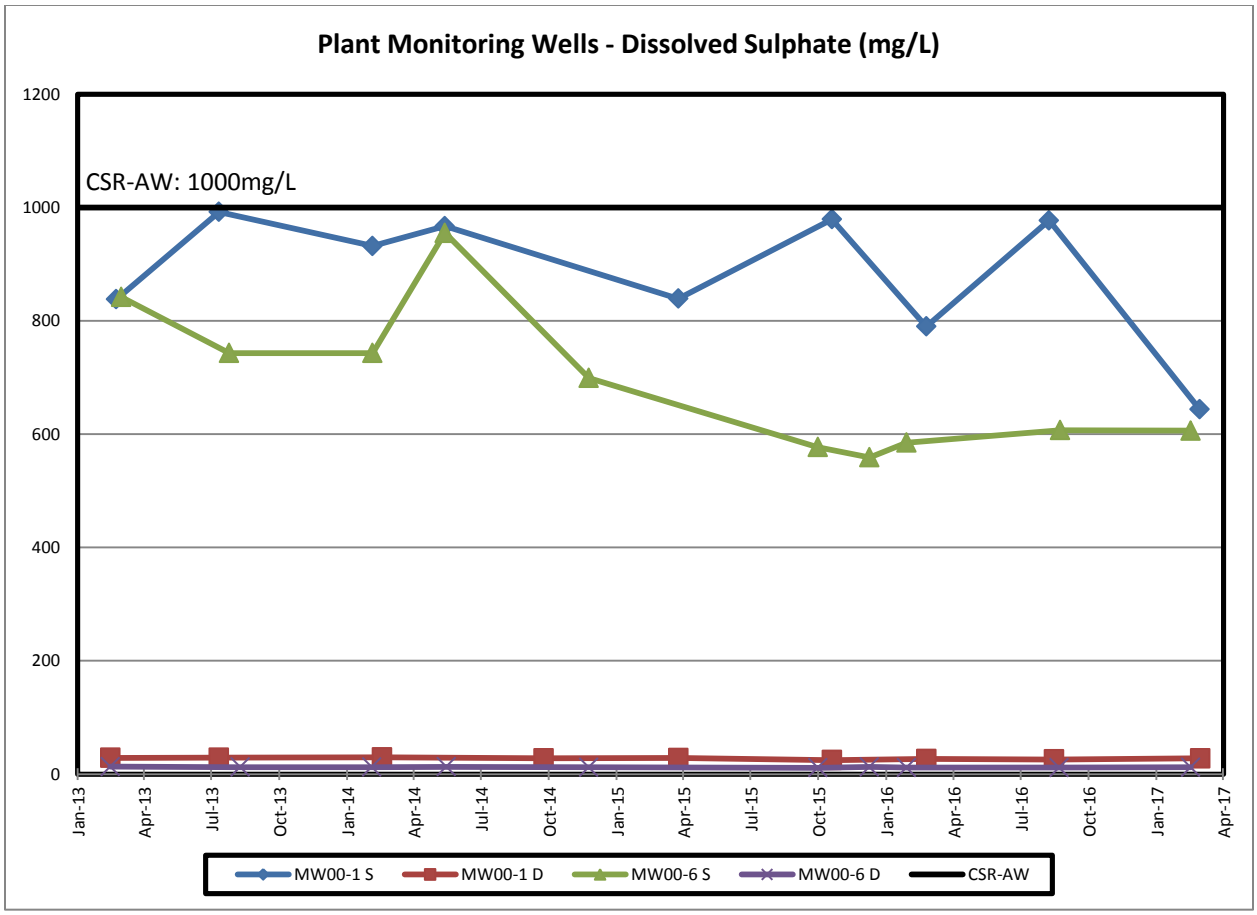


Figure 10: Plant Monitoring Wells – Dissolved Sulphate

The Quinsam Coal Environmental Department is currently assessing this area of groundwater monitoring, considering the possibility of eliminating one of these monitoring wells (due to similar parameter trends) and re-establishing a groundwater monitoring site closer to the southern drainage of the CPP and the clean coal pad.

4.2.4 5-South Mine Void

The 5-South mine void is an area of the 2-North/5-South mine located on the south side of the Quinsam River. Once retreat mining was completed in this section, the workings were isolated from the 2-North mine workings via an engineered "plug" that does not allow in-situ water to interact. The mine was allowed to flood to a specific elevation which roughly correlates with 17 crosscut (17xc) of the 5-South workings. One of the sampling locations for this mine pool is

labeled 5SXC where Quinsam personnel obtain this sample underground. The other sampling location is at the end of a discharge pipe that directs water from 17xc to Settling Pond #1 via a pumping system triggered by water elevation. As they represent near identical water, they have been merged to obtain annual averages for comparison to source terms.

Table 9 below displays the predicted results of the expected and worst case concentrations of the flooded 5-South mine pool water, as defined by Lorax, compared to the average results obtained from the 2016-2017 sampling events. Appendix B, Table 10 represents the full water quality results for this area from 2016-2017.

The results were obtained from eight samples, two of which were taken directly from the mine pool within 5-South, and 6 that were from the discharge point of the water being pumped from 5-South to surface. As shown in Table 9 below, no dissolved metals have exceeded the 'worst case' predictions, which differ from last year, when zinc and copper exceeded. However, results from this monitoring period align with past reporting years in which all parameters monitored were below the 'worst case' predictions.

A notable discrepancy when comparing expected parameter concentrations to observed concentrations involved dissolved iron. Half of the results were far below expected values while the other half reported below detection limits. The believed explanation for these low results is associated with sampling technique as it differs from collection methods of other sites. All groundwater samples collected on site are filtered and preserved immediately after filling the sample bottles. With the 5-South samples, bottles are shipped to the laboratory where filtering and preservation occurs multiple days later. As dissolved iron is a redox sensitive parameter, it is conceivable that dissolved iron present at the time of collection oxidizes and converts to particulate that cannot pass through the filter at the laboratory. To further support this theory, samples on March 29th 2017 were obtained at the discharge pipe from 5-South (5SMW) using two collection methods. One sample was collected unfiltered and unpreserved for metals while the other sample was filtered immediately and preserved. Results for the unfiltered sample correlated with samples obtained throughout the year while the filtered sample gave results that were more in-line with predictions. The iron result for the unfiltered sample was 0.0141 mg/L while the filtered result was 8.79 mg/L; 623 times greater. Going forwards, on-site practice has

been adapted to obtain the most accurate results; all samples will be filtered and preserved on the day that the sample was obtained.

Table 9: Source Terms Comparison for 5-South Mine Water

Parameters	5S Mine Void		5SXC/5SMW	Results obtained from 5 samples
	Expected	Worst Case	Annual Average	
Alkalinity ($CaCO_3$)	282		256	Below Expected
Fluoride (F)	0.71	1	0.17	Below Expected
Sulphate (SO_4)	396	1990	437	Above Expected
Aluminum (Al)	0.02	0.05	0.009	Below Expected
Arsenic (As)	0.069	0.069	0.0002	Below Expected
Boron (B)	0.707	1.88	1.02	Above Expected
Cadmium (Cd)	0.00001	0.00017	0.00001	At Expected
Cobalt (Co)	0.005	0.148	0.0129	Above Expected
Copper (Cu)	0.001	0.001	0.0004	Below Expected
Iron (Fe)	0.805	19.1	0.0239	Below Expected
Manganese (Mn)	0.136	1.3	0.340	Above Expected
Nickel (Ni)	0.007	0.213	0.023	Above Expected
Selenium (Se)	0.0001	0.001	0.0001	At Expected
Zinc (Zn)	0.008	0.014	0.006	Below Expected

4.2.5 7-South

4.2.5.1 7-South Mine with PAG-CCR

Area 2 of the 7-South mine is being used as a sub-aqueous PAG-CCR storage facility for waste material produced by the mechanical processing (crushing and floatation) of the 7-South raw coal product. Storage of this PAG-CCR commenced March 12, 2015, and has subsequently flooded due to natural groundwater infiltration. The in-situ flooded water in this area has been monitored using well QU14-10, with 15 sampling events taking place during this monitoring period. The 7-South mine void water will continue to be monitored following completion of mining and subsequent subaqueous disposal of PAG-CCR.

Lorax predicted Source Term concentrations, which are provided in Mine Permit (C-172) Amendment; 7-South Development Volume 3 Appendix J. Lorax outlined three scenarios in which results would vary, which are, in summary:

> Scenario 1: Water quality based on the CCR that is being stored, having been given enough time on surface (greater than 2 years) to become acidic, prior to being flooded.
> Scenario 2: Water quality based on the CCR being stored less than 2 years since being produced, which would not be acidic.
> Scenario 3: Expected long term water quality concentrations following the complete dissolution of stored oxidation products and the influenced mine water being completely discharged from the mine, or re-stabilized as metal sulphides within the flooded workings.

Table 10 displays the Source Term expectations for Scenario 2 and 3 (omitting Scenario 1 as PAG-CCR was stored and flooded in less than the predicted two years for the PAG-CCR to become acidic), as well as the average results for the sampling events of 2016. Average concentrations calculated are then compared to scenario 2 as they are most applicable to what is expected during this time frame. As reported in 2015, dissolved boron and sulphate are the only parameters that exceeded expected results during this monitoring period. It is noted that sulphate, arsenic, copper, iron, manganese and nickel have higher average concentrations this reporting period compared to 2015. It is likely that these parameters continue to climb in concentration and approach the expected values stated in scenario 2. Although not a parameter of interest, the water in the flooded 7-South workings is very hard, higher than any other well on site. Hardness levels averaged 2085 mg/L, indicating a strong influence from calcium and magnesium carbonates, likely found interstitially in the sandstone that is a large constituent in the 7-South coarse coal reject.

Table 10: Source Terms Comparison for 7-South with PAG-CCR

Parameters	Scenario 2 (CCR not acidic) Expected Values	Scenario 3 (Long term chemistry)	Average Results from Q14-10	Results obtained-compared to Scen. 2
Fluoride (F)	0.6	0.1	0.19	Below Expected
Sulphate (SO_4)	1260	22	1817	Above Expected
Aluminum (Al)	0.009	0.005	0.005	Below Expected
Arsenic (As)	0.19	0.099	0.0697	Below Expected
Boron (B)	0.98	0.13	1.12	Above Expected
Cadmium (Cd)	0.0002	0.000012	<0.000005	Below Expected
Cobalt (Co)	0.062	0.0003	0.0041	Below Expected
Copper (Cu)	0.001	0.0002	0.00031	Below Expected
Iron (Fe)	6.705	0.015	1.12	Below Expected
Manganese (Mn)	2.885	0.08	1.40	Below Expected
Nickel (Ni)	0.122	0.0009	0.0136	Below Expected
Selenium (Se)	0.004	0.0001	<0.0001	Below Expected
Zinc (Zn)	0.088	0.004	0.0079	Below Expected

All units are in mg/L

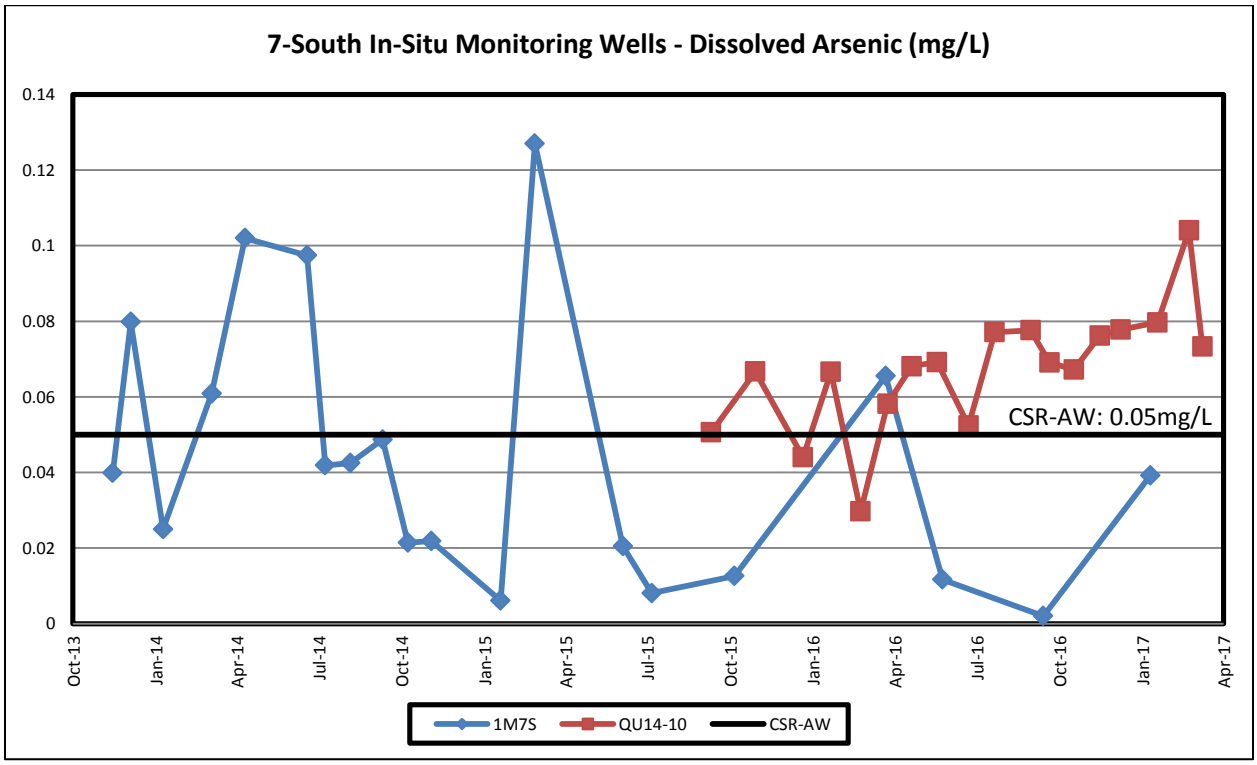


Figure 11: 7-South In-Situ Monitoring Wells - Dissolved Arsenic

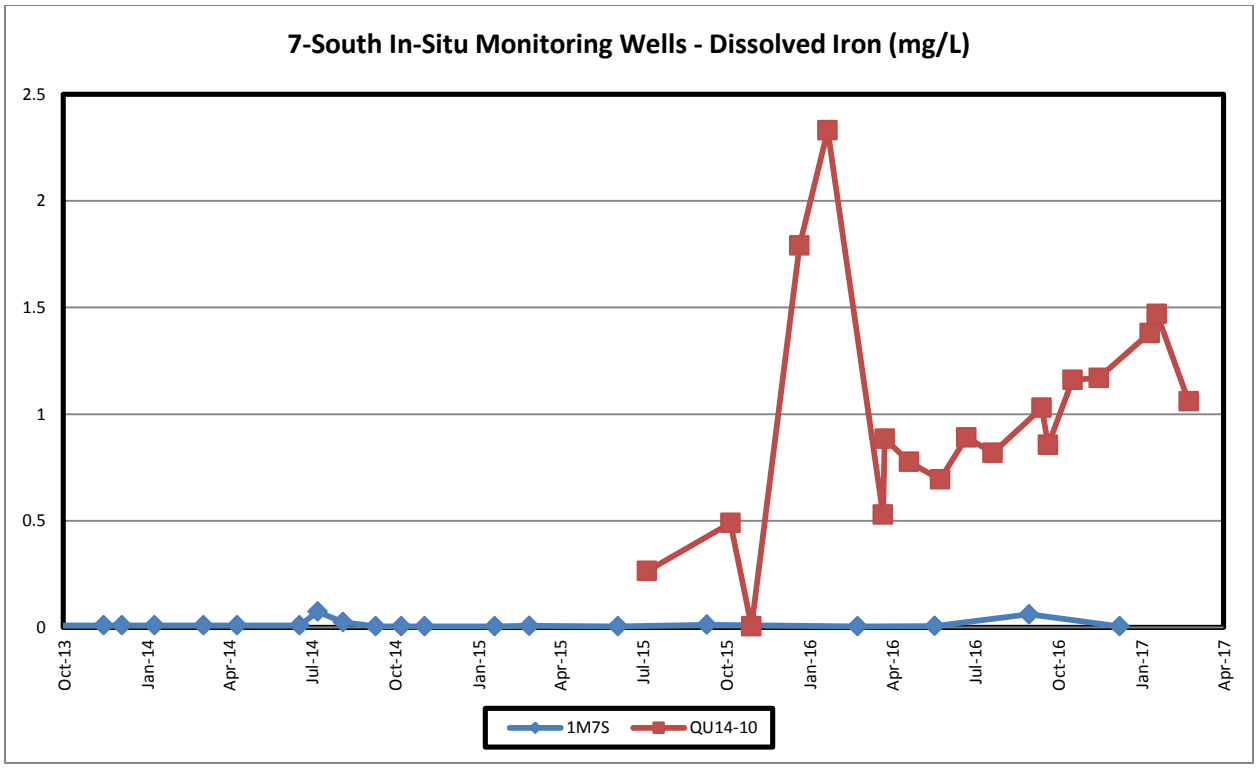


Figure 12: 7-South In-Situ Monitoring Wells - Dissolved Iron

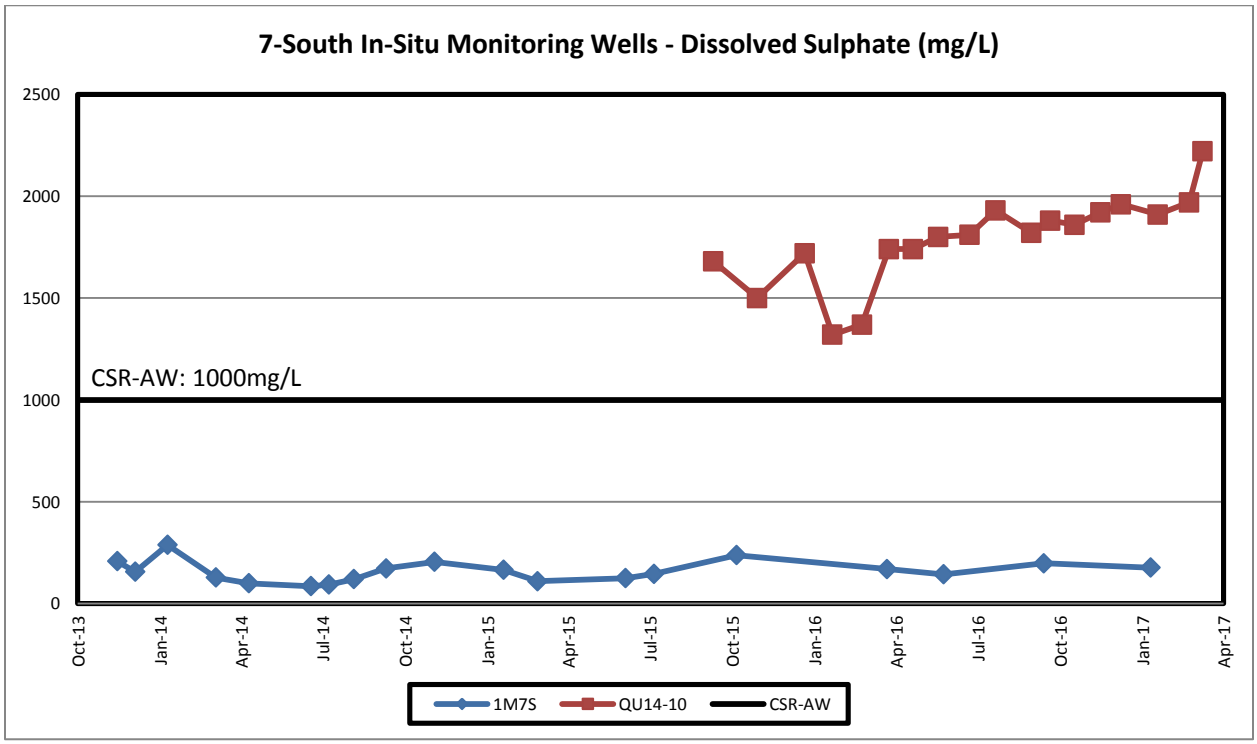


Figure 13: 7-South In-Situ Monitoring Wells - Dissolved Sulphate

4.2.5.2 7-South Underground Sump

Water chemistry in the 7-South mine pool was monitored via sump sampling in 1 Mains (1M7S). Samples from 1M7S exhibit low and consistent levels of dissolved sulphate, dissolved iron, and sulphide as H_2S, with average values of 172 mg/L, 0.02 mg/L, and 0.008 mg/L respectively during this monitoring period. Dissolved arsenic, however, has shown fluctuations since monitoring has been established, with the higher concentrations observed throughout the winter, likely attributed to high groundwater infiltration through sandstone. These inconsistent arsenic values may be attributed to variable amounts of water either pumped into or out of this sump for mining purposes.

Sulphide as H_2S in the 7-South mine pool has shown a distinct change from 2014 into 2015 where levels never exceeded the laboratory detection levels for the first eight sampling events. Results after late 2014 have still been quite low with minor variations that may be attributed to seasonal variations or usage of the sump water.

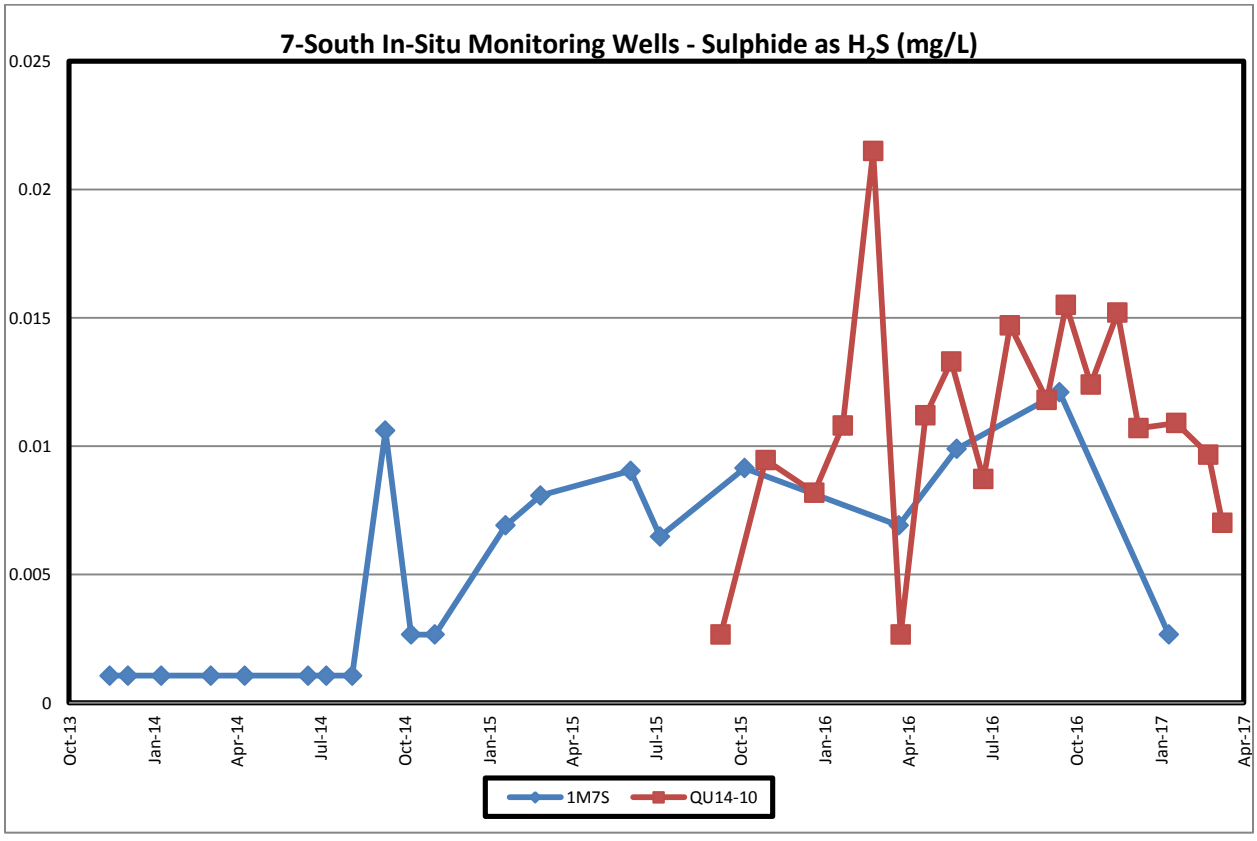


Figure 14: 7-South In-Situ Monitoring Wells - Sulphide as H_2S

4.2.5.3 7-South Ex-Situ

The primary focus of the 7-South ex-situ groundwater monitoring is to evaluate water flowing from Area 2 (permanent PAG CCR storage location) towards the Quinsam River; monitoring wells QU08-13 A and B satisfy this consideration. In addition to monitoring seepages from Area 2, monitoring well QU08-10 is situated to intercept any stockpile seepage/drainage from the raw coal pad. This well is located adjacent to the Area 4 development on the North side of the Long Lake fault, and is nested in the #4 coal zone.

The No. 4 coal zone at 7-South is hosted within the Dunsmuir Member sandstones of the Comox Formation, which is naturally elevated in arsenic and fluoride. On average, the highest concentration of arsenic in the current Quinsam Coal monitoring regime is found in the 7-South area. The northern limit of the 7-South underground mine workings is limited by the location of a normal fault called the Overlook Fault, which displaces the #4 coal zone vertically by 14 metres. The Overlook Fault defines the groundwater flow path between the 7-South mine, and the monitoring wells QU08-13 A and B. Well QU08-13 A monitors groundwater traveling down-gradient from the 7-South workings, within the #4 coal zone, at 52 metres depth. QU08-13 B monitors groundwater higher up in the stratigraphic column at the glacial till overburden/sandstone contact at 26 metres depth, effectively monitoring groundwater that would be migrating up through the stratigraphy towards the Quinsam River. This groundwater is suspected to follow a different flow path at the down gradient northern extent of the 7-South mine than other groundwater in the area (Lorax, 2011). Lorax has described this well as significantly sodium enriched with circum-neutral pH. The groundwater is anoxic with mild to moderate reducing conditions.

Starting March 12, 2015 PAG-CCR from the processing of 7-South raw coal was transported from the Quinsam Coal Preparation Plant to the 7-South Disposal Bin, which delivers PAG-CCR directly onto the underground belt structure for transport into Area 2. Since that date, material has been backfilled, and allowed to naturally flood. The in-situ flooded water in this area has been monitored using well QU14-10, while the ex-situ groundwater has been monitored using the aforementioned wells. Data acquired prior to March 12, 2015 have provided information about baseline conditions, and going forward, these wells will be monitored and compared to historic data, noting any changes and variations in various water quality trending.

Notable observations for the aforementioned wells include:

- Low, stable sulphate concentrations throughout the year, no discernable changes of sulphate levels in QU08-13 B (Figure 15)
- An increase in sulphate concentrations at QU08-10 in late 2014 through late 2015. It's important to note that there was a suspected decrease between those two sampling periods during the dry season that may have not been detected due to sampling schedule. It is believed that elevated concentrations of sulphate may be a direct result of high surface runoff and coal stockpile quantities. Concentrations of sulphate decreased through 2016 when stockpile was diminished.
- A minor increase of sulphate and iron was observed at QU08-13 A in early 2016 as water levels increased over the PAG-CCR in Area 2. These levels did not continue to increase throughout 2016 and will be monitored closely in upcoming sampling events.

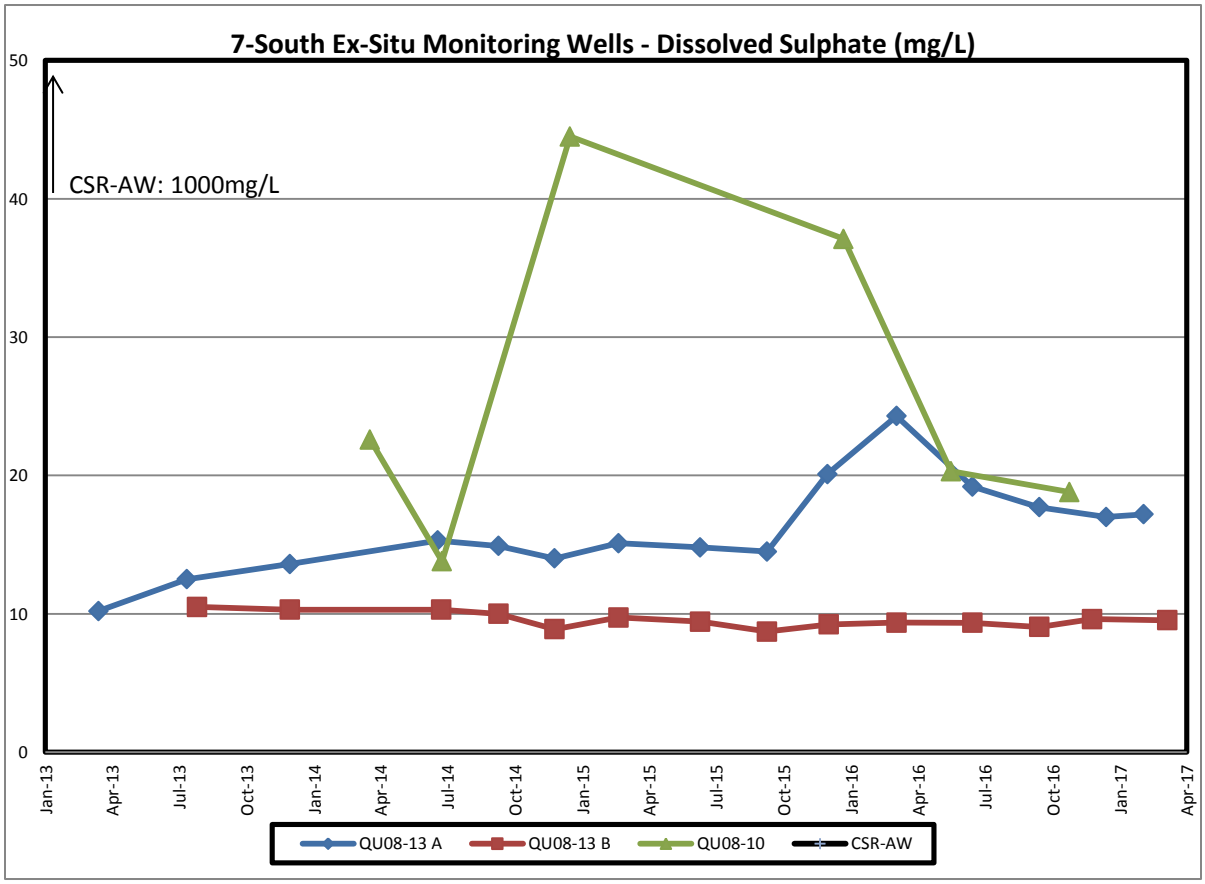


Figure 15: 7-South Ex-Situ Monitoring Wells - Dissolved Sulphate

Dissolved arsenic was above the CSR-AW guideline (0.05 mg/L) in both QU08-13 A and B in all sampling events, with some cyclical change that may be related to local water levels in Area 2 or influx (Figure 16).

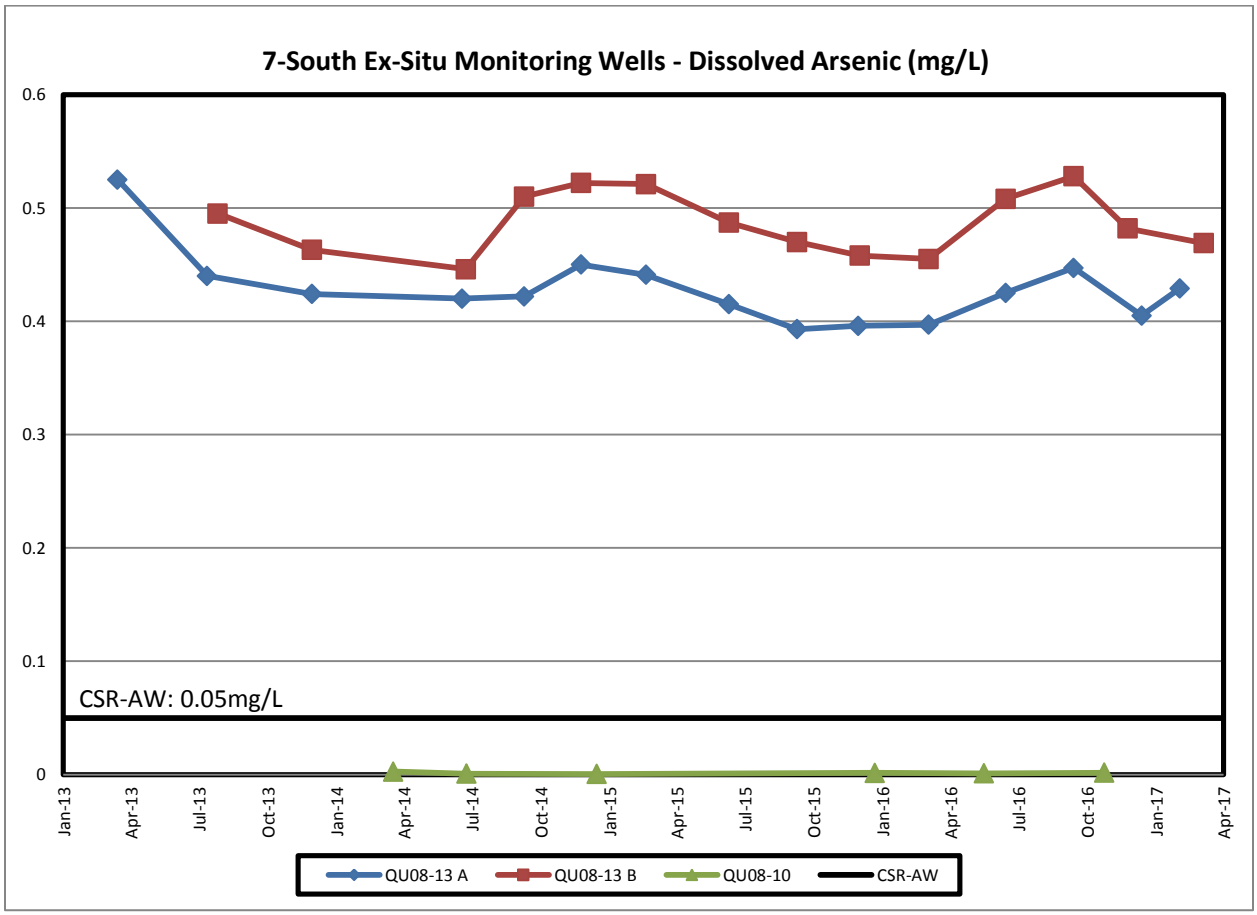


Figure 16: 7S Ex-Situ Monitoring Wells - Dissolved Arsenic

- All results from QU08-10 fall far below CSR-AW standards for dissolved arsenic.
- Sulphide as H_2S, displayed in Figure 17, was above the CSR-AW standards (0.02 mg/L) at QU08-13 A (6/6) sampling events during this reporting period.

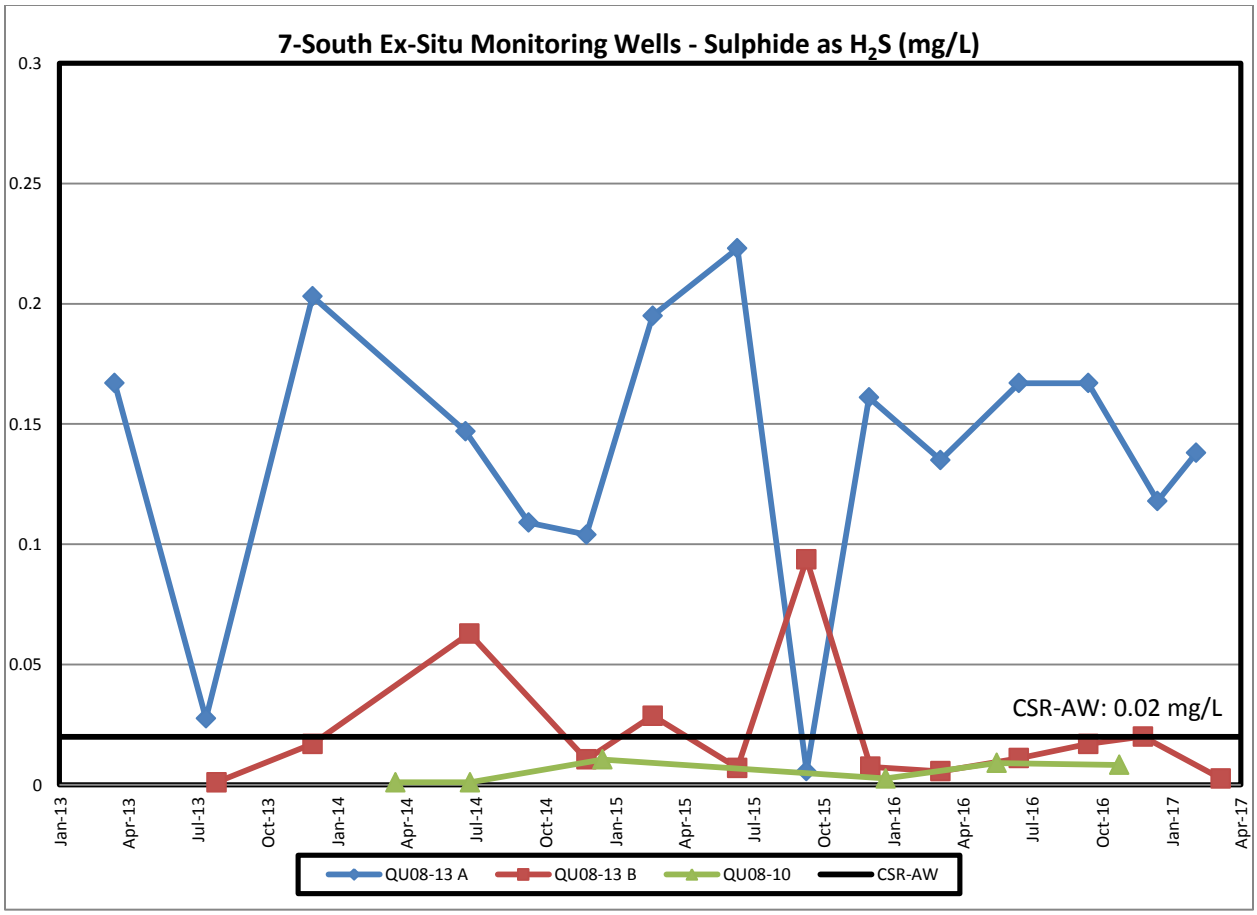


Figure 17: 7S Ex-Situ Monitoring Wells - Sulphide as H_2S

4.2.6 2/3 South Monitoring Wells

4.2.6.1 2/3 South Mine Pool

Monitoring wells MW00-4 and QU11-11 were established for monitoring the 2-South mine pool water quality while QU11-11 is also used for reference for the treatment system influent. 2-South mine pool water enters Long Lake via the Long Lake Seep and is closely related to water monitored at MW00-4. These wells exhibit moderate concentrations of sulphate averaging 304 mg/L and 540 mg/L in this monitoring period. It is noted that both wells are quite stable for sulphate concentrations; however, QU11-11 saw a noticeable decline in sulphate concentrations in late 2016 and will be examined closely in future monitoring (Figure 18). Concentrations of dissolved metals are relatively low in these wells and exhibit neutral pH. Dissolved iron

concentrations do show periodic spikes in well QU11-11 and are typically related to rising mine pool water elevations as flushing of the mine walls encourages a gradational increase in dissolved metals (see Figures 19 & 20). Appendix B, Table 12 represents the monitoring data collected for 2016-17.

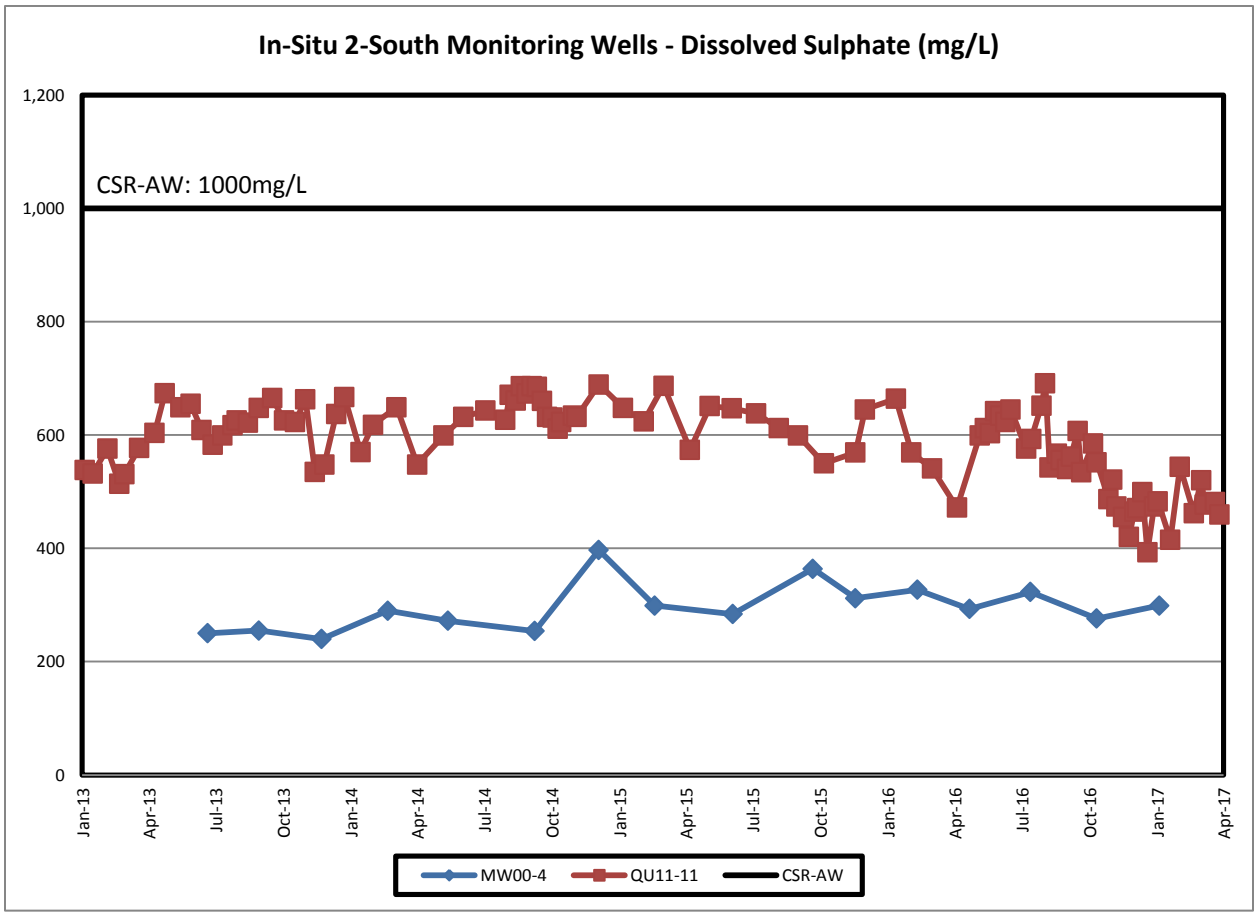


Figure 18: In-Situ 2S Monitoring Wells - Dissolved Sulphate

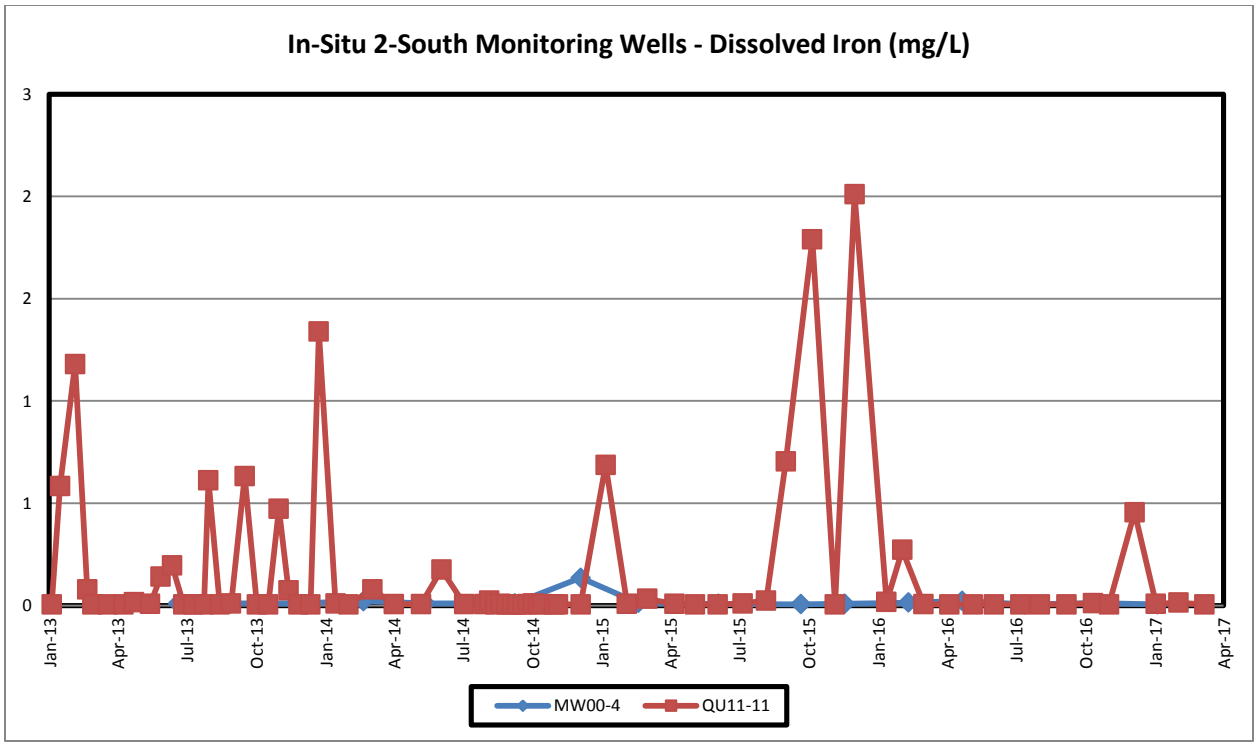


Figure 19: In-situ 2-South Monitoring Wells - Dissolved Iron

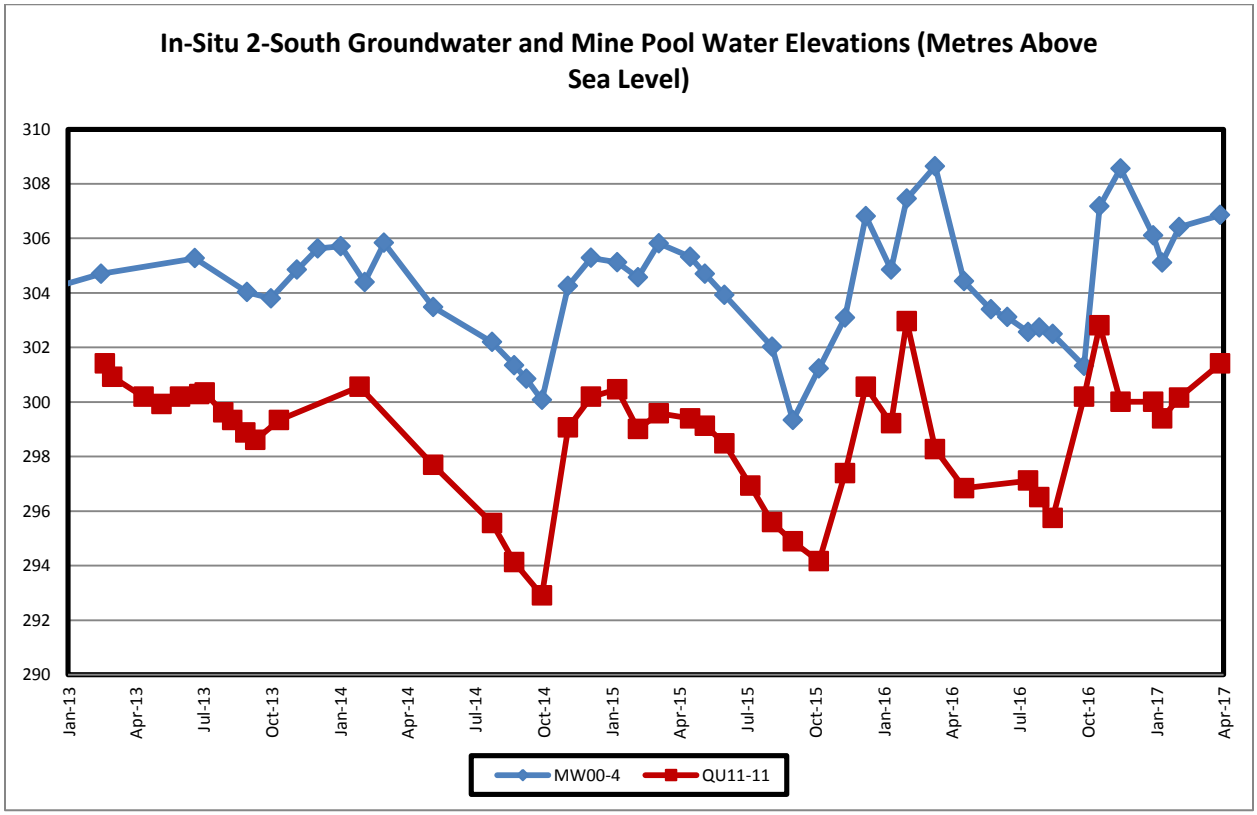


Figure 20: 2-South Groundwater and Mine Pool Water Elevations

4.2.6.2 2/3 South Ex-Situ Wells

Monitoring wells in the 2 and 3-South areas exhibit elevated concentrations of sulphate and sulphide based on their proximity to the 2-South and 3-South PAG-CCR storage facilities and past surface disturbances; open pit and underground mining activities. These wells include MW00-2 located next to the 3-South flooded PAG-CCR Storage Facility as well as MW12-23 and MW12-24 established as wells between the 2-South flooded PAG-CCR Storage Facility and No Name Lake, directly below the reclaimed historic 1-South pit. Dissolved iron, manganese and other dissolved materials are elevated at MW00-2 as it is situated about 5 metres from the 3-South PAG-CCR pond and intercepts the water that flows through the hydraulically conductive till.

While MW00-2 is located to monitor the drainage from the 3-South pit, MW12-23 and 24 are designed to intercept seepage from the reclaimed 1-South pit, the 1-South sump, and the 2-South pit. As evidenced by the dissolved sulphate levels found in these wells, the shallower well MW12-24, intercepts a perched water table, potentially attributed to the reclaimed 1-South pit up gradient, but independent of 2-South groundwater, whereas the deeper well MW12-23, intercepts 2-South seepage groundwater at an elevation approximately 3 metres below the surface water elevation in No Name Lake. Lorax suggests that No Name Lake is a 'losing' lake (i.e., recharging the aquifer at its downstream end). According to initial drill logs during the installation of these monitoring wells, the siltstone bedrock appears very tight in this area with no water bearing features intercepted.

Monitoring wells MW12-23 and MW12-24 (particularly MW12-23) have slow recharging rates, making proper sampling very difficult and often, not feasible. Sampling at MW12-23 occurs over two days; day one involves purging the well and day two involves a low flow sampling technique to obtain water that has formed over a 24 hour period using a portable bladder. While quarterly sampling is required, MW 12-23 is often found to be dry, (especially during the summer) and sampling is not possible. Based on previous efforts and understanding of well recharge, there was a higher success rate of sample collection during this reporting period as compared to previous years. Moving forward, it will be important to monitor recharge rates and

water levels to determine seepage rates from the 2-South PAG-CCR storage pond towards No Name Lake. Appendix B, Table 13 represents the monitoring data collected for 2016-17.

Notable observations in this area include:

- Dissolved sulphate concentrations exceeded the CSR-AW guideline of 1000 mg/L at MW-002 in (5/5) sampling events, averaging 1256 mg/L, as shown in Figure 21. Levels are relatively stable and any trending is unclear
- Sulphate concentrations declined at MW12-23 throughout this monitoring period from 1000 mg/L to 716 mg/L. It is noted that this decrease occurred following reclamation activities within the 1 and 2-South area (refer to the figure below)
- Sulphate concentrations in the more shallow well MW12-24, are substantially lower than in MW12-23 indicating minimal influence from the 2-South PAG-CCR storage facility

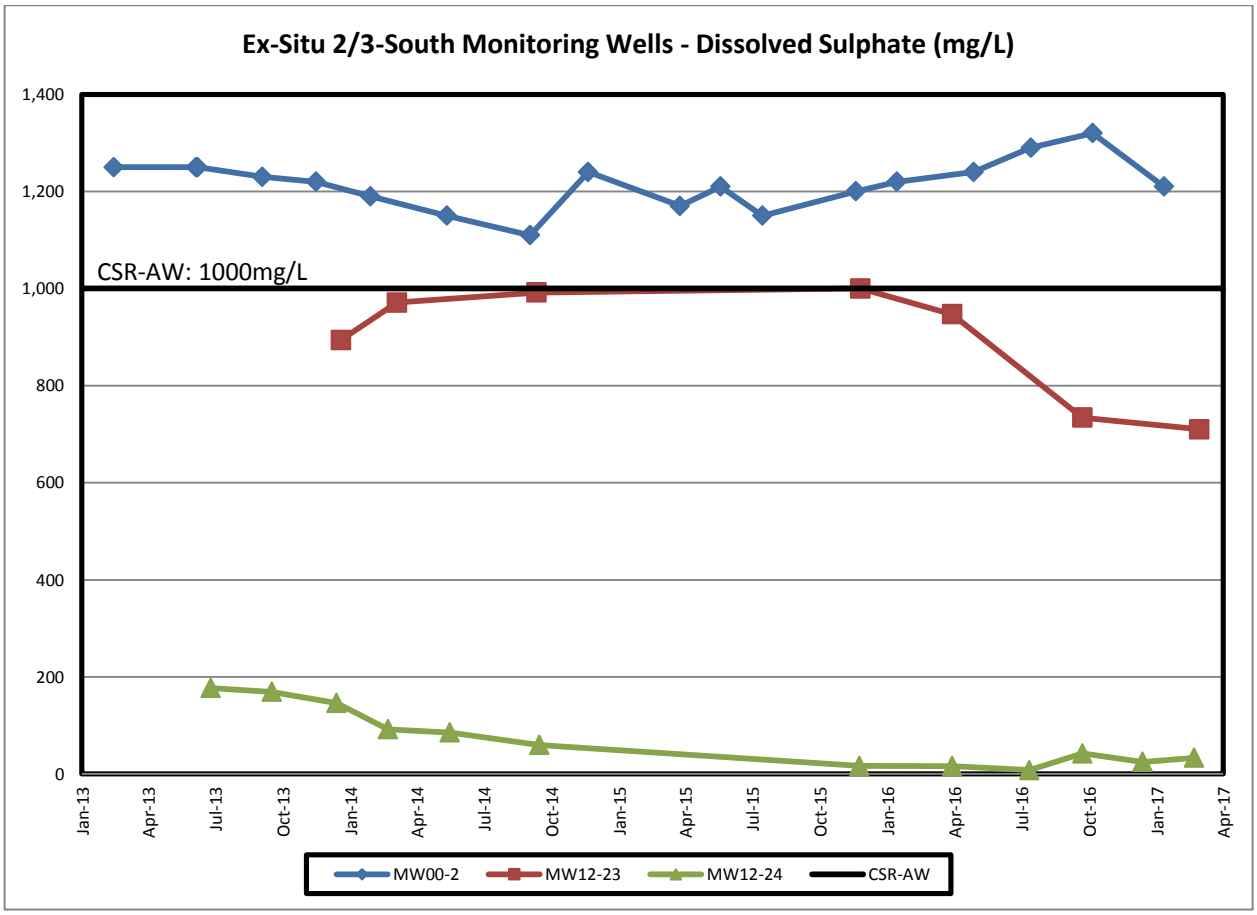


Figure 21: Ex-Situ 2/3 South Monitoring Wells - Dissolved Sulphate

- H_2S levels at MW12-23 and MW12-24 are somewhat erratic and it is difficult to determine the reason for exceedances
- Conductivity was found to be very high in MW00-2 and MW12-23, and moderate in MW12-24, reflecting results of past years.
- Dissolved arsenic is found in stable, low concentrations in the 2-South ex-situ wells.
- Dissolved manganese is elevated in MW00-2 and MW12-23 indicating influence from PAG-CCR storage however levels are declining
- Dissolved iron concentrations are increasing at MW00-2 and have nearly tripled in the past four years (Figure 22).

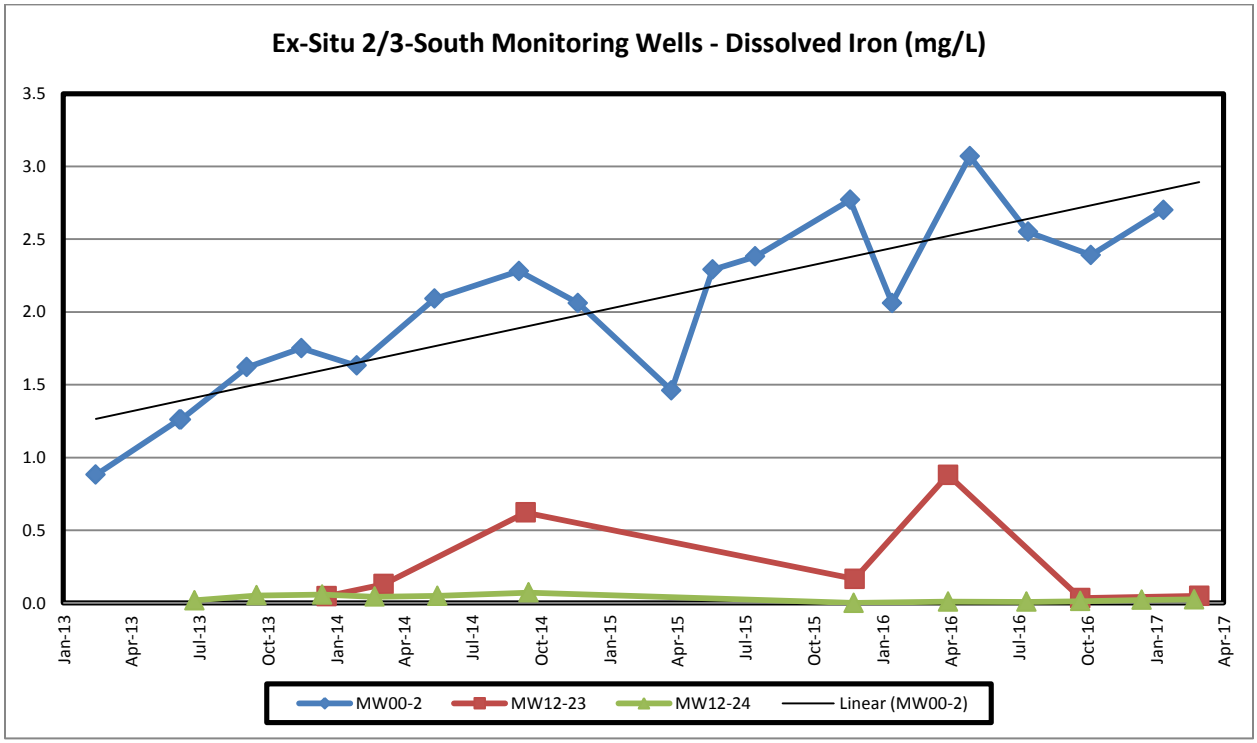


Figure 22: Ex-Situ 2/3 South Monitoring Wells – Dissolved Iron

4.2.7 4-South Mine Area

4.2.7.1 4-South Mine Pool

Predicted mature mine pool source terms were developed for the flooded 4-South mine and are quantified using maximum concentrations measured in QU78-161 and QU11-01. The 4-South mine pool chemistry indicates that the mine water has evolved into a mature state and can be

used to estimate long term water chemistry. The mine water is expected to be anoxic and contain elevated sulphate, reduced iron and traces of dissolved sulphide, although eventually the mine waters are predicted to display higher pH, alkalinity and lower metal concentrations as iron and other metals are sequestered into sulphide minerals. Values seen this monitoring period are comparable to previous monitoring years and sampling was deemed adequately representative of the mine pool. Table 11 below depicts the maximum concentrations that were used to obtain the predicted source terms from wells QU78-161 and QU11-01. The values stated were the maximum values found for both wells across the four sampling events (two each) during this monitoring period. The only parameters that were above the predicted concentration levels were arsenic, boron and selenium. It is noted that only one value for dissolved selenium exceeded the maximum concentration of 0.0004 mg/L while the other three sampling results were about five times lower than the reported maximum of 0.00052 mg/L. Iron, manganese and sulphate continue to show concentrations that are near predicted values; however, these parameters are generally trending downward.

Table 11: Source Terms Comparison of Flooded 4-South Mine Void Mature Mine Pool

Parameters	Predicted Max. Values	Maximum Values	Results obtained
Alkalinity (as $CaCO_3$)	450	204	Below Predicted
Aluminum (Al)	0.024	0.0186	Below Predicted
Arsenic (As)	0.0924	0.183	Above Predicted
Boron (B)	0.637	1.43	Above Predicted
Cadmium (Cd)	0.000085	<0.0000050	Below Predicted
Cobalt (Co)	0.063	0.00219	Below Predicted
Copper (Cu)	0.0564	<0.00020	Below Predicted
Fluoride (F)	1	0.27	Below Predicted
Iron (Fe)	257	235	Below Predicted
Manganese (Mn)	5.97	4.22	Below Predicted
Selenium (Se)	0.0004	0.00052	Above Predicted
Sulfate (SO_4)	2060	1600	Below Predicted
Zinc (Zn)	0.0712	<0.0050	Below Predicted

According to Lorax, chemical stratification is apparent in this mine pool as the heavily mineralized water remains on the bottom of the water column and the less mineralized water remains in the upper portion due to limited mixing of the water column. Lorax described the

groundwater in this area as having an age affected signature of fluoride and arsenic, directly related to the increased residence time in the groundwater system.

The mine void is “flooded” and water levels in the mine pool show little change as there is no dewatering effort. POI are generally quite stable due to the flooded status of the mine and do not show major fluctuations. It is noted that some POI concentrations are trending downward (iron and sulphate) while arsenic has shown a steady increase since 2013 (Figures 23-26).

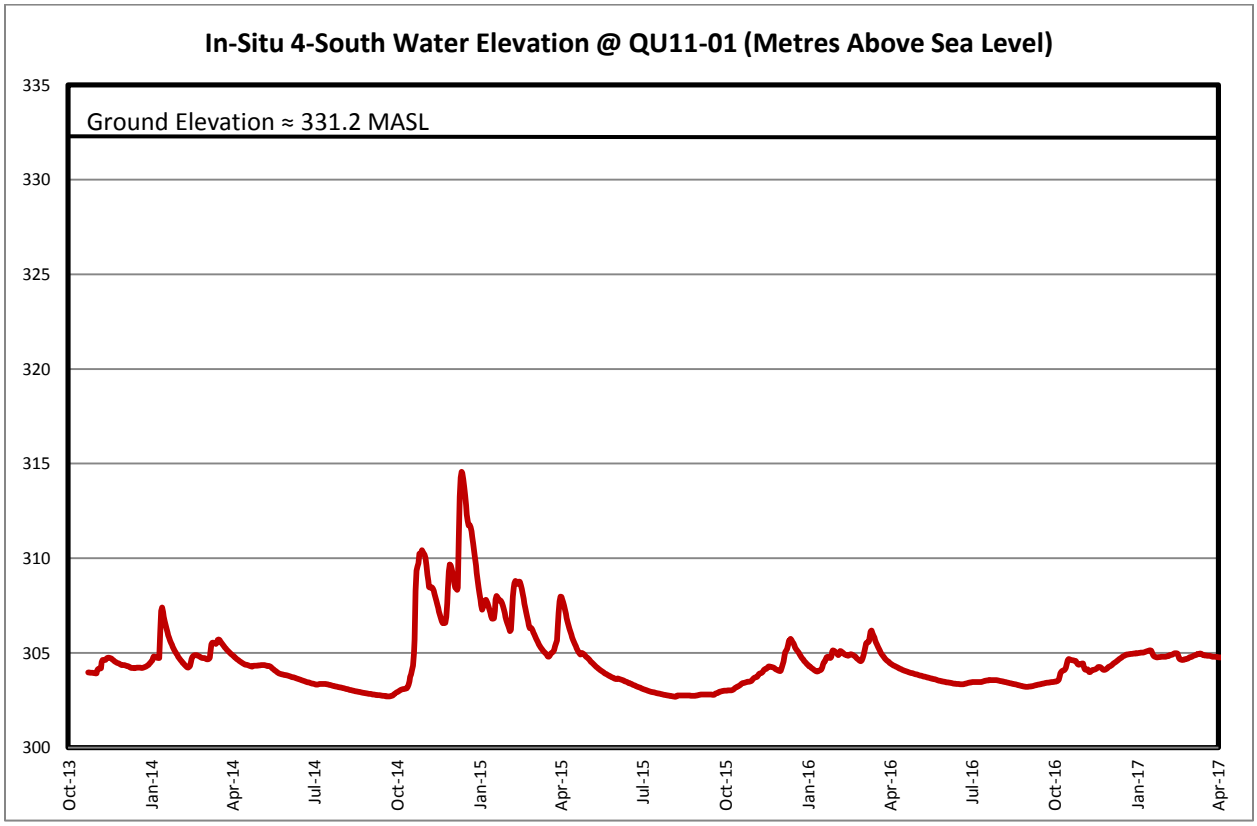


Figure 23: 4-South Mine Pool Water Elevation at QU11-01

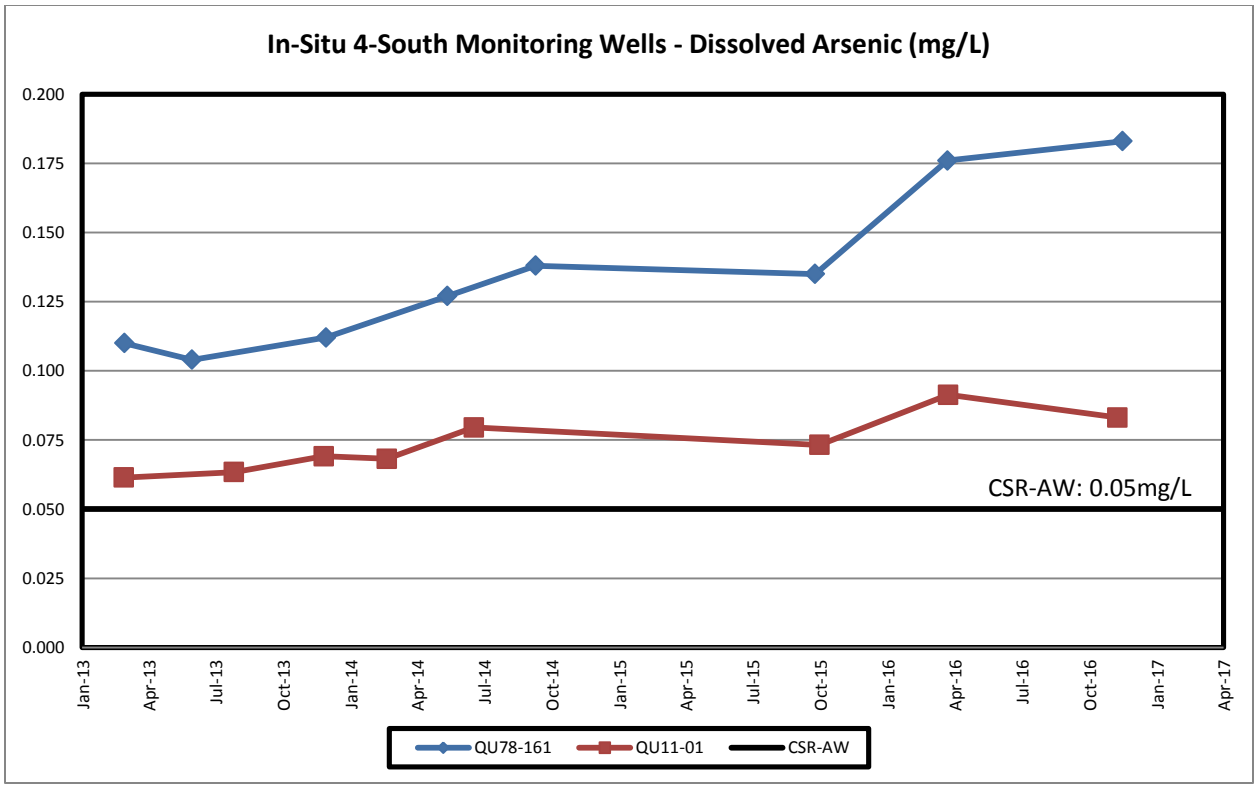


Figure 24: In-Situ 4-South Monitoring Wells - Dissolved Arsenic

The 4-South mine pool is dominated by iron reducing conditions with elevated concentrations of iron and sulphate. The chemical stratification is characterized by the high concentrations of iron and sulphate found at depth in the mine pool. The mine pool water quality has the highest concentration of dissolved iron on the mine site, exhibiting concentrations greater than 200 mg/L at QU11-01. While dissolved iron is elevated, it appears to be steadily decreasing at both sampling locations.

Lorax observed that sulphate has an opposite trend to fluoride; sulphate is found in lowest concentrations in the formation water and highest in the mine pool. Sulphate concentrations are elevated and follow a similar profile to dissolved iron where concentrations have been generally decreasing since 2013. Sulphate concentrations in 2016 were reported at 1470 and 1600 mg/L in QU11-01 and 1410 (x2) and 1450 mg/L in QU78-161 as shown in Figure 26. Fluoride ranged from 0.20 mg/L - 0.27 mg/L in the two wells, which reflects past results of ‘below detection’ when detection levels were 0.4 mg/L.

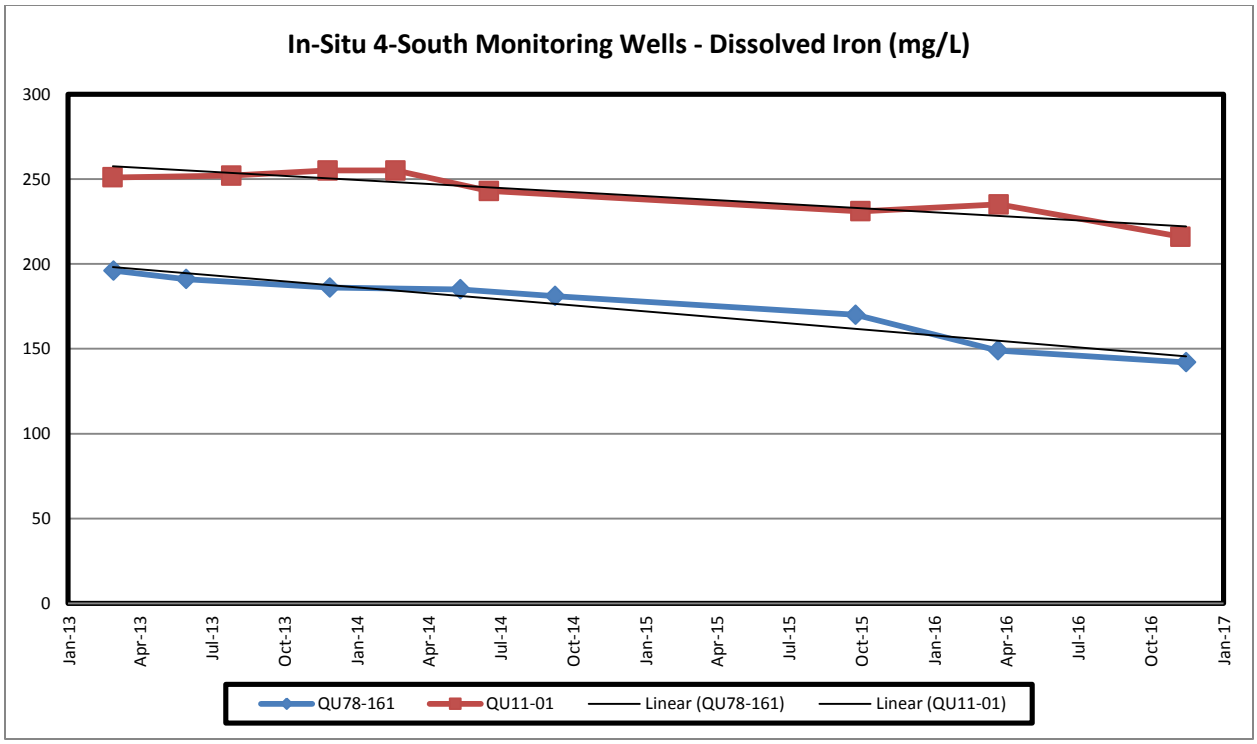


Figure 25: In-Situ 4-South Monitoring Wells - Dissolved Iron

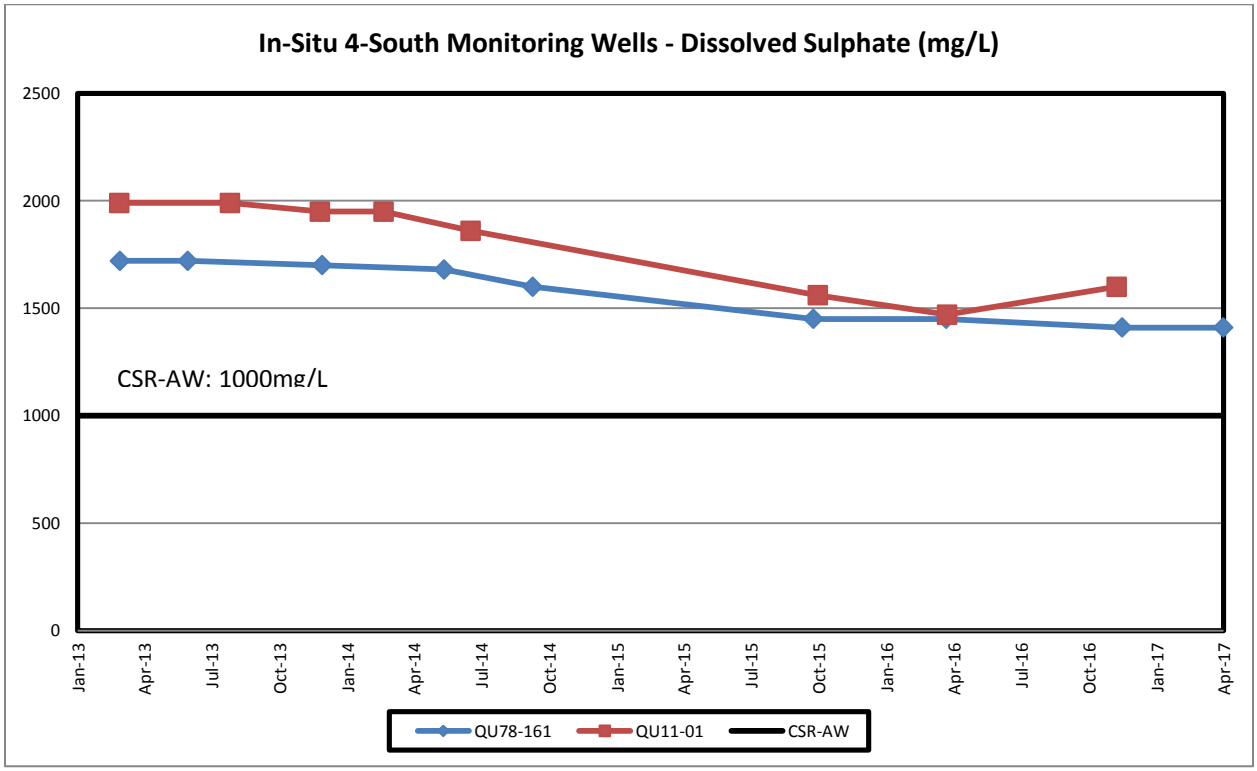


Figure 26: In-Situ 4-South Monitoring Wells - Dissolved Sulphate

As shown in Figure 27, sulphide levels remained stable in 2016 and both wells exhibited near identical concentrations. Appendix B, Table 11 presents the analytical results.

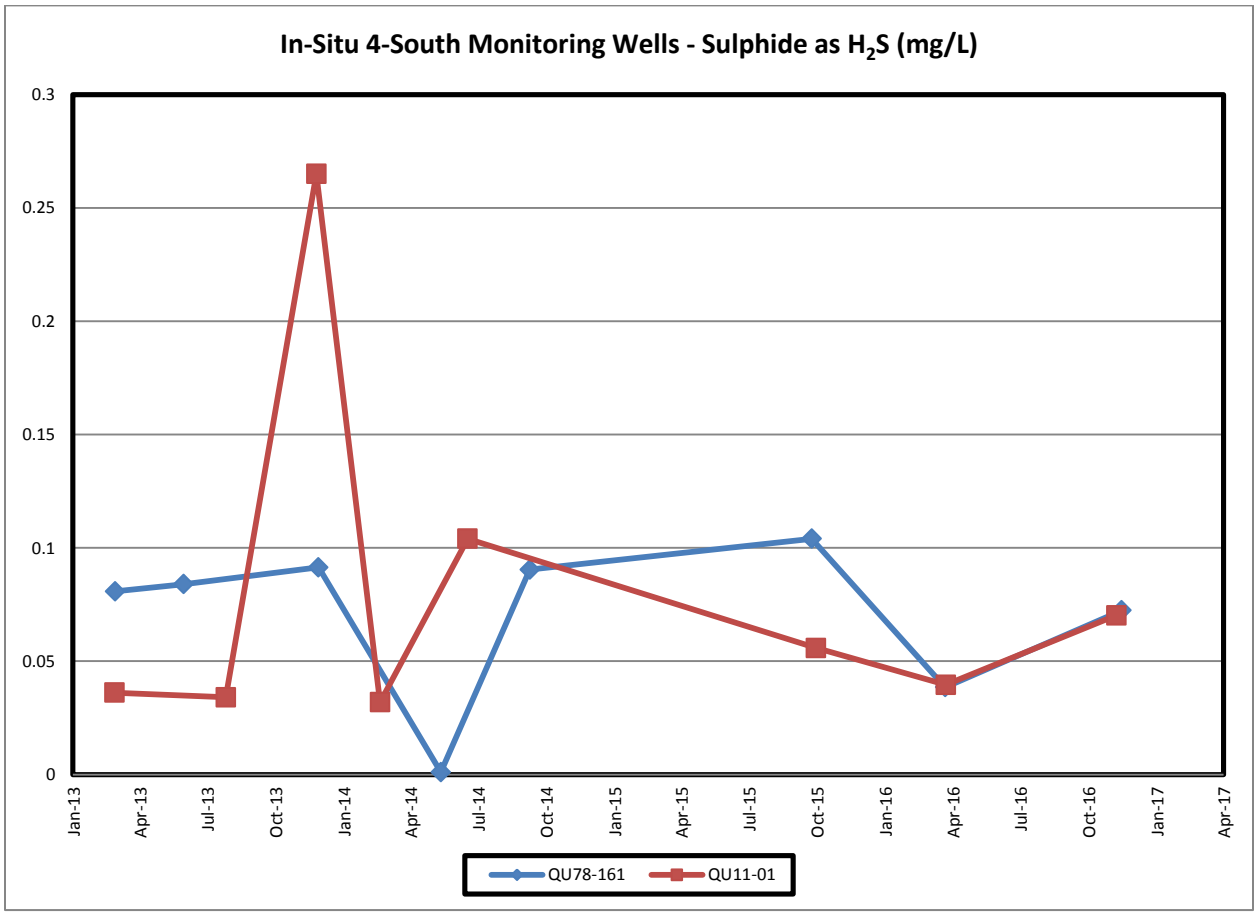


Figure 27: In-Situ 4-South Monitoring Wells – Sulphide as H_2S

4.2.7.2 4-South Ex-Situ Wells

Observations by Lorax of formation water down-gradient of the 4-South mine indicate mine and age-affected signatures suggesting a hydraulic connection between the 4-South mine pool and the down gradient monitoring wells. The hydraulic connection is most obvious at QU10-09 S, and less obvious at QU10-07 D. The strong mine signature in QU10-09 indicates that it is along the flow path of the juvenile mine waters discharging from the upper portion of the 4-South mine workings (Lorax, 2011).

Monitoring wells in this area are focused on four types of water quality:

- QU10-09 (S & D) ex-situ formation waters, outside of existing workings, assess vertical gradients and water quality adjacent to Long Lake
- QU10-07 D ex-situ formation waters; down gradient of existing workings next to the Long Lake Entrance wetland (LLE)
- QU10-08 D ex-situ up gradient of the existing workings; assess water quality immediately up gradient of existing workings
- QU78-161 and QU11-01 in-situ mine pool water; assess 4-South mine pool water quality.

Generally, major ion concentrations highest in the mine pool waters and lowest in the formation groundwater. POI concentrations in and outside the 4-South mine pool are relatively stable, showing some minor trending.

Notable observations include:

- Dissolved arsenic concentrations were elevated above CSR-AW standards (0.05mg/L) at each well for all sampling events, reflecting historic results (Figure 28)

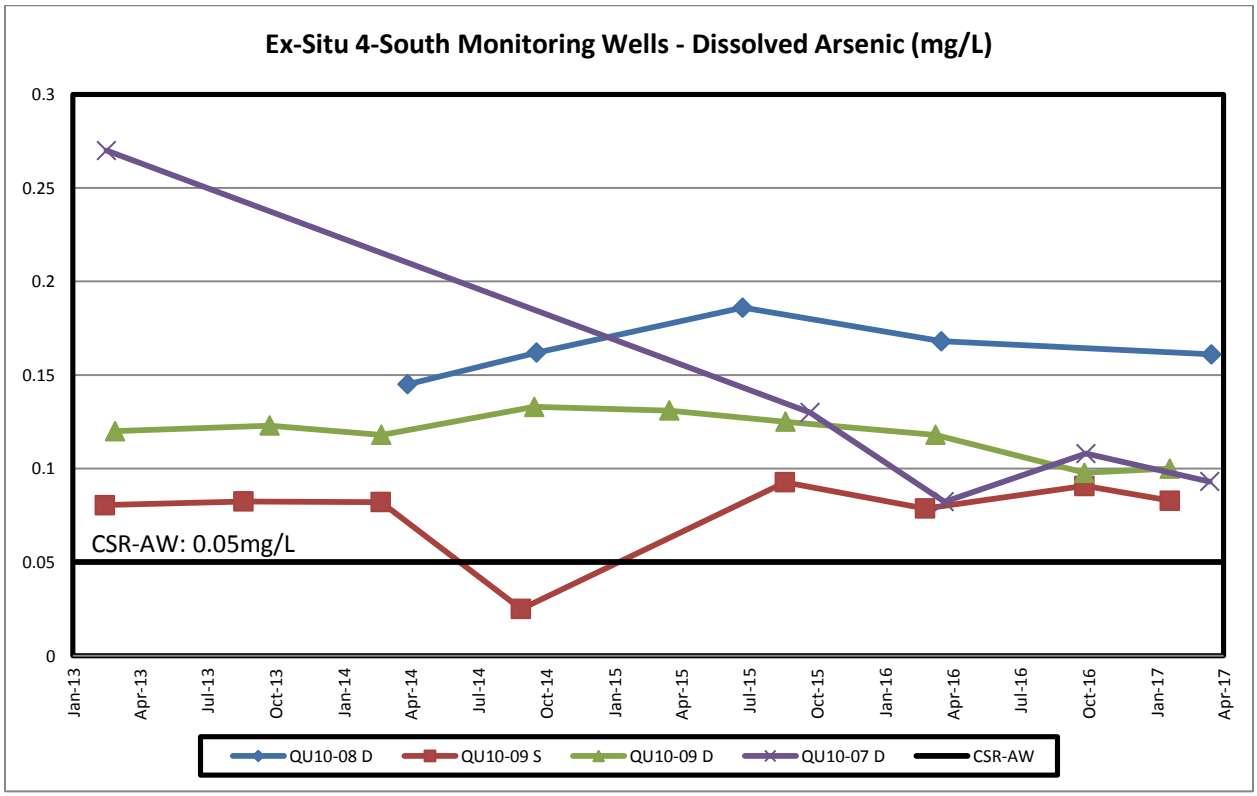


Figure 28: Ex-Situ 4-South Monitoring Wells - Dissolved Arsenic

- Dissolved iron was below 1.0 mg/L in all wells except in QU10-09 S, where the results ranged from 5-6 mg/L
- Dissolved sulphate levels were generally low as observed in the past, especially at QU10-07 D and QU10-08 D
- Dissolved sulphate levels were higher in QU10-09 S/D throughout the monitoring period and shows some signs of seasonal variation (Figure 29)

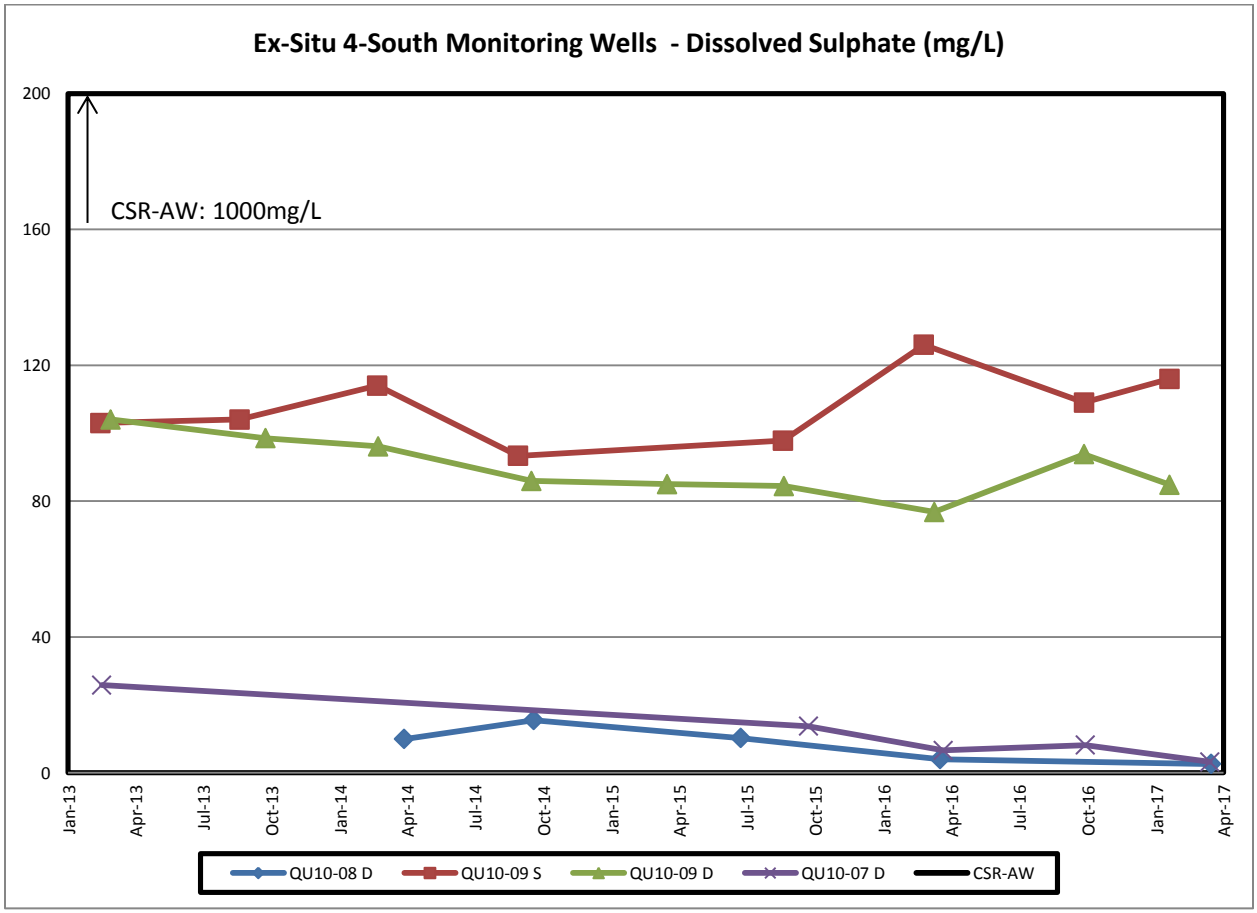


Figure 29: Ex-Situ 4S Monitoring Wells - Dissolved Sulphate

- There were many H_2S standard exceedances throughout this area during this monitoring period. QU10-07 D and QU10-09 D exceeded during all sampling events while QU10-08 D exceeded 1/2 sampling events. QU 10-09 S saw much lower levels than the other wells as it is shallower and contains higher levels of dissolved oxygen (Figure 30).

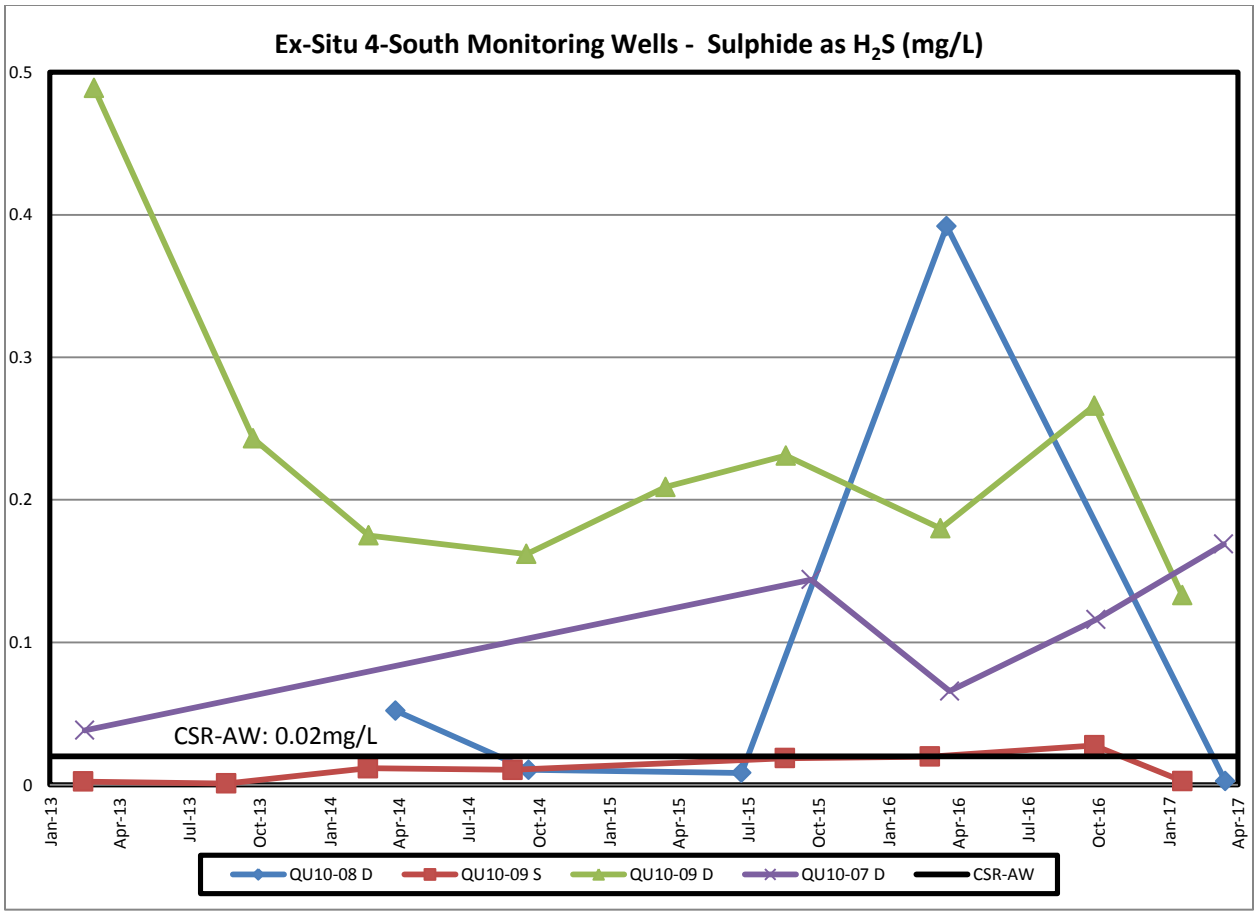


Figure 30: Ex-Situ 4- South Monitoring Wells - Sulphide as H_2S

- Fluoride exceeded CSR-AW standards in well QU10-08 both times this parameter was measured. Levels were consistent with previous years at 2.30 and 2.80 mg/L respectively.

4.2.8 242 Mine

The pH of the flooded waters of the historic 242 mine (242-D) has been consistently neutral, ranging from approximately 6.5-7.5. During this monitoring period, the water exhibited low concentrations of alkalinity, sulphate and metals, consistent with past monitoring events since 2014. Consistent water quality is expected as the small amount of mining that occurred was prior to 1996, and the mine was flooded immediately, with no additional disturbances. The 242 Portal site was reclaimed in Spring, 2016 with backfilling of the portal, permanent slope creation,

topsoil cover and subsequent revegetation, and thus was only sampled two times; January and March, 2017. Appendix B, Table 14 represents the monitoring data collected for 2016-17.

4.2.9 7-South Area 5 Baseline Monitoring

Baseline monitoring established in the 7-South area in support of the 7-South Area 5 Mine permit application is now complete. Sufficient data were collected through 2014, and one sampling event took place at three of these wells in 2015, and thus no sampling occurred within this reporting period. The observed anomalies or exceedances are commented on here. The wells that were sampled were QU11-18 S, QU11-18 D, and QU11-36 D.

Notable observations include:

- H_2S was above the CSR-AW standards of 0.02 mg/L in wells QU11-18 D (0.046 mg/L) and QU11-36D (0.033 mg/L). H_2S levels in the shallow well, QU11-18 S, were below detection limits.
- Dissolved arsenic was substantially above the CSR-AW guideline of 0.05 mg/L in well QU11-36 D with 1.0 mg/L, reflecting results from past sampling events. These high arsenic values reflect structurally affected areas of the Dunsmuir Member sandstones.
- Total suspended solids measured in QU11-18 S were 808 mg/L. Observations while sampling were that the water was dark grey and turbid.

5 Summary

The groundwater monitoring program at Quinsam Coal has been established to capture the interaction between mine related surface and underground disturbance areas (contact water) with the receiving environment. The comprehensive nature of this program allows Quinsam to generate water quality predictions, strategically manage surplus water generated as a result of mining activities, and create management plans with a focus on mitigating potential receiving environment impacts.

During the mine operations phase, the groundwater program provides critical information to ensure that plans and targets are being achieved. For example, in-situ wells provide the necessary

information to validate water quality predictions (source terms) within a mining area. The program also provides opportunity to monitor water quality associated with three key operational waste management practices:

1) Subaqueous PAG-CCR disposal
2) Fine Tailings underground storage in 2 North mine void(s)
3) Backfilled and flooded underground PAG-CCR

The information attained from monitoring these unique and innovative disposal methods will inform future waste management plans and opportunities for Quinsam Coal.

Overall, in-situ groundwater at Quinsam Coal is generally within the water quality prediction scenarios and ex-situ groundwater typically trends below the CSR-AW standards. The two exceptions to the aforementioned is groundwater influenced by host geological formations (e.g. Dunsmuir Member sandstones, Cumberland Member No.1 Coal seam and mudstones) with naturally elevated concentrations of parameters of interest and by weathering processes (i.e. mine wall oxidation and flushing) of disturbed materials within the mine footprint.

The long-term groundwater quality trend(s) demonstrate that deeper formation groundwater systems are not substantially influenced by contact water at most locations (i.e. 2-North/5-South and 7-South), as moderate concentrations of dissolved metals and low concentrations of sulphate are typical. In contrast, the underground mine voids, flooded open pit mining areas, and those areas used for subaqueous PAG-CCR and tailings stowage have, in some cases, elevated concentrations of certain parameters. Sulphate is the primary parameter of interest within these mining areas, due to the fact that sulphate has a distinctive geochemical signature and the contact water flow path can be tracked.

The groundwater program will continue to evolve as mining advances into new areas, or retreats from existing areas, and information on existing mine developments is evaluated. Furthermore, the program will be adapted to encompass the progression of our waste management strategy and any well or area specific trending.

References

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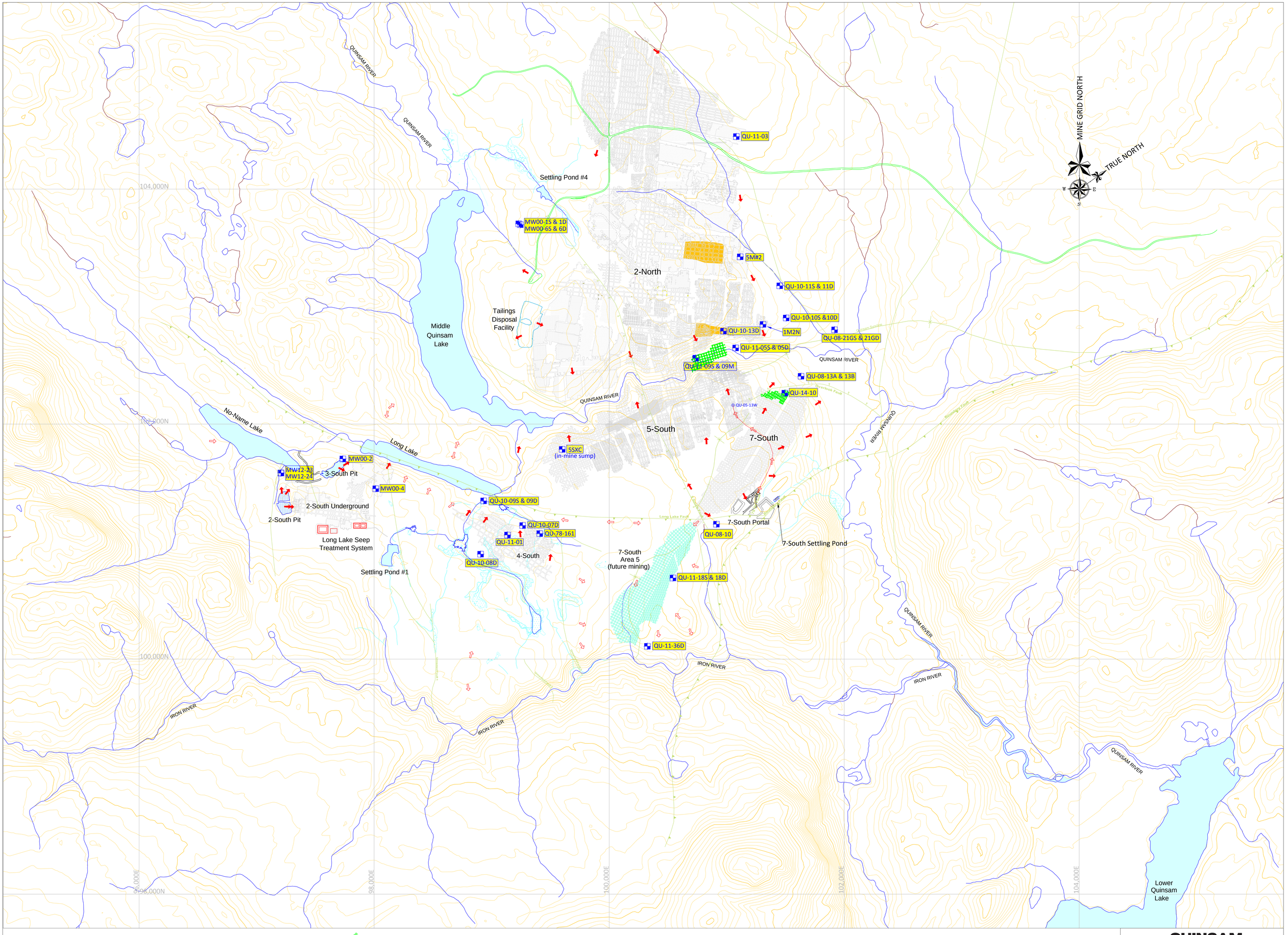
Appendix A



Groundwater Monitoring Well

Groundwater Flow (mine impacted water)

Groundwater Flow (non-mine impacted water)

Pumping (mine impacted water to underground workings)

Underground PAG-CCR Disposal

Underground Tailings Disposal

QUINSAM COAL

2017 Annual Water Quality Report
Site Plan - Groundwater

Scale: 1:10,000 | Site Plan - Groundwater

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Appendix B

2016-2017 Annual Groundwater Report

List of Tables	
Table 1	Description of Groundwater Monitoring Sites at Quinsam Coal Mine
Table 2	CSR-AW Exceedances
Table 3	2-3 North Monitoring Results In-Situ
Table 4	2-3 North Monitoring Results Ex-Situ
Table 5	River Barrier Pillar Monitoring Results In-Situ
Table 6	River Barrier Pillar Monitoring Results Ex-Situ
Table 7	2-North Plant Monitoring Results Ex-Situ
Table 8	7-South Monitoring Results In-Situ
Table 9	7-South Monitoring Results Ex-Situ
Table 10	5-South Monitoring Results In-situ and Ex-Situ
Table 11	4-South Monitoring Results In-Situ
Table 12	2-3 South Monitoring Results Ex-Situ
Table 13	2-3 South Monitoring Results Ex-Situ
Table 14	242 Monitoring Results In-Situ & Ex-Situ

Table 1

Description of Groundwater Monitoring Sites at Quinsam Coal Mine				
Area	**Site ID**	**Screened Interval**	**Monitoring Frequency**	**Site Description**
2-North	1 Mains 2-North	No. 1 Seam	M	Flooded Underground Workings Dewatering well
	5 Mains #2	No. 1 Seam	M	Flooded Underground Workings Dewatering well
	QU08-21 GD	No. 1 Seam	Q	Down gradient of u/g tailings disposal, measure water quality and hydraulic gradients downstream of Forjan Fault
	QU08-21 GS	No. 4 Seam and Sandstone	Q	
	QU10-10 D	No. 1 Seam / mudstone	SA	Down gradient of u/g tailings disposal, measure water quality and hydraulic head downstream of 2-North workings
	QU10-10 S	No. 4 Seam / sandstone	SA	
	QU10-11 S	Fractured Sand Stone	A	Measure water quality and hydraulic gradient in Forjan Fault
	QU10-11 D	No.1 Seam	A	Down gradient of u/g tailings disposal, measure water quality and hydraulic head downstream of 2-North workings
	QU10-13 D	Caved Zone	Q	Measure hydraulic head above 2-North mine (1 mains), fine tailing disposal **(Dry)**
	QU11-03	Fracture Zone	A	Measure water quality in 2-North mine (10-Panel)
River Barrier Pillar (RBP)	QU11-05 S	Sand Stone	Q	Monitoring water quality and vertical gradients downstream of the RBP and 2-North mine.
	QU11-05 D	Sand Stone	Q	Monitoring water quality and vertical gradients downstream of the RBP and 2-North mine.
	QU11-09 S	Sand Stone	Q	Monitor water quality & gradients above the RBP
	QU11-09 M	RBP Mine Pool	M	Mine pool – CCR backfill in River Barrier Pillar.
2-North Plant Site	MW00-1 S	Till	SA	Seepage to MQL
	MW00-1 D	1-Seam	SA	Seepage to MQL
	MW00-6 D	Till	SA	Seepage to MQL
	MW00-6 S	Till	SA	Seepage to MQL
7-South	1M7S	No. 4 Seam	Q	Underground Sump
	QU08-05	No. 4 Seam and Sandstone	**Q (H2O Level Only)**	7-South, 3 mains
	QU08-10	No. 4 Seam	A	Southern margin of workings
	QU08-13 A	No. 4 Seam	Q	Down gradient of the CCR backfill towards QR
	QU08-13 B	Till & SST contact	Q	Down gradient of the CCR backfill towards QR
	QU14-10	Mine Void	Q	PAG Storage Mine Void
7 South Area 5 (ON HOLD)	QU11-28	No. 4 Seam	A	Baseline 7-South Area 5, 4Seam (Complete)
	QU11-18 D	Sandstone	Q	Baseline info for 7-South A5 Subcrop (Complete)
	QU11-18 S	Till Bedrock Contact	SA	Baseline 7-South Area 5 Subcrop (Complete)
	QU11-36 S	Sandstone below No.5 Seam	SA	Baseline (Between 242 and IR) down gradient of 7SA5 (Complete)
	QU11-36 D	4B Seam and Sand Stone	SA	Baseline (Between 242 and IR) (Complete)
242 Mine Area	242D	No. 4 Seam	M	Mine pool/Portal water **(Reclaimed)**
	242-PS	Surface sump	NA	Rain water / groundwater collected in surface sump
5-South	5SXC	Mine pool	Q	Grab sample collected in flooded underground workings
	5SMW	Mine pool	Q	Flooded Underground workings pumped to surface
4-South	QU10-08 D	No. 3 Seam	A	4-South (just outside mine pool) up gradient of existing workings
	QU11-01	Foot print area of 4-South GOB	A	Assess 4-South Mine Pool water quality
	QU10-07 D	Down gradient of workings	SA	Assess water quality immediately down gradient of 4-South workings (just outside mine pool)
	QU10-09 S	Down gradient of existing workings	SA	Assess vertical gradients and water quality adjacent to Long Lake.
	QU10-09 D	Down gradient of existing workings	SA	
	QU78-161	Foot print area of 4 South GOB	A	Assess 4-South Mine Pool water quality
2-South & 3-South	MW00-2	1 Seam	Q	3-South seepage
	MW00-4	Mine Pool (1 Seam)	Q	2-South mine pool gob depillared area
	MW12-23	Silt Stone	Q	2-South seepage
	MW12-24	Silt Stone	Q	2-South seepage

M= Monthly **Q =Quarterly** **SA= Semi Annually** **A= Annually**

Table 2

Area	Site ID	Parameter (mg/L)	CSR-AW Standard (mg/L)	Result (mg/L)	Sampling Events Exceeding Standard
2-North	Q08-21G S	As-D	0.05	0.215, 0.207, 0.212, 0.218 & 0.153	(5/5) Sampling Events
	Q08-21G S	H_2S	0.02	0.0658, 0.128, 0.0514, 0.130 & 0.0996	(5/5) Sampling Events
	Q08-21G D	As-D	0.05	0.146, 0.153, 0.111, 0.162 & 0.208	(5/5) Sampling Events
	Q08-21G D	H_2S	0.02	0.0973, 0.128, 0.0990, 0.115 & 0.140	(5/5) Sampling Events
	QU10-10 D	Cl-D	1500	3400 & 3500	(2/2) Sampling Events
	QU10-10 S	As-D	0.05	0.123 & 0.133	(2/2) Sampling Events
RBP	QU11-05 D	H_2S	0.02	1.41, 1.66, 5.43, 7.0 & 10.4	(5/5) Sampling Events
	QU11-05 S	As-D	0.05	0.0913, 0.0992 & 0.103	(3/5) Sampling Events
	QU11-05 S	H_2S	0.02	0.0313, 0.0296, 0.0454, 0.06 & 0.0539	(5/5) Sampling Events
	QU11-09 S	As-D	0.05	0.0799, 0.0771, 0.0952, 0.0668 & 0.0678	(5/5) Sampling Events
	QU11-09 S	H_2S	0.02	0.445, 0.166, 0.272, 1.18, & 1.11	(5/5) Sampling Events
2/3 South	MW00-2	SO4-D	1000	1220, 1240, 1290, 1320 & 1210	(5/5) Sampling Events
7-South	Q08-13 A	As-D	0.05	0.397, 0.425, 0.447, 0.405 & 0.429	(5/5) Sampling Events
	Q08-13 A	H_2S	0.02	0.135, 0.167, 0.167, 0.118 & 0.138	(5/5) Sampling Events
	Q08-13 B	As-D	0.05	0.455, 0.508, 0.528, 0.428 & 0.469	(5/5) Sampling Events
	Q08-13 B	H_2S	0.02	0.0201	(1/5) Sampling Events
4-South	QU10-07 D	As-D	0.05	0.0823, 0.108 & 0.0930	(3/3) Sampling Events
	QU10-07 D	H_2S	0.02	0.0658, 0.116 & 0.169	(3/3) Sampling Events
	QU10-08 D	As-D	0.05	0.168 & 0.161	(2/2) Sampling Events
	QU10-08 D	H_2S	0.02	0.392	(1/2) Sampling Events
	QU10-08 D	F	2	2.30 & 2.80	(2/2) Sampling Events
	QU10-09 S	As-D	0.05	0.0787, 0.0907 & 0.0829	(3/3) Sampling Events
	QU10-09 S	H_2S	0.02	0.0277	(1/3) Sampling Events
	QU10-09 D	As-D	0.05	0.118, 0.0977 & 0.100	(3/3) Sampling Events
	QU10-09 D	H_2S	0.02	0.108, 0266 & 0.133	(3/3) Sampling Events

Table 3

2-3 North Monitoring Results
In-Situ

Site ID:		1M2N				5M#2				6M2N			QU10-13 D				
Date:		09-Mar-16	27-Jun-16	01-Nov-16	03-Jan-17	09-Mar-16	27-Jun-16	01-Nov-16	03-Jan-17	09-Mar-16	16-Nov-16	11-Jan-17	11-Feb-16	24-May-16	14-Sep-16	14-Nov-16	23-Jan-17
Parameter:	Units																
SO4-D	mg/L	438	486	792	1020	298	204	196	194	196	186	168	580	794	1180	889	973
S2-T	mg/L	0.0309	0.140	0.111	0.197	<0.0050	0.0387	0.0507	0.0357	0.0082	<0.0050	0.0065	0.0124	0.0753	0.0228	1.49	0.0233
H2S	mg/L	0.033	0.15	0.12	0.21	<0.0050	0.041	0.054	0.038	0.0090	<0.0053	0.0070	0.013	0.080	0.024	1.6	0.025
Cond-F	uS/cm	1566	-	2130	2258	1405	-	1392	1351	1229	-	1069	2276	2227	3524	3830	2971
pH-F	pH Units	7.0	-	7.6	7.5	7.8	-	7.9	7.6	7.5	-	7.8	7.07	7.04	6.54	7.14	6.93
Alk-T	mg/L	350	468	418	436	463	485	512	483	457	445	442	400	405	451	481	469
Acidity83	mg/L	2.75	2.89	3.08	5.55	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	9.31	14.0	10.5	8.17	2.62
N-D	mg/L	0.250	0.241	0.360	0.426	0.158	0.153	0.167	0.162	0.198	0.238	0.201	0.244	0.296	0.428	0.330	0.550
DOC	mg/L	1.33	<0.50	1.33	1.42	<0.50	0.93	0.64	1.45	1.05	1.22	1.08	<0.50	0.79	0.65	0.51	12.1
Hydrox	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bicarb	mg/L	427	570	510	532	565	591	614	589	557	543	539	489	494	551	587	572
Carb	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.02	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cl-D	mg/L	21	20	27	22	14	14	14	9.9	5.6	4.1	4.1	28	27	31	60	50
F-D	mg/L	0.160	0.097	0.150	0.160	0.120	0.110	0.110	0.140	0.053	0.060	0.056	0.130	0.130	0.099	0.120	0.130
Br-D	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.050	<0.10	<0.10	0.061	0.12	<0.10
P-D	mg/L	0.0068	0.0058	0.0023	0.0085	0.0045	0.0059	0.0038	0.0040	0.0027	<0.0020	0.0093	0.0043	0.0076	0.0079	0.0038	0.0249
TSS	mg/L	4.0	6.0	12.8	16.0	4.5	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	<4.0	<4.0
Al-D	mg/L	<0.0030	0.0030	<0.0030	0.0038	<0.0030	0.0045	<0.0030	0.0034	<0.0030	0.0088	0.0052	0.0044	0.0065	0.0034	0.0064	0.0089
Ag-D	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
As-D	mg/L	0.00880	0.00324	0.00393	0.00327	0.00441	0.00646	0.00510	0.00619	0.00110	0.00103	0.00246	0.00351	0.00460	0.00489	0.00554	0.00464
Ba-D	mg/L	0.0325	0.0227	0.0289	0.0281	0.0266	0.0222	0.0238	0.0236	0.0359	0.0426	0.0401	0.0252	0.0315	0.0384	0.0262	0.0273
B-D	mg/L	1.13	1.20	1.10	1.16	1.31	1.13	0.955	0.985	0.970	0.803	0.752	1.28	1.32	1.28	1.18	1.24
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bi-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd-D	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000085	<0.0000050	0.0000082	<0.0000050	<0.0000050
Ca-D	mg/L	76.0	101	135	182	51.4	38.0	37.0	35.1	43.7	50.7	48.8	119	162	201	111	121
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00191	0.00286	0.00353	0.00143	0.00196
Cu-D	mg/L	<0.00020	<0.00020	0.00022	<0.00020	<0.00020	0.00022	0.00039	0.00022	0.00059	0.00051	0.00034	0.00096	0.00072	0.00041	0.00036	0.00026
Fe-D	mg/L	0.0242	0.0226	0.0114	0.0052	0.287	0.0965	0.0060	0.0262	0.0059	0.0223	0.0286	0.319	0.774	0.955	0.741	0.711
Hard-D	mg/L	218	291	394	538	147	108	107	101	126	144	139	334	457	576	312	342
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00031	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-D	mg/L	6.88	9.44	14.0	20.1	4.62	3.17	3.46	3.15	4.09	4.27	4.17	9.12	12.9	18.1	8.59	9.88
Mn-D	mg/L	0.149	0.250	0.480	0.727	0.0975	0.0597	0.0602	0.0511	0.0110	0.0817	0.0824	0.332	0.586	0.764	0.409	0.488
Hg-D	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	0.0000043	0.0000053	0.0000045	0.0000036	0.0000054
Na-D	mg/L	285	406	403	474	294	284	287	290	236	217	216	375	489	561	481	508
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0015	<0.0010
Ni-D	mg/L	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0033	0.0030	0.0066	0.0014	0.0022
K-D	mg/L	4.28	4.15	5.17	6.02	3.01	2.30	2.33	2.38	2.04	1.93	2.18	4.77	5.42	7.16	4.52	5.15
S-D	mg/L	166	190	279	388	117	75.8	71.5	72.4	71.6	66.9	63.2	245	400	468	291	337
Sb-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00141	<0.00050	<0.00050	<0.00050
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Si-D	mg/L	3.16	2.92	3.53	3.66	2.86	2.82	2.80	2.96	2.95	3.22	3.52	3.48	3.83	3.74	3.17	3.32
Sr-D	mg/L	0.789	1.03	1.49	1.94	0.545	0.378	0.422	0.386	0.497	0.612	0.529	0.941	1.57	1.97	1.20	1.27
Tl-D	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010
Ti-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
U-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00017	0.00061	0.00027	0.00030	0.00030
V-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zn-D	mg/L	<0.0050	0.0051	<0.0050	<0.0050	<0.0050	0.0199	<0.0050	<0.0050	<0.0050	<0.0050	0.0068	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

* Calculated parameters

Highlighted Red indicates CSR-AW exceedance

Table 4

2-3 North Monitoring Results
Ex-Situ

Site ID:		CSR-AW	QU08-21 GS					QU08-21 GD					QU10-10 S		QU10-10 D		QU10-11 S		QU10 -11 D
Date:			20-Jan-16	26-Apr-16	01-Aug-16	01-Nov-16	20-Feb-17	20-Jan-16	27-Apr-16	01-Aug-16	01-Nov-16	20-Feb-17	22-Feb-16	18-Oct-16	15-Feb-16	19-Oct-16	21-Jun-16	14-Nov-16	09-Jan-17
Parameter:	Units																		
SO4-D	mg/L	1000	2.15	0.54	<0.50	1.01	<0.50	<0.50	<0.50	<0.50	0.64	<0.50	17.0	49.8	<0.50	<0.50	7.73	3.94	0.95
S2-T	mg/L		0.0619	0.120	0.0484	0.122	0.0937	0.0915	0.120	0.0931	0.108	0.132	<0.0050	0.0141	<0.0050	<0.0050	0.0108	0.0093	<0.0050
H2S	mg/L	0.02	0.066	0.13	0.051	0.13	0.10	0.097	0.13	0.099	0.11	0.14	<0.0050	0.015	<0.0050	<0.0050	0.011	0.010	<0.0050
Cond-F	uS/cm		733	619.7	730	734	544	4153	4847	4471	3771	3371	339	412	11770	11266	279	145	2760
pH-F	pH Units		8.07	7.96	7.77	8.03	7.36	7.26	7.24	7.34	7.45	7.97	8.01	7.92	7.24	7.18	7.62	6.64	7.05
Alk-T	mg/L		201	200	203	203	222	216	215	220	220	197	147	151	96.8	92.3	153	59.6	360
Acidity83	mg/L		<0.50	<0.50	<0.50	<0.50	2.03	<0.50	0.88	8.77	3.20	<0.50	<0.50	<0.50	19.6	4.63	<0.50	3.73	10.9
N-D	mg/L		0.332	0.539	0.322	0.317	0.549	0.569	0.218	0.641	0.547	0.249	0.176	0.282	0.767	0.843	0.108	0.173	0.435
DOC	mg/L		0.51	0.93	1.78	2.54	1.76	1.53	1.28	1.53	1.45	0.82	<0.50	0.90	1.27	1.94	1.23	1.56	4.63
Hydrox	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bicarb	mg/L		241	239	244	248	271	263	263	268	269	233	179	184	118	113	187	72.7	440
Carb	mg/L		1.91	2.76	1.90	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.82	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cl-D	mg/L	1500	96	56	180	85	850	1100	1000	1400	910	51	4.1	0.68	3400	3500	1.8	1.3	560
F-D	mg/L	2	1.60	1.60	1.40	1.60	1.10	0.970	1.00	0.790	1.20	1.50	0.620	0.540	0.021	0.024	0.340	0.049	0.230
Br-D	mg/L		0.138	0.092	0.291	0.14	1.12	0.143	1.63	2.41	1.44	0.069	<0.010	<0.010	4.94	4.55	<0.010	<0.010	0.92
P-D	mg/L		0.127	0.0385	0.154	0.101	0.0661	0.0543	0.104	0.0659	0.0579	0.100	0.0534	0.0686	0.0767	0.0665	0.0195	0.0055	0.0764
TSS	mg/L		5.0	<4.0	<4.0	<4.0	<4.0	5.0	<4.0	4.5	<4.0	<4.0	986	31.8	140	59.5	<4.0	<4.0	1410
Al-D	mg/L		0.0066	0.0068	0.0097	0.0066	0.0090	0.0034	0.0036	0.0061	0.0042	0.0084	<0.0030	0.0188	0.0053	0.0129	0.0056	0.0183	0.0215
Ag-D	mg/L	*	<0.000020	<0.000020	<0.000020	<0.000020	<0.000040	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000040	<0.000020	<0.000020	<0.000020
As-D	mg/L	0.05	0.215	0.207	0.212	0.218	0.153	0.146	0.153	0.111	0.162	0.208	0.123	0.133	0.0151	0.0152	0.00820	0.00169	0.00905
Ba-D	mg/L	10	0.435	0.288	0.589	0.341	2.32	3.22	2.86	4.10	2.26	0.283	0.338	0.454	1.27	1.26	0.214	0.108	0.451
B-D	mg/L	50	2.16	1.92	2.18	1.80	3.85	3.62	3.13	3.85	2.95	2.20	0.613	0.599	0.316	0.35	0.585	0.074	1.47
Be-D	mg/L	0.053	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010
Bi-D	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010
Cd-D	mg/L	*	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000010	0.0000060	<0.0000050	0.0000133	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000070	0.000022	<0.0000050	<0.0000050	<0.0000050
Ca-D	mg/L		18.1	14.2	28.5	15.8	93.8	127	123	170	87.4	12.9	23.8	32.9	590	608	30.7	14.8	81.8
Cr-D	mg/L	0.01	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0024	<0.0010	<0.0010	<0.0010
Co-D	mg/L	0.04	<0.00050	<0.00050	<0.00050	<0.00050	<0.00040	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020	<0.00050	<0.00050	0.00073	<0.0010	<0.00050	<0.00050	<0.00050
Cu-D	mg/L	*	<0.00020	<0.00020	<0.00020	<0.00020	<0.00040	<0.00020	<0.00020	<0.00020	<0.00020	0.00022	<0.00020	<0.00020	<0.00020	0.00085	<0.00020	0.00025	<0.00020
Fe-D	mg/L		0.381	0.317	0.543	0.314	1.01	1.08	0.993	1.59	0.851	0.303	0.217	0.351	11.2	10.2	0.352	0.179	4.09
Hard-D	mg/L		62.7	50.6	96.6	57.1	294	392	381	529	285	46.5	83.3	113	1520	1570	104	50.7	236
Pb-D	mg/L	*	<0.00020	<0.00020	<0.00020	<0.00020	<0.00040	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00043	<0.00020	<0.00020	<0.00020
Mg-D	mg/L		4.26	3.67	6.15	4.27	14.4	18.3	17.7	25.6	16.3	3.44	5.77	7.56	12.0	11.9	6.72	3.31	7.81
Mn-D	mg/L		0.0831	0.0698	0.128	0.0723	0.0946	0.127	0.104	0.174	0.113	0.0535	0.0337	0.0531	0.510	0.433	0.0716	0.0488	0.453
Hg-D	mg/L	0.001	<0.0000020	0.0000078	0.0000035	0.0000024	0.0000026	<0.0000020	0.0000049	<0.0000020	0.0000039	<0.0000020	<0.0000020	0.0000054	0.0000060	0.0000023	0.0000063	0.0000048	0.0000031
Na-D	mg/L		110	99.4	176	113	507	591	615	833	501	95.6	34.8	39.7	1340	1430	23.2	4.44	424
Mo-D	mg/L	10	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0020	0.0012	<0.0010	<0.0010
Ni-D	mg/L	*	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010
K-D	mg/L		4.40	3.82	5.05	3.86	9.60	10.4	10.5	13.6	8.74	3.85	3.77	3.56	7.77	8.46	2.63	0.835	6.65
S-D	mg/L		<3.0	<3.0	<3.0	<3.0	<6.0	<3.0	<3.0	<3.0	<3.0	<3.0	6.9	16.6	<3.0	<6.0	<3.0	<3.0	<3.0
Sb-D	mg/L	0.2	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050
Se-D	mg/L	0.01	<0.00010	<0.00010	<0.00010	<0.00010	0.00045	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010
Si-D	mg/L		4.02	3.69	3.96	3.57	4.96	5.18	4.43	5.08	4.03	3.58	4.92	5.03	4.08	4.17	4.22	3.50	6.91
Sr-D	mg/L		0.459	0.370	0.656	0.449	2.02	2.53	2.46	3.37	2.15	0.368	0.383	0.583	5.49	5.89	0.424	0.177	1.12
Tl-D	mg/L	0.003	<0.000050	<0.000050	<0.000050	<0.000050	<0.000020	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000050	<0.000050	<0.000050	<0.00010	<0.000050	<0.000050	<0.000050
Ti-D	mg/L	1	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050
U-D	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	0.00025
V-D	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050
Zn-D	mg/L	*	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050

* Calculated parameters

Highlighted Red indicates CSR-AW exceedance

Table 5

River Barrier Pillar Monitoring Results
In-Situ

Site ID:		QU11-09 M													
Date:		21-Jan-16	23-Feb-16	24-Mar-16	19-Apr-16	18-May-16	13-Jun-16	20-Jul-16	29-Aug-16	27-Sep-16	17-Oct-16	09-Nov-16	21-Dec-16	24-Jan-17	13-Mar-17
Parameter:	Units														
SO4-D	mg/L	1280	1240	1270	1200	1250	1270	1200	1160	1270	1140	1150	1360	1160	1110
S2-T	mg/L	0.0169	0.0318	0.0160	0.0355	0.117	0.0945	0.0549	0.0567	0.0443	0.0377	0.0579	0.0493	0.0517	0.0654
H2S	mg/L	0.018	0.034	0.017	0.038	0.12	0.10	0.058	0.060	0.047	0.040	0.062	0.052	0.055	0.069
Cond-F	uS/cm	4056	4118	3657	3725	3108	2317	4030	3577	2907	3594	4086	3352	3599	3348
pH-F	pH Units	6.99	7.05	7.08	7.19	7.16	7.41	7.29	7.35	7.34	7.31	7.38	7.31	7.72	7.22
Alk-T	mg/L	535	534	526	531	517	499	488	506	508	495	490	512	525	524
Acidity83	mg/L	11.4	2.86	11.2	8.73	<0.50	11.6	12.3	<0.50	8.50	5.42	13.7	13.7	9.83	15.3
N-D	mg/L	0.449	0.420	0.355	1.17	0.401	0.421	0.468	0.446	0.387	0.431	0.569	0.464	0.391	0.336
DOC	mg/L	1.15	0.82	<0.50	2.05	0.69	0.76	<0.50	1.30	<0.50	0.74	0.58	1.34	<0.50	<0.50
Hydrox	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bicarb	mg/L	652	652	642	648	631	609	595	617	620	604	598	625	641	639
Carb	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cl-D	mg/L	80	75	77	77	72	77	65	65	72	68	67	78	70	70
F-D	mg/L	0.120	0.092	0.110	0.110	0.130	0.120	0.110	0.120	0.110	0.110	0.100	0.110	0.110	0.120
Br-D	mg/L	0.010	0.164	0.146	0.21	0.14	<0.10	<0.10	0.130	0.12	0.12	0.13	0.12	0.10	0.14
P-D	mg/L	0.0045	0.0046	0.0043	0.0065	0.0036	0.0073	0.0056	0.0044	0.0043	0.0037	0.0044	0.0054	0.0041	0.0040
TSS	mg/L	36	28.8	28.3	24.0	31.0	42.7	46.0	42.0	45.8	39.5	45.5	44.8	37.0	27.5
Al-D	mg/L	<0.0030	<0.0030	0.0070	0.0070	0.0068	0.0045	0.0057	0.0054	0.0048	<0.0030	0.0123	0.0045	0.0047	0.0122
Ag-D	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
As-D	mg/L	0.00628	0.00623	0.00655	0.00585	0.00592	0.00536	0.00572	0.00624	0.00580	0.00493	0.00538	0.00474	0.00410	0.00345
Ba-D	mg/L	0.0174	0.0156	0.0149	0.0149	0.0181	0.0195	0.0166	0.0163	0.0165	0.0157	0.0157	0.0153	0.0142	0.0147
B-D	mg/L	1.40	1.49	1.35	1.27	1.10	1.13	1.05	1.06	1.04	1.11	1.02	1.04	1.13	1.06
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bi-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd-D	mg/L	0.0000050	0.0000050	<0.0000050	<0.0000050	0.0000051	<0.0000050	0.000171	<0.0000050	<0.0000050	<0.0000050	0.0000400	<0.0000050	0.0000110	<0.0000050
Ca-D	mg/L	197	180	183	196	196	171	153	163	164	167	155	146	142	144
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00066	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020
Cu-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00035	0.00020	<0.00020	<0.00020	0.00042	<0.00020	0.00034	<0.00020
Fe-D	mg/L	15.2	13.5	12.6	12.6	16.6	22.3	22.4	21.6	23.0	24.3	22.2	18.3	16.0	12.8
Hard-D	mg/L	561	523	528	561	564	498	452	477	479	490	453	434	419	418
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-D	mg/L	16.9	17.6	17.1	17.2	17.9	17.2	16.8	17.3	17.0	17.7	16.2	16.6	15.7	14.4
Mn-D	mg/L	0.374	0.334	0.325	0.315	0.371	0.504	0.491	0.466	0.485	0.479	0.463	0.424	0.383	0.319
Hg-D	mg/L	0.0000033	<0.0000020	0.0000036	0.0000042	0.0000028	0.0000030	<0.0000020	0.0000047	0.0000037	0.000005	0.0000047	0.0000028	0.0000030	0.0000049
Na-D	mg/L	632	627	646	633	646	576	572	594	593	625	580	614	600	571
Mo-D	mg/L	0.0027	0.0028	0.0028	0.0027	0.0025	0.0016	0.0017	0.0018	0.0019	0.0017	0.0021	0.0025	0.0028	0.0032
Ni-D	mg/L	<0.0010	<0.0010	<0.0010	0.0014	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
K-D	mg/L	6.79	6.98	6.24	6.58	7.35	7.06	6.43	6.47	6.49	7.84	6.54	6.70	6.30	6.09
S-D	mg/L	470	509	434	431	435	446	405	415	414	472	408	433	398	384
Sb-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Si-D	mg/L	3.71	3.70	3.45	3.66	4.14	3.97	3.39	3.40	3.27	3.85	3.32	3.06	3.11	3.20
Sr-D	mg/L	2.19	2.07	2.12	2.08	1.98	1.89	1.83	1.85	1.92	1.82	1.98	1.81	1.71	1.74
Tl-D	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010
Ti-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
U-D	mg/L	0.00011	0.00012	0.00014	0.00015	0.00018	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010
V-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.0057	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
* Calculated parameters															

Table 6

River Barrier Pillar Monitoring Results Ex-Situ																	
Site ID:		**CSR-AW**	**QU11-05 S**					**QU11-05 D**					**QU11-09 S**				
Date:			18-Feb-16	02-May-16	01-Sep-16	30-Nov-16	08-Mar-17	18-Feb-16	03-May-16	01-Sep-16	30-Nov-16	21-Feb-17	24-Mar-16	13-Jun-16	29-Aug-16	09-Nov-16	13-Mar-17
Parameter:	**Units**																
SO4-D	**mg/L**	**1000**	161	52.3	42.3	121	156	52.9	91.4	106	136	135	442	540	437	435	498
S2-T	**mg/L**		0.0294	0.0278	0.0427	-	0.0507	1.33	1.56	5.11	-	9.74	0.419	0.156	0.256	1.11	1.04
H2S	**mg/L**	**0.02**	0.031	0.030	0.045	0.060	0.054	1.4	1.7	5.4	7.0	10	0.45	0.17	0.27	1.2	1.1
Cond-F	**uS/cm**		1138	355	281	1003.4	998	5251	5948	5001	5793	5336	2090	1852	1951	2624	2377
pH-F	**pH Units**		6.9	7.28	7.8	7.17	7.01	7.42	7.3	7.46	7.33	7.51	7.92	8.00	7.81	7.9	7.76
Alk-T	**mg/L**		335	96.6	82.8	329	323	280	279	265	275	288	516	492	458	544	554
Acidity83	**mg/L**		4.09	<0.50	<0.50	5.16	7.84	<0.50	14.9	3.76	3.83	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
N-D	**mg/L**		0.327	0.223	0.112	0.220	0.229	0.503	0.399	0.355	0.467	0.437	0.423	0.412	0.405	0.449	0.863
DOC	**mg/L**		1.06	<0.50	2.08	2.59	2.07	4.09	3.39	1.54	1.28	0.87	0.81	0.82	1.00	0.72	0.86
Hydrox	**mg/L**		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bicarb	**mg/L**		408	118	101	401	394	342	341	324	335	352	613	571	542	646	676
Carb	**mg/L**		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.24	14.1	7.76	8.63	<0.50
Cl-D	**mg/L**	**1500**	2.7	2.5	3.1	1.1	2.1	1300	1300	1300	1300	1300	60	71	61	76	71
F-D	**mg/L**	**2**	0.280	0.150	0.200	0.300	0.290	0.031	0.030	0.039	0.034	0.031	0.710	0.660	0.630	0.640	0.670
Br-D	**mg/L**		<0.010	<0.010	<0.010	<0.10	<0.10	2.87	2.42	2.51	2.54	2.48	0.111	0.10	0.109	0.14	0.12
P-D	**mg/L**		0.0369	0.0126	0.0479	0.0343	0.0254	0.169	0.173	0.281	0.251	0.264	0.0445	0.0469	<0.0020	0.0348	0.0349
TSS	**mg/L**		8.8	<4.0	12.5	6.5	6.3	5.5	8.0	<4.0	<4.0	23.3	<4.0	17.5	<4.0	<4.0	<4.0
Al-D	**mg/L**		0.0032	<0.0030	0.0057	0.0070	0.0083	<0.0030	0.0047	0.0075	0.0262	0.0118	0.0033	0.0047	0.0045	0.0097	0.0050
Ag-D	**mg/L**	*	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
As-D	**mg/L**	**0.05**	0.0913	0.0362	0.0482	0.0992	0.103	0.00769	0.0115	0.00921	0.00711	0.00803	0.0799	0.0771	0.0952	0.0668	0.0678
Ba-D	**mg/L**	**10**	0.157	0.0523	0.0605	0.102	0.112	0.521	0.505	0.443	0.454	0.443	0.0809	0.0688	0.0635	0.0597	0.0568
B-D	**mg/L**	**50**	1.25	0.281	0.311	1.10	1.28	0.528	0.412	0.424	0.439	0.467	2.61	2.55	2.25	2.57	2.37
Be-D	**mg/L**	**0.053**	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bi-D	**mg/L**		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd-D	**mg/L**	*	<0.0000050	0.0000055	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000135	<0.0000050	<0.0000050	0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000140	<0.0000050
Ca-D	**mg/L**		58.2	23.5	15.9	39.8	42.7	133	141	137	142	130	31.6	32.5	29.8	28.7	31.3
Cr-D	**mg/L**	**0.01**	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	**mg/L**	**0.04**	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020
Cu-D	**mg/L**	*	<0.00020	<0.00020	0.00027	<0.00020	0.00024	<0.00020	<0.00020	<0.00020	<0.00020	0.00156	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Fe-D	**mg/L**		2.64	0.613	0.358	2.46	2.15	0.420	0.334	0.0790	0.0550	0.0829	0.214	0.255	0.292	0.171	0.191
Hard-D	**mg/L**		196	74.1	50.1	133	144	351	370	362	377	346	111	114	107	101	112
Pb-D	**mg/L**	*	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-D	**mg/L**		12.3	3.76	2.56	8.09	9.01	4.74	4.63	4.77	5.20	5.00	7.83	7.96	7.93	7.16	8.27
Mn-D	**mg/L**		0.369	0.123	0.0988	0.254	0.228	0.241	0.250	0.171	0.125	0.104	0.0200	0.0233	0.0222	0.0193	0.0220
Hg-D	**mg/L**	**0.001**	0.0000046	0.0000108	0.0000032	0.0000024	0.0000032	0.0000038	0.0000020	0.0000069	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	0.0000028
Na-D	**mg/L**		147	35.0	35.8	148	154	857	884	916	889	916	430	437	410	430	492
Mo-D	**mg/L**	**10**	0.0010	<0.0010	<0.0010	0.0012	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ni-D	**mg/L**	*	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0064	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
K-D	**mg/L**		4.42	1.49	1.29	3.23	3.46	4.98	5.08	5.19	5.28	4.96	4.80	4.93	4.68	4.74	5.30
S-D	**mg/L**		66.9	19.5	16.0	44.2	53.1	27.6	34.9	58.5	49.0	48.0	166	207	165	152	184
Sb-D	**mg/L**	**0.2**	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Se-D	**mg/L**	**0.01**	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00015	<0.00010	0.00057	0.00069	<0.00010	0.00010	0.00034	<0.00010	<0.00010	0.00197
Si-D	**mg/L**		3.85	2.41	2.41	3.40	3.32	4.96	4.71	4.38	4.44	4.22	5.29	6.08	5.35	5.17	4.99
Sr-D	**mg/L**		0.659	0.207	0.140	0.381	0.495	1.52	1.60	1.49	1.60	1.60	0.704	0.651	0.638	0.669	0.689
Tl-D	**mg/L**	**0.003**	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010
Ti-D	**mg/L**	**1**	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
U-D	**mg/L**		<0.00010	<0.00010	<0.00010	0.00014	<0.00010	<0.00010	<0.00010	0.00015	0.00017	0.00018	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
V-D	**mg/L**		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zn-D	**mg/L**	*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.112	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
* Calculated parameters																	
Highlighted Red indicates CSR-AW exceedance																	

Table 7

2-North Plant Monitoring Results Ex-Situ														
Site ID:			**MW00-1 S**			**MW00-1 D**			**MW00-6 S**			**MW00-6 D**		
Date:			24-Feb-16	08-Aug-16	28-Feb-17	24-Feb-16	15-Aug-16	01-Mar-17	28-Jan-16	23-Aug-16	16-Feb-17	28-Jan-16	22-Aug-16	16-Feb-17
Parameter:	**Units**													
SO4-D	**mg/L**	**1000**	790	977	644	26.6	25.8	27.9	585	607	606	11.5	11.6	12.0
S2-T	**mg/L**		0.0081	0.0073	0.0091	0.0178	0.0134	0.0099	0.0053	0.0052	<0.0050	0.0074	0.0062	0.0077
H2S	**mg/L**	**0.02**	0.0090	0.0080	0.010	0.019	0.014	0.011	-	0.0060	<0.0050	-	0.0070	0.0080
Cond-F	**uS/cm**		1266	2857	1864	277	302	247	1029	1769	1467	120.7	195.6	180.9
pH-F	**pH Units**		6.54	6.46	6.48	9.16	9.22	9.16	7.76	7.52	7.64	8.82	8.66	8.71
Alk-T	**mg/L**		356	363	348	93.4	88.4	87.1	195	186	172	82.2	82.4	78.1
Acidity83	**mg/L**		16.0	20.1	36.5	<0.50	<0.50	<0.50	<0.50	1.69	<0.50	<0.50	<0.50	<0.50
N-D	**mg/L**		0.142	0.165	0.185	0.303	0.234	0.247	0.174	0.417	0.312	1.72	0.104	0.099
DOC	**mg/L**		2.98	1.04	3.26	2.91	2.46	2.15	2.97	2.24	2.13	0.89	<0.50	0.56
Hydrox	**mg/L**		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bicarb	**mg/L**		434	443	424	101	96.5	106	238	227	210	100	93.8	95.2
Carb	**mg/L**		<0.50	<0.50	<0.50	6.28	5.57	<0.50	<0.50	<0.50	<0.50	<0.50	3.29	<0.50
Cl-D	**mg/L**	**1500**	4.8	4.4	2.4	0.79	0.79	1.1	4.3	4.1	4.3	0.74	0.79	1.1
F-D	**mg/L**	**2**	0.020	0.020	0.021	0.110	0.130	0.100	0.050	0.064	0.062	0.091	0.110	0.100
Br-D	**mg/L**		0.026	0.024	<0.10	0.013	0.015	0.011	<0.10	0.018	<0.10	<0.010	<0.010	<0.010
P-D	**mg/L**		0.0032	0.0030	0.0036	0.182	0.164	0.172	0.0530	0.0576	0.0536	0.147	0.165	0.165
TSS	**mg/L**		<4.0	<4.0	<4.0	10.5	34.5	26.5	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Al-D	**mg/L**		<0.0030	0.0194	<0.0030	0.0302	0.128	0.0989	0.0340	0.0041	0.0067	0.0506	0.0226	0.0194
Ag-D	**mg/L**	*	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
As-D	**mg/L**	**0.05**	0.00032	0.00013	<0.00010	0.0205	0.0193	0.0223	0.00157	0.00173	0.00156	0.0290	0.0277	0.0291
Ba-D	**mg/L**	**10**	0.0141	0.0146	0.0125	0.0038	0.0044	0.0045	0.0359	0.0405	0.0366	0.0100	0.0092	0.0100
B-D	**mg/L**	**50**	0.555	0.442	0.395	0.087	0.073	0.079	0.192	0.216	0.224	0.053	<0.050	0.059
Be-D	**mg/L**	**0.053**	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bi-D	**mg/L**		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd-D	**mg/L**	*	0.0000760	0.000103	0.0000291	<0.0000050	0.0000060	<0.0000050	0.0000107	0.0000300	0.0000150	<0.0000050	<0.0000050	<0.0000050
Ca-D	**mg/L**		280	381	250	8.33	7.96	8.62	159	156	158	19.0	17.1	18.2
Cr-D	**mg/L**	**0.01**	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	**mg/L**	**0.04**	0.00068	<0.00050	0.00026	<0.00050	<0.00050	<0.00020	<0.00050	<0.00050	<0.00020	<0.00050	<0.00050	<0.00020
Cu-D	**mg/L**	*	0.00038	<0.00020	<0.00020	0.00131	0.00230	0.00177	0.00141	0.00080	0.00084	0.00073	0.00111	0.00064
Fe-D	**mg/L**		0.0550	0.0857	0.0284	<0.0050	0.119	0.0746	0.0149	0.0239	0.0073	0.0051	0.0148	<0.0050
Hard-D	**mg/L**		941	1240	820	21.4	20.5	22.0	464	462	457	50.1	45.0	47.6
Pb-D	**mg/L**	*	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-D	**mg/L**		58.5	70.7	47.5	0.135	0.139	0.113	16.5	17.9	15.0	0.638	0.569	0.540
Mn-D	**mg/L**		1.59	1.95	0.681	0.0060	0.0106	0.0051	0.0122	0.0551	0.0451	<0.0010	0.0015	<0.0010
Hg-D	**mg/L**	**0.001**	0.0000039	0.0000054	0.0000032	0.0000048	0.0000067	0.0000048	0.0000067	0.0000064	0.0000053	0.0000054	0.0000059	0.0000079
Na-D	**mg/L**		114	128	90.1	44.8	42.0	42.7	193	185	160	22.1	21.0	20.9
Mo-D	**mg/L**	**10**	<0.0010	<0.0010	<0.0010	0.0109	0.0095	0.0108	0.0335	0.0336	0.0303	0.0036	0.0035	0.0034
Ni-D	**mg/L**	*	0.0017	0.0027	0.0012	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
K-D	**mg/L**		2.15	2.64	2.02	0.571	0.588	0.613	2.87	2.70	2.41	0.793	0.712	0.712
S-D	**mg/L**		315	369	232	9.9	8.2	9.2	215	238	211	3.4	3.2	4.0
Sb-D	**mg/L**	**0.2**	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Se-D	**mg/L**	**0.01**	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00047	0.00036	0.00029	<0.00010	<0.00010	<0.00010
Si-D	**mg/L**		9.42	10.2	8.68	2.73	2.72	3.06	5.07	5.40	5.41	3.38	3.68	3.94
Sr-D	**mg/L**		1.50	1.64	1.31	0.0319	0.0281	0.0292	0.894	1.02	0.873	0.0901	0.0767	0.0830
Tl-D	**mg/L**	**0.003**	<0.000050	<0.000050	<0.000010	<0.000050	<0.000050	<0.000010	<0.000050	<0.000050	<0.000010	<0.000050	<0.000050	<0.000010
Ti-D	**mg/L**	**1**	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
U-D	**mg/L**		0.00345	0.00382	0.00304	0.00069	0.00085	0.00071	0.00982	0.00893	0.00767	0.00087	0.00068	0.00078
V-D	**mg/L**		<0.0050	<0.0050	<0.0050	0.0066	0.0064	0.0066	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zn-D	**mg/L**	*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0078	<0.0050
* Calculated parameters														
Highlighted Red indicates CSR-AW exceedance														

Table 8

7-South Monitoring Results
In-Situ

Site ID:		QU14-10															1M7S			
Date:		21-Jan-16	23-Feb-16	24-Mar-16	20-Apr-16	18-May-16	22-Jun-16	21-Jul-16	30-Aug-16	20-Sep-16	17-Oct-16	15-Nov-16	08-Dec-16	18-Jan-17	22-Feb-17	09-Mar-17	22-Mar-16	24-May-16	13-Sep-16	10-Jan-17
Parameter:	Units																			
SO4-D	mg/L	1320	1370	1740	1740	1800	1810	1930	1820	1880	1860	1920	1960	1910	1970	2220	170	144	198	177
S2-T	mg/L	0.0102	0.0202	<0.0050	0.0105	0.0125	0.0082	0.0138	0.0111	0.0146	0.0117	0.0143	0.0101	0.0103	0.0091	0.0066	0.0065	0.0093	0.0114	<0.0050
H2S	mg/L	0.011	0.022	<0.0050	0.011	0.013	0.0090	0.015	0.012	0.016	0.012	0.015	0.011	0.011	0.010	0.0070	0.0070	0.010	0.012	<0.0050
Cond-F	uS/cm	2861	3031	3143	2882	2935	3931	2317	3605	3342	3306	3965	3941	3896.4	3582	3831	-	1536	1613	645
pH-F	pH Units	6.8	6.72	6.75	6.9	6.71	6.5	6.76	6.76	6.71	6.71	6.75	6.57	6.67	6.74	6.61	-	8.2	7.9	7.9
Alk-T	mg/L	209	200	251	269	261	269	284	290	269	291	286	302	301	303	303	106	119	126	144
Acidity83	mg/L	10.7	21.1	9.98	9.45	1.18	22.0	22.4	7.47	15.3	16.4	8.83	17.1	27.0	18.4	26.8	<0.50	0.94	<0.50	0.78
N-D	mg/L	0.213	0.166	0.195	0.250	0.238	0.140	0.296	0.205	0.178	0.216	0.292	0.300	0.234	0.278	0.215	0.170	0.233	0.214	0.159
DOC	mg/L	1.18	0.69	0.73	1.91	0.96	1.90	0.71	1.55	0.79	0.63	1.94	1.18	<0.50	1.14	0.62	0.56	0.86	1.01	0.60
Hydrox	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bicarb	mg/L	255	244	306	328	318	328	347	353	328	355	348	369	367	369	369	130	145	154	175
Carb	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cl-D	mg/L	5.2	5.8	5.0	4.8	5.0	5.5	6.1	6.2	6.0	6.0	6.1	6.1	5.8	6.1	5.9	-	-	5.7	3.4
F-D	mg/L	0.230	0.190	0.180	0.180	0.180	0.170	0.180	0.180	0.170	0.170	0.190	0.180	0.190	0.200	0.180	-	-	0.410	0.330
Br-D	mg/L	<0.010	<0.010	<0.010	<0.10	<0.10	<0.10	<0.10	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	-	<0.010	<0.010
P-D	mg/L	0.0125	0.0047	0.0084	0.0210	0.0127	0.0144	0.0122	0.0215	0.0248	0.0121	0.0171	0.0217	0.0082	0.0248	0.0159	0.0266	0.0134	0.0112	0.0285
TSS	mg/L	11.5	9.0	<4.0	<4.0	<4.0	<4.0	<4.0	8.3	7.5	5.0	7.5	5.0	6.0	4.3	<4.0	4.0	<4.0	17.5	36.5
Al-D	mg/L	<0.0030	<0.0030	0.0077	0.0030	0.0040	0.0040	0.0103	0.0060	0.0057	<0.0030	0.0055	0.0035	0.0057	0.0052	0.0059	0.0068	0.0066	0.0038	0.0044
Ag-D	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
As-D	mg/L	0.0666	0.0297	0.0582	0.0681	0.0692	0.0524	0.0771	0.0776	0.0691	0.0672	0.0762	0.0778	0.0797	0.104	0.0733	0.0655	0.0117	0.00203	0.0392
Ba-D	mg/L	0.0266	0.0261	0.0212	0.0200	0.0227	0.0181	0.0178	0.0179	0.0183	0.0185	0.0174	0.0178	0.0168	0.0189	0.0172	0.0682	0.0789	0.0703	0.0762
B-D	mg/L	0.885	0.856	1.18	1.15	1.05	1.10	1.15	1.13	1.20	1.10	1.13	1.09	1.21	1.30	1.24	0.328	0.325	0.411	0.322
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bi-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd-D	mg/L	<0.0000050	<0.0000050	0.0000060	<0.0000050	0.0000052	0.0000050	0.0000240	0.0000080	0.0000080	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000110	0.0000050	<0.0000050	0.0000110	0.0000121	<0.0000050
Ca-D	mg/L	442	417	529	565	548	529	524	491	575	490	517	512	523	476	481	83.1	70.4	86.0	78.5
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	mg/L	0.00723	0.0174	0.00623	0.00376	0.00398	0.00380	0.00299	0.00286	0.00248	0.00227	0.00194	0.00189	0.00190	0.00132	0.00182	0.00190	0.00139	0.00247	0.00087
Cu-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00102	0.00054	<0.00020	<0.00020	<0.00020	<0.00020	0.00060	<0.00020	0.00036	0.00040	0.00184	0.00074	<0.00020
Fe-D	mg/L	1.79	2.33	0.529	0.885	0.776	0.694	0.891	0.818	1.03	0.856	1.16	1.17	1.38	1.47	1.06	<0.0050	0.0071	0.0619	<0.0050
Hard-D	mg/L	1480	1510	1960	2200	2090	2090	2190	2140	2320	2090	2230	2290	2280	2260	2150	265	234	293	262
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-D	mg/L	92.1	113	154	192	176	186	213	222	216	210	229	244	236	259	231	14.0	14.0	19.1	16.0
Mn-D	mg/L	1.12	1.30	1.32	1.42	1.46	1.42	1.40	1.46	1.44	1.44	1.47	1.46	1.54	1.33	1.49	0.135	0.0736	0.125	0.0881
Hg-D	mg/L	0.0000037	0.0000059	0.0000056	0.0000084	0.0000025	0.0000058	0.0000028	0.0000040	0.0000044	0.000008	0.0000051	0.0000052	0.0000024	0.0000051	0.0000027	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Na-D	mg/L	54.0	46.1	75.6	71.8	73.1	69.0	64.6	71.6	68.8	66.8	68.1	71.8	66.2	67.9	62.7	15.1	15.9	16.9	14.8
Mo-D	mg/L	0.0018	0.0011	0.0020	0.0018	0.0017	0.0015	0.0016	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0017	0.0015	0.0011	0.0010	0.0011	<0.0010
Ni-D	mg/L	0.0194	0.0346	0.0202	0.0136	0.0142	0.0146	0.0172	0.0124	0.0101	0.0090	0.0087	0.0081	0.0079	0.0058	0.0079	0.0039	0.0035	0.0050	0.0022
K-D	mg/L	6.08	5.89	7.68	8.31	9.02	7.71	7.86	8.13	7.81	7.95	7.36	8.15	7.53	8.25	7.71	2.30	2.01	2.22	2.06
S-D	mg/L	479	551	634	702	696	681	689	721	736	725	736	731	718	791	714	55.8	48.2	70.5	56.8
Sb-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00099	0.00086	0.00073	<0.00050
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00025	<0.00010	<0.00010	<0.00010
Si-D	mg/L	2.48	2.25	2.74	3.11	3.07	2.74	2.76	2.70	2.95	2.52	2.61	2.87	3.20	3.05	2.88	3.43	3.77	3.57	3.80
Sr-D	mg/L	3.21	3.08	4.22	4.78	4.77	4.67	5.08	5.04	5.50	4.99	5.64	4.92	5.23	5.09	4.83	0.567	0.619	0.726	0.665
Tl-D	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000050	<0.000050	<0.000050
Ti-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
U-D	mg/L	0.00096	0.00079	0.00123	0.00121	0.00135	0.00151	0.00166	0.00163	0.00157	0.00149	0.00146	0.00139	0.00141	0.00129	0.00158	<0.00010	<0.00010	<0.00010	<0.00010
V-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zn-D	mg/L	<0.0050	0.0114	0.0085	0.0077	0.0111	0.0080	0.0140	0.0078	0.0058	0.0051	0.0062	0.0061	0.0073	0.0063	0.0081	<0.0050	<0.0050	<0.0050	<0.0050
* Calculated parameters																				

Table 9

7-South Monitoring Results Ex-Situ														
Site ID:		**CSR-AW**	**QU08-10**		**QU08-13 A**					**QU08-13 B**				
Date:			16-May-16	24-Oct-16	03-Mar-16	14-Jun-16	13-Sep-16	13-Dec-16	02-Feb-17	03-Mar-16	14-Jun-16	13-Sep-16	24-Nov-16	06-Mar-17
Parameter:	**Units**													
SO4-D	mg/L	**1000**	20.3	18.8	24.3	19.2	17.7	17.0	17.2	9.37	9.35	9.05	9.62	9.54
S2-T	mg/L		0.0086	0.0078	0.127	0.157	0.157	0.111	0.130	0.0053	0.0104	0.0160	0.0189	<0.0050
H2S	mg/L	**0.02**	0.0090	0.0080	0.13	0.17	0.17	0.12	0.14	0.0060	0.011	0.017	0.020	<0.0050
Cond-F	uS/cm		428	369.6	372	354	438	413	421.6	236	243	296	326.8	293.9
pH-F	pH Units		7.26	7.36	7.78	7.85	7.5	7.73	7.65	8.07	8.21	8.01	8.08	7.97
Alk-T	mg/L		166	158	179	180	169	175	179	125	131	124	129	126
Acidity83	mg/L		2.07	<0.50	<0.50	<0.50	<0.50	<0.50	1.40	<0.50	<0.50	<0.50	<0.50	<0.50
N-D	mg/L		0.204	0.243	0.237	0.195	0.299	0.210	0.241	0.260	0.128	0.142	0.215	0.135
DOC	mg/L		0.84	1.35	0.86	0.95	<0.50	0.67	<0.50	<0.50	1.14	<0.50	0.67	1.55
Hydrox	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bicarb	mg/L		203	193	213	219	206	213	218	153	155	151	157	154
Carb	mg/L		<0.50	<0.50	2.58	<0.50	<0.50	<0.50	<0.50	<0.50	2.46	<0.50	<0.50	<0.50
Cl-D	mg/L	**1500**	0.96	1.3	7.5	7.3	6.6	6.0	7.0	0.92	1.4	1.5	1.4	0.79
F-D	mg/L	**2**	0.630	0.600	0.670	0.720	0.410	0.690	0.660	0.360	0.390	0.720	0.380	0.390
Br-D	mg/L		<0.010	<0.010	0.014	0.012	0.013	0.012	0.014	<0.010	<0.010	<0.010	<0.010	<0.010
P-D	mg/L		0.0177	0.0279	0.216	0.170	0.174	0.155	0.0931	0.155	0.220	0.216	0.299	0.213
TSS	mg/L		12.8	28.3	6.0	<4.0	6.5	5.0	<4.0	88.0	26.3	13.0	5.5	187
Al-D	mg/L		0.0044	0.0086	0.0071	0.0048	<0.0030	0.0057	<0.0030	0.0085	0.0138	0.0084	0.0073	0.0201
Ag-D	mg/L	*	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
As-D	mg/L	**0.05**	0.00109	0.00164	0.397	0.425	0.447	0.405	0.429	0.455	0.508	0.528	0.482	0.469
Ba-D	mg/L	**10**	0.106	0.144	0.234	0.240	0.215	0.228	0.225	0.0339	0.0341	0.0356	0.0348	0.0301
B-D	mg/L	**50**	0.213	0.223	0.795	0.672	0.698	0.681	0.702	0.300	0.280	0.321	0.304	0.286
Be-D	mg/L	**0.053**	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bi-D	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd-D	mg/L	*	0.0000120	0.0000090	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000240	<0.0000050
Ca-D	mg/L		63.2	47.4	36.8	37.1	35.1	30.7	31.1	24.4	25.9	25.3	25.0	23.6
Cr-D	mg/L	**0.01**	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	mg/L	**0.04**	<0.00050	0.00066	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020
Cu-D	mg/L	*	0.00040	0.00053	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Fe-D	mg/L		0.0190	0.0312	0.262	0.216	0.221	0.222	0.205	0.120	0.228	0.109	0.116	0.120
Hard-D	mg/L		199	160	127	128	121	110	110	76.3	80.4	79.9	77.5	75.0
Pb-D	mg/L	*	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-D	mg/L		9.92	10.1	8.58	8.71	8.04	8.02	7.94	3.75	3.83	4.07	3.66	3.94
Mn-D	mg/L		0.0336	0.120	0.0514	0.0521	0.0459	0.0813	0.0431	0.0878	0.0880	0.0809	0.0749	0.0888
Hg-D	mg/L	**0.001**	0.0000075	0.0000089	0.0000041	<0.0000020	<0.0000020	<0.0000020	0.0000034	0.0000069	0.0000031	0.0000049	0.0000121	0.0000021
Na-D	mg/L		9.05	8.28	40.0	40.8	38.5	37.3	37.3	27.8	31.0	30.8	25.2	28.0
Mo-D	mg/L	**10**	0.0016	0.0014	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0027	0.0029	0.0033	0.0028	0.0029
Ni-D	mg/L	*	0.0013	0.0025	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0185	<0.0010	<0.0010	<0.0010
K-D	mg/L		2.45	2.52	2.08	2.14	2.21	2.02	1.87	1.22	1.33	1.39	1.25	1.24
S-D	mg/L		5.6	6.9	8.7	8.9	6.6	6.7	6.0	3.5	5.2	4.0	3.5	3.3
Sb-D	mg/L	**0.2**	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Se-D	mg/L	**0.01**	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Si-D	mg/L		4.74	4.27	4.22	4.27	4.25	3.58	3.49	4.57	4.90	4.90	4.50	4.09
Sr-D	mg/L		0.347	0.415	0.440	0.453	0.410	0.408	0.426	0.154	0.166	0.179	0.163	0.173
Tl-D	mg/L	**0.003**	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010
Ti-D	mg/L	**1**	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
U-D	mg/L		0.00089	0.00059	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
V-D	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zn-D	mg/L	*	0.0294	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0130	<0.0050	<0.0050	<0.0050
* Calculated parameters														
Highlighted Red indicates CSR-AW exceedance														

Table 10

5-South Monitoring Results In-Situ									
Site ID:		**5SXC**		**5SMW**					
Date:		13-Sep-16	20-Oct-16	21-Jan-16	02-Mar-16	05-Jul-16	27-Oct-16	10-Jan-17	29-Mar-17
Parameter:	**Units**								
SO4-D	**mg/L**	388	487	748	541	404	434	245	245
S2-T	**mg/L**	0.0127	0.0298	-	0.0294	<0.0050	0.0337	0.0056	-
H2S	**mg/L**	0.014	0.032	-	0.031	<0.0050	0.036	0.0060	-
Cond-F	**uS/cm**	1812	1893	2020	1841	-	1940	1392	1096
pH-F	**pH Units**	7.1	7.2	7.3	7.1	-	7.1	7.8	7.2
Alk-T	**mg/L**	242	317	342	326	185	341	658	-
Acidity83	**mg/L**	0.58	<0.50	13.4	11.7	3.52	10.5	0.71	-
N-D	**mg/L**	0.180	0.410	-	0.377	0.164	0.428	0.127	-
DOC	**mg/L**	0.91	1.49	-	1.39	1.47	1.84	<0.50	-
Hydrox	**mg/L**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-
Bicarb	**mg/L**	295	386	417	398	226	416	47.7	-
Carb	**mg/L**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-
Cl-D	**mg/L**	5.8	6.3	-	6.7	6.1	8.1	4.2	-
F-D	**mg/L**	0.240	0.160	-	0.150	0.180	0.160	0.110	-
Br-D	**mg/L**	<0.010	<0.10	-	<0.10	<0.10	<0.050	<0.010	-
P-D	**mg/L**	0.0051	0.0053	-	<0.0020	0.0048	<0.0020	0.0187	0.0022
TSS	**mg/L**	4.8	43.0	55.0	52.0	<4.0	29	11.0	-
Al-D	**mg/L**	<0.0030	0.0076	0.0039	<0.0030	0.0068	0.0060	0.0159	0.0264
Ag-D	**mg/L**	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
As-D	**mg/L**	0.00025	0.00014	0.00027	0.00019	0.00022	0.00022	0.00011	0.00011
Ba-D	**mg/L**	0.0186	0.0170	0.0159	0.0175	0.0183	0.0179	0.0157	0.0207
B-D	**mg/L**	1.12	1.09	1.49	1.26	0.926	1.17	0.192	0.873
Be-D	**mg/L**	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bi-D	**mg/L**	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd-D	**mg/L**	0.0000061	0.0000150	0.0000100	<0.0000050	0.0000290	0.0000081	0.0000360	0.0000050
Ca-D	**mg/L**	68.0	68.6	105	76.6	85.1	68.7	84.1	53.7
Cr-D	**mg/L**	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	**mg/L**	0.00524	0.00689	0.0291	0.0191	0.0182	0.0109	0.0109	0.00282
Cu-D	**mg/L**	0.00025	0.00068	0.00027	0.00026	0.00054	0.00028	<0.00020	0.00094
Fe-D	**mg/L**	0.0125	0.139	<0.0050	<0.0050	0.0056	<0.0050	<0.0050	0.0141
Hard-D	**mg/L**	206	216	331	248	256	216	238	170
Pb-D	**mg/L**	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-D	**mg/L**	8.86	10.9	17.0	13.9	10.5	10.9	6.88	8.70
Mn-D	**mg/L**	0.213	0.225	0.561	0.393	0.323	0.332	0.489	0.183
Hg-D	**mg/L**	<0.0000020	0.0000050	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-
Na-D	**mg/L**	198	270	353	290	178	281	24.7	205
Mo-D	**mg/L**	0.0032	0.0014	<0.0010	<0.0010	0.0021	0.0012	0.0011	0.0012
Ni-D	**mg/L**	0.0100	0.0235	0.0437	0.0284	0.0339	0.0182	0.0233	0.0058
K-D	**mg/L**	4.57	5.69	7.30	6.62	4.03	5.71	1.35	5.65
S-D	**mg/L**	141	164	269	209	143	156	88.7	108
Sb-D	**mg/L**	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Se-D	**mg/L**	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00014	<0.00010
Si-D	**mg/L**	2.44	2.62	2.95	2.64	2.41	2.71	2.95	2.87
Sr-D	**mg/L**	0.710	0.829	1.26	1.02	0.680	0.834	0.317	0.622
Tl-D	**mg/L**	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010
Ti-D	**mg/L**	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
U-D	**mg/L**	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
V-D	**mg/L**	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zn-D	**mg/L**	<0.0050	0.0050	<0.0050	<0.0050	0.0119	<0.0050	<0.0050	<0.0050
* Calculated parameters									

Table 11

4-South Monitoring Results																		
		In-Situ					Ex-Situ											
Site ID:		QU11-01		QU78-161		CSR-AW	QU10-07 D			QU10-08 D		QU10-09 S			QU10-09 D			
Date:		23-Mar-16	08-Nov-16	22-Mar-16	15-Nov-16		21-Mar-16	28-Sep-16	14-Mar-17	17-Mar-16	16-Mar-17	24-Feb-16	26-Sep-16	19-Jan-17	09-Mar-16	26-Sep-16	19-Jan-17	
Parameter:	Units																	
SO4-D	mg/L	1470	1600	1450	1410	1000	6.59	8.13	3.21	3.97	2.58	126	109	116	76.8	93.8	84.8	
S2-T	mg/L	0.0373	0.0660	0.0362	0.0681		0.0619	0.109	0.159	0.369	<0.0050	0.0187	0.0261	<0.0050	0.169	0.250	0.125	
H2S	mg/L	0.040	0.070	0.038	0.072	0.02	0.066	0.12	0.17	0.39	<0.0050	0.020	0.028	<0.0050	0.18	0.27	0.13	
Cond-F	uS/cm	2357	2819	2831	3360		601	591	608	566	410	329.1	550	569	575	589	566.4	
pH-F	pH Units	6.58	6.62	6.46	6.43		8.18	8.09	8.14	8.65	8.49	6.88	6.85	6.74	8.1	7.45	7.21	
Alk-T	mg/L	56.3	94.6	184	204		303	296	302	276	301	140	132	157	185	184	188	
Acidity83	mg/L	179	276	146	116		<0.50	<0.50	<0.50	<0.50	<0.50	2.01	2.74	4.56	<0.50	<0.50	3.26	
N-D	mg/L	0.478	0.729	0.272	0.341		0.150	0.171	0.214	0.108	0.151	0.130	0.092	0.130	0.155	0.173	0.183	
DOC	mg/L	2.65	1.87	1.68	2.76		6.27	3.64	5.19	3.02	5.81	1.77	0.52	0.76	0.88	2.64	<0.50	
Hydrox	mg/L	<0.50	<0.50	<0.50	<0.50		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
Bicarb	mg/L	68.7	115	224	249		365	361	354	319	349	171	161	191	226	225	229	
Carb	mg/L	<0.50	<0.50	<0.50	<0.50		2.38	<0.50	7.33	8.58	8.94	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
Cl-D	mg/L	4.2	6.3	5.0	4.6	1500	5.5	5.8	5.1	5.3	7.3	1.9	1.8	1.2	2.6	3.4	1.7	
F-D	mg/L	0.200	0.270	0.200	0.240	2	1.40	1.40	1.60	2.30	2.80	0.041	0.066	0.063	0.350	0.290	0.220	
Br-D	mg/L	<0.10	<0.10	<0.010	<0.10		0.015	0.013	0.016	0.012	0.014	0.031	0.032	0.025	0.013	0.022	0.015	
P-D	mg/L	0.0152	0.0153	0.0399	0.0459		0.768	0.709	0.820	0.223	0.261	0.0338	0.0347	0.0232	0.0300	0.0468	0.0338	
TSS	mg/L	15.8	46.0	22.3	45.3		10.0	6.8	6.8	53.5	258	9.5	10.3	31.0	<4.0	<4.0	<4.0	
Al-D	mg/L	0.0058	0.0043	0.0186	0.0076		0.0301	0.0331	0.103	0.0579	0.0061	<0.0030	<0.0030	<0.0030	0.0392	<0.0030	<0.0030	
Ag-D	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	*	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	
As-D	mg/L	0.0913	0.0831	0.176	0.183	0.05	0.0823	0.108	0.0930	0.168	0.161	0.0787	0.0907	0.0829	0.118	0.0977	0.100	
Ba-D	mg/L	0.0135	0.0130	0.0149	0.0144	10	0.0515	0.0483	0.0523	0.0221	0.0226	0.143	0.139	0.154	0.0832	0.157	0.136	
B-D	mg/L	0.951	0.833	1.43	1.10	50	2.16	1.76	1.84	2.34	2.20	0.051	0.060	0.054	0.806	0.564	0.440	
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.053	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Bi-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Cd-D	mg/L	0.0000050	<0.0000050	<0.0000050	<0.0000050	*	0.0000050	<0.0000050	0.0000306	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Ca-D	mg/L	397	364	433	423		5.63	5.11	5.79	2.52	2.55	74.5	68.9	81.9	35.8	47.4	61.4	
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.01	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Co-D	mg/L	<0.00050	<0.00050	0.00219	0.00131	0.04	<0.00050	<0.00050	0.00030	<0.00050	<0.00020	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Cu-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	*	<0.00020	<0.00020	0.00026	0.00221	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	
Fe-D	mg/L	235	216	149	142		0.277	0.168	0.244	0.0934	0.0760	5.84	5.07	5.72	0.194	0.346	0.741	
Hard-D	mg/L	1290	1160	1270	1250		18.7	17.2	19.5	7.31	7.56	237	215	253	125	161	203	
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	*	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	
Mg-D	mg/L	71.5	61.7	45.3	46.9		1.12	1.08	1.22	0.245	0.290	12.3	10.5	11.8	8.54	10.3	12.1	
Mn-D	mg/L	4.22	4.04	2.93	3.02		0.631	0.557	0.564	0.174	0.153	0.406	0.354	0.405	0.0147	0.147	0.115	
Hg-D	mg/L	0.0000060	0.0000030	0.0000064	0.0000042	0.001	0.0000039	0.0000047	0.0000028	0.0000053	0.0000024	0.0000053	0.0000033	0.0000058	<0.0000020	<0.0000020	0.0000045	
Na-D	mg/L	126	112	107	120		127	137	133	127	129	10.5	9.10	9.52	58.0	52.4	35.1	
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	10	0.0064	0.0056	0.0061	<0.0010	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Ni-D	mg/L	<0.0010	<0.0010	0.0055	0.0030	*	<0.0010	<0.0010	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
K-D	mg/L	7.72	6.22	6.45	5.97		1.06	0.973	1.01	0.683	0.650	0.730	0.699	0.726	1.94	2.00	1.56	
S-D	mg/L	616	516	536	509		<3.0	<3.0	<3.0	<3.0	<3.0	45.1	38.3	37.4	27.0	32.2	29.9	
Sb-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.2	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Se-D	mg/L	0.00014	<0.00010	0.00052	<0.00010	0.01	0.00021	<0.00010	0.00019	0.00026	<0.00010	<0.00010	<0.00010	<0.00010	0.00018	<0.00010	<0.00010	
Si-D	mg/L	6.60	5.82	6.34	5.75		3.71	3.50	3.88	5.10	4.49	9.17	8.80	10.0	8.51	9.29	10.8	
Sr-D	mg/L	2.18	2.11	1.78	1.91		0.0666	0.0642	0.0703	0.0571	0.0804	0.299	0.270	0.300	0.786	1.02	0.987	
Tl-D	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.003	<0.000050	<0.000050	<0.000010	<0.000050	<0.000010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Ti-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	1	<0.0050	0.0062	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
U-D	mg/L	0.00012	0.00010	0.00016	0.00014		0.00033	0.00026	0.00028	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	0.00026	<0.00010	
V-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
* Calculated parameters																		
Highlighted Red indicates CSR-AW exceedance																		

Table 12

2-3 South Monitoring Results
In-Situ

Site ID:		MW00-4					QU11-11														
Date:		10-Feb-16	21-Apr-16	13-Jul-16	11-Oct-16	04-Jan-17	12-Jan-16	02-Feb-16	01-Mar-16	04-Apr-16	05-May-16	02-Jun-16	07-Jul-16	02-Aug-16	06-Sep-16	11-Oct-16	01-Nov-16	05-Dec-16	02-Jan-17	01-Feb-17	07-Mar-17
Parameter:	Units																				
SO4-D	mg/L	327	293	323	276	299	664	569	541	472	599	634	576	691	562	552	521	471	483	544	477
S2-T	mg/L	0.0058	0.0055	0.0069	<0.0050	0.0097	0.0234	0.0883	0.0084	0.0103	0.0115	0.0213	0.0415	0.206	0.0775	0.0309	0.0258	0.0247	0.026	0.022	0.0264
H2S	mg/L	0.0060	0.0060	0.0070	<0.0050	0.010	0.025	-	0.0090	0.011	0.012	0.023	0.044	0.22	0.082	0.033	0.027	0.026	0.028	0.023	0.028
Cond-F	uS/cm	1037	978.5	1082	1147	1089	934	1490	1042	953	1860	1721	1865	1614	1711	2048	1074	1022	999	1520	1448
pH-F	pH Units	6.94	6.92	6.71	6.89	6.85	7.08	6.7	6.8	7.03	6.87	6.95	7.06	6.8	6.71	6.81	6.36	7.02	7.09	7.33	6.96
Alk-T	mg/L	102	134	160	141	152	267	259	245	215	256	262	274	276	265	225	245	244	252	253	250
Acidity83	mg/L	3.80	<0.50	7.18	4.82	2.14	-	-	3.65	-	-	<0.50	-	-	-	-	-	-	-	-	-
N-D	mg/L	0.169	0.161	0.138	0.238	0.138	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DOC	mg/L	1.57	3.82	2.78	4.43	2.58	-	-	<0.50	-	-	1.49	-	-	-	-	-	-	-	-	-
Hydrox	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bicarb	mg/L	125	163	196	172	186	326	316	299	262	312	320	334	337	323	274	299	298	308	309	305
Carb	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cl-D	mg/L	1.0	0.91	0.91	1.3	<0.50	-	-	1.4	-	-	1.3	-	-	-	-	-	-	-	-	-
F-D	mg/L	0.063	0.076	0.091	0.072	0.086	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Br-D	mg/L	<0.010	<0.10	<0.10	0.035	<0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P-D	mg/L	0.0054	0.0183	<0.0020	0.0047	0.0022	<0.0020	0.0027	<0.0020	0.0027	0.0030	0.0026	<0.0020	0.0098	<0.0020	0.0062	0.0022	<0.0020	0.0023	0.0070	0.0021
TSS	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	-	-	5.3	-	-	6.8	-	-	-	-	-	-	-	-	-
Al-D	mg/L	0.0277	0.0078	0.0078	0.0163	0.0070	0.0127	<0.0030	<0.0030	<0.0030	<0.0030	0.0037	0.0033	0.0038	0.0050	0.0090	<0.0030	0.0057	0.0051	0.0048	<0.0030
Ag-D	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
As-D	mg/L	0.00065	0.00084	0.00027	0.00031	0.00016	0.00144	0.00165	0.00089	0.00069	0.00102	0.00117	0.00111	0.00174	0.00160	0.00087	0.00144	0.00096	0.00084	0.00117	0.0009
Ba-D	mg/L	0.0228	0.0302	0.0372	0.0269	0.0341	0.0188	0.0194	0.0196	0.0196	0.0212	0.0208	0.0197	0.0186	0.0183	0.0193	0.0183	0.0181	0.0207	0.0172	0.0206
B-D	mg/L	0.200	0.258	0.284	0.238	0.258	0.936	0.782	0.736	0.652	0.590	0.699	0.725	0.821	0.729	0.624	0.680	0.624	0.634	0.656	0.623
Be-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bi-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd-D	mg/L	0.0000050	0.0000076	0.0000052	0.0000110	0.0000090	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000090	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Ca-D	mg/L	123	133	134	101	133	245	203	189	192	226	237	236	233	229	216	189	179	212	175	190
Cr-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00076	0.00059	0.00082	0.00075	0.00081	0.00078	0.00067	0.00190	<0.00050	0.00329	0.00107	<0.00050	0.00074	0.00060	0.00030
Cu-D	mg/L	0.00127	0.00092	0.00104	0.00167	0.00086	0.00117	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00038	<0.00020
Fe-D	mg/L	0.0137	0.0225	0.0054	0.0112	<0.0050	0.0172	0.272	0.0060	<0.0050	<0.0050	<0.0050	<0.0050	0.0051	<0.0050	0.0110	<0.0050	0.456	0.0084	0.0136	<0.0050
Hard-D	mg/L	378	401	398	298	400	675	562	531	533	626	657	657	651	634	596	520	493	588	492	526
Pb-D	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-D	mg/L	17.1	16.9	15.5	11.1	16.2	15.4	13.6	14.4	12.8	15.2	15.8	16.2	16.9	15.4	13.7	11.6	11.0	14.4	13.5	12.1
Mn-D	mg/L	0.0130	0.0041	0.0025	0.0014	0.0041	0.381	0.309	0.241	0.253	0.368	0.369	0.383	0.365	0.362	0.454	0.346	0.219	0.261	0.279	0.242
Hg-D	mg/L	0.0000054	0.0000044	0.0000047	0.0000035	0.0000031	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	<0.0000020	-	<0.0000020	<0.0000020
Na-D	mg/L	41.7	47.6	59.9	54.7	49.6	151	134	122	114	100	117	127	129	118	95.3	112	102	113	107	104
Mo-D	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011
Ni-D	mg/L	0.0025	<0.0010	<0.0010	<0.0010	<0.0010	0.0014	0.0012	0.0019	0.0016	0.0013	0.0012	0.0011	0.0053	<0.0010	0.0064	0.0018	0.0011	0.0016	0.0011	<0.0010
K-D	mg/L	1.64	1.87	1.96	1.69	1.73	2.02	1.85	1.70	1.77	1.90	1.89	2.05	2.18	1.81	1.65	1.54	1.56	1.71	1.62	1.64
S-D	mg/L	125	112	123	102	116	242	226	199	193	219	214	232	243	204	192	175	159	187	168	166
Sb-D	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Se-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00014	<0.00010	<0.00010
Si-D	mg/L	3.42	3.63	3.15	3.53	3.67	3.56	3.36	3.02	3.21	3.44	3.06	3.47	3.47	3.68	3.83	3.07	2.84	3.59	2.92	2.89
Sr-D	mg/L	0.849	0.901	1.04	0.884	0.970	2.10	2.04	1.83	1.78	2.42	2.08	2.01	1.99	1.97	1.99	1.87	1.59	1.81	1.71	1.89
Tl-D	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	-	<0.000010	<0.000010
Ti-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
U-D	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
V-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zn-D	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0056	0.0073	<0.0050	0.0674	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0108	<0.0050	0.0076	0.011	<0.0050	<0.0050
* Calculated parameters																					

Table 13

2-3 South Monitoring Results
Ex-Situ

Site ID:		CSR-AW	MW00-2					MW12-23			MW12-24				
Date:			14-Jan-16	27-Apr-16	14-Jul-16	06-Oct-16	11-Jan-17	29-Mar-16	22-Sep-16	28-Feb-17	29-Mar-16	12-Jul-16	22-Sep-16	13-Dec-16	21-Feb-17
Parameter:	Units														
SO4-D	mg/L	1000	1220	1240	1290	1320	1210	947	734	710	16.3	7.90	42.3	24.7	33.4
S2-T	mg/L		0.0076	0.0056	0.0059	<0.0019	<0.0050	0.0369	0.0090		0.0168	<0.0050	0.0054	0.0070	<0.0050
H2S	mg/L	0.02	0.0080	0.0060	0.0060	<0.0019	<0.0050	0.039	0.010		0.018	<0.0050	0.0060	0.0070	<0.0050
Cond-F	uS/cm		1630	2778	2748	2445	2470	4682	2600		1133	687	1054	900	771
pH-F	pH Units		6.77	6.75	6.67	6.97	6.62	7.04	-		7.77	7.4	7.45	8.73	8.26
Alk-T	mg/L		210	215	206	187	205	564	495		397	304	388	430	396
Acidity83	mg/L		9.34	9.85	22.8	21.3	15.4	4.31	<0.50		<0.50	<0.50	<0.50	<0.50	<0.50
N-D	mg/L		0.263	0.180	0.160	0.240	0.215	0.544	1.81		0.184	0.304	0.168	0.190	0.193
DOC	mg/L		1.23	1.03	0.65	2.35	0.55	28.7	18.4	Not enough water for full set	1.39	2.59	3.00	1.80	4.01
Hydrox	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50		<0.50	<0.50	<0.50	<0.50	<0.50
Bicarb	mg/L		256	262	252	228	250	688	604		477	360	442	495	461
Carb	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50		3.50	5.45	15.5	14.1	10.6
Cl-D	mg/L	1500	2.4	2.3	2.3	5.6	2.0	66	37		5.4	5.7	7.5	5.8	7.2
F-D	mg/L	2	0.150	0.110	0.130	0.130	0.120	0.150	0.160		0.150	0.170	0.190	0.190	0.200
Br-D	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10	0.466	0.25		0.032	0.027	<0.10	<0.10	<0.10
P-D	mg/L		0.0023	<0.0020	0.0046	<0.0020	<0.0020	0.0540	0.0758		0.0460	0.0373	0.0468	0.0610	0.0669
TSS	mg/L		7.0	9.0	5.0	<4.0	4.8	37.8	20.8		14.8	33.5	5.0	10.5	16.8
Al-D	mg/L		<0.0030	0.0031	<0.0030	0.0097	<0.0030	0.0261	0.0107	0.0130	0.0275	0.0076	0.0211	0.0179	0.0309
Ag-D	mg/L	*	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
As-D	mg/L	0.05	0.00041	0.00040	0.00048	0.00071	0.00082	0.00667	0.00138	0.00290	0.00174	0.00121	0.00207	0.00255	0.00281
Ba-D	mg/L	10	0.0153	0.0155	0.0169	0.0183	0.0191	0.0496	0.0447	0.0364	0.0370	0.0305	0.0275	0.0305	0.0298
B-D	mg/L	50	0.482	0.472	0.511	0.490	0.548	0.522	0.523	0.480	0.575	0.634	0.561	0.522	0.626
Be-D	mg/L	0.053	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bi-D	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd-D	mg/L	*	0.0000110	0.0000120	<0.0000050	0.0000060	0.0000120	0.0000080	0.000450	0.0000252	0.0000250	0.0000372	<0.0000050	<0.0000050	0.0000060
Ca-D	mg/L		455	445	464	482	478	83.8	68.5	50.8	12.4	10.2	9.77	9.45	10.3
Cr-D	mg/L	0.01	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Co-D	mg/L	0.04	0.00552	0.00586	0.00536	0.00563	0.00536	0.00575	0.00332	0.00216	<0.00050	<0.00050	<0.00050	<0.00050	0.00041
Cu-D	mg/L	*	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00053	0.00522	0.00347	0.00215	0.00198	0.00039	0.00075	0.00130
Fe-D	mg/L		2.06	3.07	2.55	2.39	2.70	0.880	0.0328	0.0483	0.0093	0.0078	0.0123	0.0205	0.0246
Hard-D	mg/L		1320	1300	1370	1410	1430	220	180	136	32.8	26.9	25.7	25.1	27.2
Pb-D	mg/L	*	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Mg-D	mg/L		44.8	45.8	50.6	50.4	58.1	2.61	2.09	2.09	0.435	0.321	0.323	0.373	0.367
Mn-D	mg/L		2.62	2.52	2.40	2.68	2.51	1.10	0.731	0.335	0.0339	0.0871	0.0994	0.112	0.131
Hg-D	mg/L	0.001	0.0000030	0.0000033	0.0000030	0.0000051	<0.0000020	0.000011	0.0000058	-	0.0000062	0.0000064	0.0000030	0.0000032	0.0000041
Na-D	mg/L		82.2	83.8	77.7	76.4	82.8	612	544	521	166	135	176	186	178
Mo-D	mg/L	10	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0083	0.0080	0.0088	0.0040	0.0026	0.0034	0.0067	0.0058
Ni-D	mg/L	*	0.0028	0.0029	0.0025	0.0027	0.0026	0.0187	0.0228	0.0146	0.0030	0.0035	0.0031	0.0034	0.0034
K-D	mg/L		3.81	4.06	4.17	4.19	5.13	2.16	2.97	2.26	1.31	1.07	1.24	1.30	1.12
S-D	mg/L		426	445	476	473	509	323	281	250	4.2	3.6	7.0	7.6	8.1
Sb-D	mg/L	0.2	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00127	<0.00050	<0.00050	0.00060	<0.00050	<0.00050	<0.00050
Se-D	mg/L	0.01	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00075	0.00671	0.00142	0.00109	0.00097	0.00023	0.00038	0.00015
Si-D	mg/L		3.04	3.27	3.38	3.47	3.78	5.40	4.35	4.67	3.06	3.11	2.70	2.55	2.87
Sr-D	mg/L		2.93	3.13	3.15	3.64	3.70	1.26	1.06	0.851	0.131	0.108	0.115	0.124	0.118
Tl-D	mg/L	0.003	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010
Ti-D	mg/L	1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
U-D	mg/L		0.00035	0.00038	0.00039	0.00039	0.00040	0.0313	0.0260	0.0479	0.00194	0.00131	0.00270	0.00280	0.00270
V-D	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zn-D	mg/L	*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0093	<0.0050	0.0077	0.0155	<0.0050	<0.0050	<0.0050

* Calculated parameters

Highlighted Red indicates CSR-AW exceedance

Table 14

242 Monitoring Results						
		In-Situ			Ex-Situ	
Site ID:		242-D		CSR-AW	242-PS	
Date:		14-Jan-16	02-Mar-16		12-Oct-16	22-Mar-17
Parameter:	Units					
SO4-D	mg/L	68.1	59.1	**1000**	62.1	18.9
S2-T	mg/L	0.0104	0.0079		-	-
H2S	mg/L	0.011	0.0080	**0.02**	-	-
Cond-F	uS/cm	167.3	229		48	84
pH-F	pH Units	6.66	6.52		6.8	7.2
Alk-T	mg/L	61.5	68.7		11.1	5.60
Acidity83	mg/L	1.01	3.27		1.12	2.87
N-D	mg/L	0.124	0.145		-	-
DOC	mg/L	1.29	<0.50		-	-
Hydrox	mg/L	<0.50	<0.50		<0.50	<0.50
Bicarb	mg/L	75.0	83.9		13.6	6.83
Carb	mg/L	<0.50	<0.50		<0.50	<0.50
Cl-D	mg/L	<0.50	0.90	**1500**	-	-
F-D	mg/L	0.130	0.120	**2**	-	-
Br-D	mg/L	<0.010	<0.010		-	-
P-D	mg/L	<0.0020	<0.0020		-	-
TSS	mg/L	<4.0	5.3		<4.0	<4.0
Al-D	mg/L	0.0043	0.0042		0.0473	0.0070
Ag-D	mg/L	<0.000020	<0.000020	*	<0.000020	<0.000020
As-D	mg/L	0.00035	0.00037	**0.05**	0.00282	0.00048
Ba-D	mg/L	0.0559	0.0625	**10**	0.0354	0.0126
B-D	mg/L	0.105	0.140	**50**	0.063	<0.050
Be-D	mg/L	<0.00010	<0.00010	**0.053**	<0.00010	<0.00010
Bi-D	mg/L	<0.0010	<0.0010		<0.0010	<0.0010
Cd-D	mg/L	0.0000110	0.0000110	*	0.0000400	0.0000200
Ca-D	mg/L	40.5	40.9		21.8	8.87
Cr-D	mg/L	<0.0010	<0.0010	**0.01**	<0.0010	<0.0010
Co-D	mg/L	0.00079	0.00051	**0.04**	0.00077	0.00142
Cu-D	mg/L	0.00026	0.00021	*	0.00114	0.00024
Fe-D	mg/L	<0.0050	<0.0050		0.0229	0.0346
Hard-D	mg/L	117	119		65.4	26.1
Pb-D	mg/L	<0.00020	<0.00020	*	<0.00020	<0.00020
Mg-D	mg/L	3.98	3.95		2.64	0.950
Mn-D	mg/L	0.0675	0.0519		0.123	0.151
Hg-D	mg/L	0.0000055	0.0000054	**0.001**	<0.0000020	<0.0000020
Na-D	mg/L	4.64	4.83		2.32	0.763
Mo-D	mg/L	<0.0010	<0.0010	**10**	<0.0010	<0.0010
Ni-D	mg/L	0.0022	0.0016	*	0.0019	<0.0010
K-D	mg/L	0.602	0.639		0.540	0.232
S-D	mg/L	23.0	22.9		21.1	7.3
Sb-D	mg/L	<0.00050	<0.00050	**0.2**	<0.00050	<0.00050
Se-D	mg/L	<0.00010	<0.00010	**0.01**	<0.00010	<0.00010
Si-D	mg/L	3.40	3.37		3.16	1.40
Sr-D	mg/L	0.0904	0.100		0.0585	0.0243
Tl-D	mg/L	0.000142	0.000111	**0.003**	<0.000050	<0.000010
Ti-D	mg/L	<0.0050	<0.0050	**1**	<0.0050	<0.0050
U-D	mg/L	<0.00010	<0.00010		<0.00010	<0.00010
V-D	mg/L	<0.0050	<0.0050		<0.0050	<0.0050
Zn-D	mg/L	0.0099	0.0474	*	0.0326	<0.0050
* Calculated parameters						
Highlighted Red indicates CSR-AW exceedance						

Appendix C

Enterprise Geoscience Services Ltd.

Borehole Log of QU-78-161 (4 South)

Date Started	: 1978	Drilled By	: n/a
Date Completed	: 1978	Northing Coord.	: 101068.3
Hole Diameter	: 140 mm assumed	Easting Coord.	: 99409.0
Drilling Method	: n/a	Survey By	: n/a
Sampling Method	: n/a	Logged By	: n/a

Water Levels

QU-78-161: 305.14 m (12-Jan-2011)

Well: QU-78-161
Elev. m: 318.5

Depth (m)	Elev. m 318.5	USCS	Graphic Symbol	Material Description
50	268.5	SP		
55	263.5	SS		
60	258.5	SM		
65	253.5	SS		
70	248.5			
75				

4" PVC

Screen

EOH @ 71.7 m

Notes:

Borehole terminated to drift at 86.4 m.

Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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PROJECT No.: 002-1065

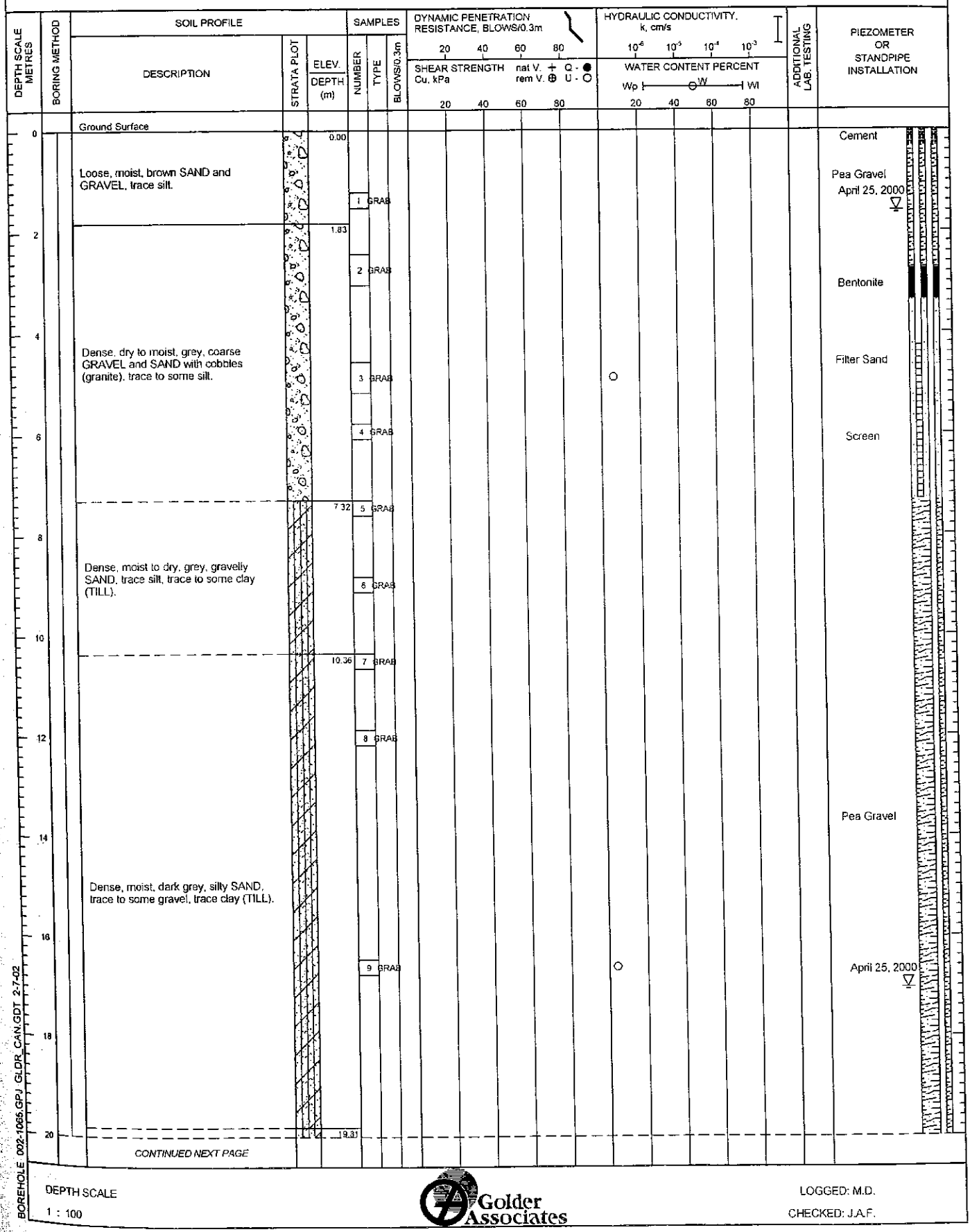
RECORD OF MONITORING WELL: MW00-1(D&S)

SHEET 1 OF 2

LOCATION: Washplant Ditch, Quinsam Mine

BORING DATE: April 17-18, 2000

DATUM: Local



BOREHOLE 002-1065.GPJ GLDR_CAN.GDT 2-7-02

DEPTH SCALE
1 : 100

Golder Associates

LOGGED: M.D.

CHECKED: J.A.F.

PROJECT No.: 002-1065

RECORD OF MONITORING WELL: MW00-1(D&S)

SHEET 2 OF 2

LOCATION: Washplant Ditch, Quinsam Mine

BORING DATE: April 17-18, 2000

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
20											
22		Dense, dry, grey, gravelly SAND and GRAVEL, trace to some silt (TILL). *(continued)*									Pea Gravel
24				24.38							Bentonite
26		Dense, dry, gravelly SAND, some clay, trace silt (TILL).			10	GRAB					Screen / Filter Sand
28											
30											Drill Cuttings
32		End of MONITORING WELL.		30.48							
34											
36											
38											
40											

BOREHOLE 002-1065.GPJ GLDR_CAN.GDT 2-7-02

DEPTH SCALE
1 : 100

Golder Associates

LOGGED: M.D

CHECKED: J.A.F.

PROJECT No.: 002-1065

RECORD OF MONITORING WELL: MW00-2

SHEET 1 OF 1

LOCATION: Washplant Ditch, Quinsam Mine

BORING DATE: April 17-18, 2000

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		Ground Surface									
		Dry, grey SAND and GRAVEL (shale rock fragments) (Rock Fill).		0.00							Cement; Bentonite; April 19, 2000; April 25, 2000
2		SHALE (bedrock).		1.52							Filter Sand
4		Coal and Shale.		3.96	1	GRAB					
		SHALE		4.88	2	GRAB					Screen
		Coal Seam.		5.49	3	GRAB					
6		SHALE		6.10							
		End of MONITORING WELL.		6.31							
8											
10											
12											
14											
16											
18											
20											

BOREHOLE 002-1065.GPJ GLOR_CAN.GDT 2-7-02

DEPTH SCALE 1 : 100

Golder Associates

LOGGED: M.D.

CHECKED: J.A.F.

PROJECT No.. 002-1065

RECORD OF MONITORING WELL: MW00-4

SHEET 1 OF 3

LOCATION: 3S Pit, Quinsam Coal Mine

BORING DATE: Nov. 20,22&23, 2000

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V ⊕, Q -●, U -○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		Ground Surface		0.00									
		Loose, moist, grey and brown ROCK FILL, some sand and silt.											Bentonite and Concrete
2													
				3.35	1	CS							
4		Dense, moist, light brown, silty SAND, some gravel (sub-angular). (Till).											
6				5.79									
8					2	CS							
10													
12		Medium strong, grey SANDSTONE. - grades to lighter grey @ 15.24m - trace black coal @ 24.38m											
14													
16					3	CS							
18													
20					4	CS							

CONTINUED NEXT PAGE

BOREHOLE 002-1065.GPJ GLDR.CAN.GDT 2-7-02

DEPTH SCALE 1 : 100

Golder Associates

LOGGED: W.H.

CHECKED: J.A.F.

PROJECT No.: 002-1065

RECORD OF MONITORING WELL: MW00-4

SHEET 2 OF 3

LOCATION: 3S Pit, Quinsam Coal Mine

BORING DATE: Nov. 20,22&23, 2000

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (20 40 60 80); nat V. +, rem V ⊕; Q - ●, U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl; 20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
20					4	CS							
22													
24													
26		Medium strong, grey SANDSTONE. - grades to lighter grey @ 15.24m - trace black coal @ 24.38m *(continued)*			5	CS							
28													
30													
32					6	CS							
34				34.14									
		VOID - likely old mine workings, broken and caved in bedrock.											
36				35.66									
38		SANDSTONE.											
40		*CONTINUED NEXT PAGE*											

BOREHOLE 002-1065.GPJ GLDR_CAN.GDT 2-7-02

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: W.H.

CHECKED: J.A.F.

PROJECT No.: 002-1065

RECORD OF MONITORING WELL: MW00-4

SHEET 3 OF 3

LOCATION: 3S Pit, Quinsam Coal Mine

BORING DATE: Nov. 20,22&23, 2000

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-5} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
40											
42		SANDSTONE. *(continued)*									Nov. 24/00 ▽
44		VOID - likely old mine workings, broken and caved in bedrock.		44.51							
46		SANDSTONE.		45.72							50mm PVC Slotted Pipe
48		VOID - likely old mine workings, broken and caved in bedrock.		48.77							
50		End of MONITORING WELL.		49.68							
52											
54											
56											
58											
60											

BOREHOLE 002-1065.GPJ GLDR_CAN.GDT 2-7-02

DEPTH SCALE
1 : 100

Golder Associates

LOGGED: W.H.

CHECKED: J.A.F.

PROJECT No.. 002-1065

RECORD OF MONITORING WELL: MW00-6

SHEET 1 OF 1

LOCATION: 3S Pit, Quinsam Coal Mine

BORING DATE: Nov. 21-22, 2000

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		Ground Surface		0.00									
2		Compact, moist, light brown TILL (FILL) (boulders, cobbles, sandy silt).			1	CS							Slough MW 6D Nov. 24/00 ▽
4					2	CS							Bentonite Seal Silica Sand
6				5.79	3	CS							MW 6S Nov. 24/00 ▽ 50mm Slotted PVC Pipe
8													
10													Bentonite Seal
12		Dense, moist to wet, dark grey, sandy SILT (Native), some gravel, cobbles and boulders. (TILL).											
14													
16													50mm Slotted PVC Pipe Silica Sand
18													Slough
20		End of MONITORING WELL.		18.59									

BOREHOLE 002-1065.GPJ GLDR_CAN.GDT 2-7-02

DEPTH SCALE
1 : 100

Golder Associates

LOGGED: W.H.

CHECKED: J.A.F.

Lorax Environmental Services Ltd.
2289 Burrard Street
Vancouver, BC, Canada, V6J 3H9
Phone: +1 (604) 688-7173
Fax: +1 (604) 688-7175
www.lorax.ca

Borehole ID: QU08-10

Project #: 885-1
Project: Quinsam Coal Groundwater Monitoring
Client: Quinsam Coal/Hillsborough Resources
Location: 7 South

Northing: 5533856.79
Easting: 324464.06
Ground Elevation: 295.02m
Steel Casing: 6 inch

Depth	Symbol	Description	Depth/Elev.	Well	Observations
ft / m		Ground Surface			
0 / 0		Overburden/ Glacial Till	0.0	Pea Gravel 0.0m-3.0m	
2 / 6				Cement Grout 3.0m-17.37m	
20 / 6		Sandstone	21.3		
58 / 16				Bentonite Pellets 17.37m-18.29m	

Drilled By: Drillwell
Drill Method: Downhole Hammer
Geologists: M. Storey
Drill Date: March 10, 2008

Hole Size: 7 in (0-6.5m), 6 in (6.5m-30.9m)
PVC Casing: 2 inch
Well Installation Date: April 20, 2010
Sheet: 1 of 2

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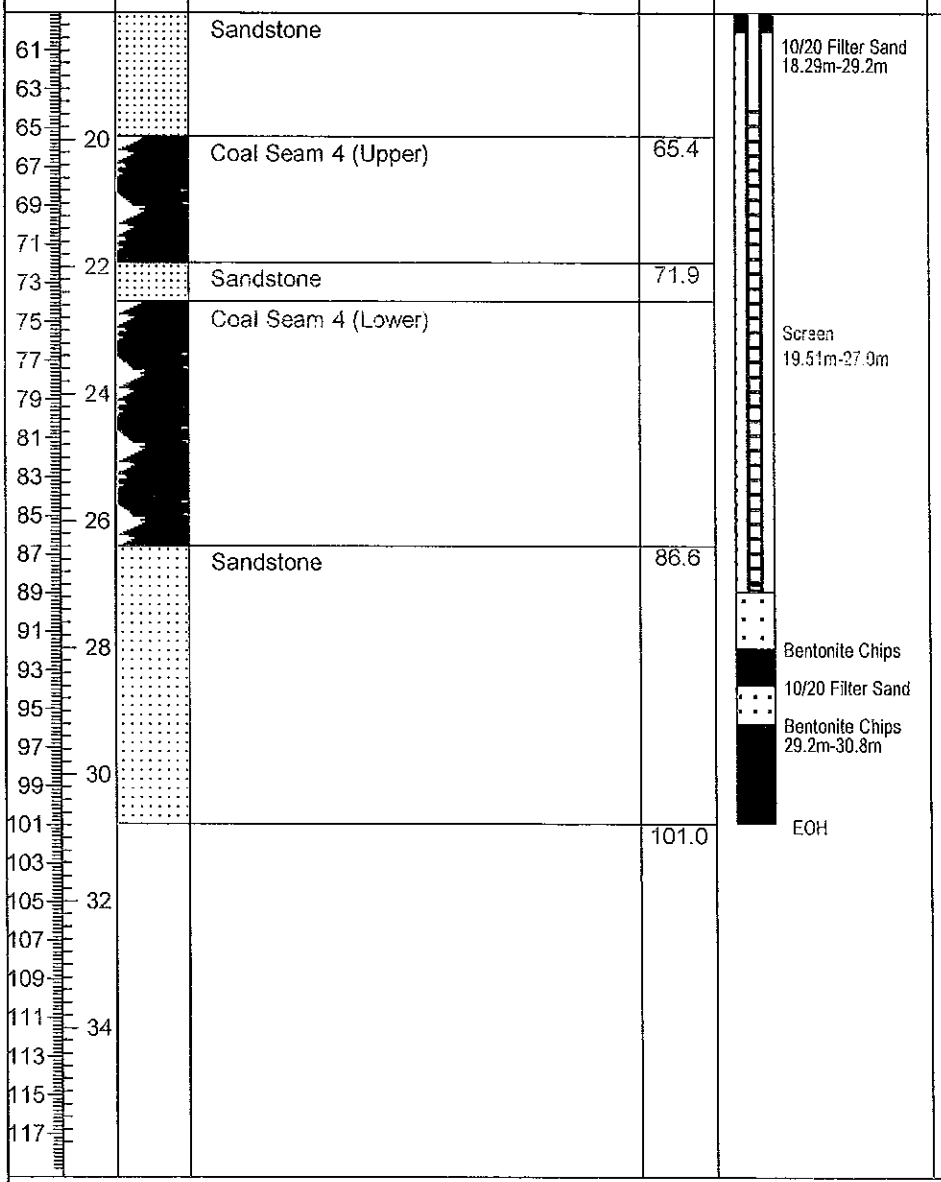

Drilled By: Drillwell
Drill Method: Downhole Hammer
Geologists: M. Storey
Drill Date: March 10, 2008

Hole Size: 7 in (0-6.5m), 6 in (6.5m-30.9m)
PVC Casing: 2 inch
Well Installation Date: April 20, 2010
Sheet: 2 of 2

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www.lorax.ca

Borehole ID: P08-13

Project #: 885-1
Project: Quinsam Coal Groundwater Monitoring
Client: Quinsam Coal/ Hillsborough Resources
Location: 7 South

Northing: 5535188
Easting: 323887
Ground Elevation: 220.40m
Steel Casing: 6 inch

Depth (ft / m)	Symbol	Description	Depth/Elev.	Well A	Well B	Observations
0 / 0		Ground Surface				
		Overburden Glacial Till			Pea Gravel 0-2.0m	
6 / 2					Cement Grout 2.0m-4.0m	
12 / 4					Pea Gravel 4.0m-6.9m	
20 / 6					Bentonite chips 6.9m-7.93m	
26 / 8					Pea Gravel 8.6m-13.72m	GW Elevation: 212.41m Well B (April 27, 2010)
32 / 10						
40 / 12						
46 / 14					Bentonite Pellets 13.72m-14.94m	GW Elevation: 207.21m Well A (April 27, 2010)
					Pea Gravel 14.94m-21.03m	
52 / 16						
58 / 18						
66 / 20						

Drilled By: Drillwell Enterprises
Drill Method: Downhole Hammer
Geologists: M. Storey
Drill Date: March 3, 2008

Hole Size: 7 in (0-25.5m), 5.5 in (25.5m-EOH)
PVC Casing: Well A: 2 inch,Well B: 1-1/4inch
Well Installation Date: April 20, 2010
Sheet: 1 of 3

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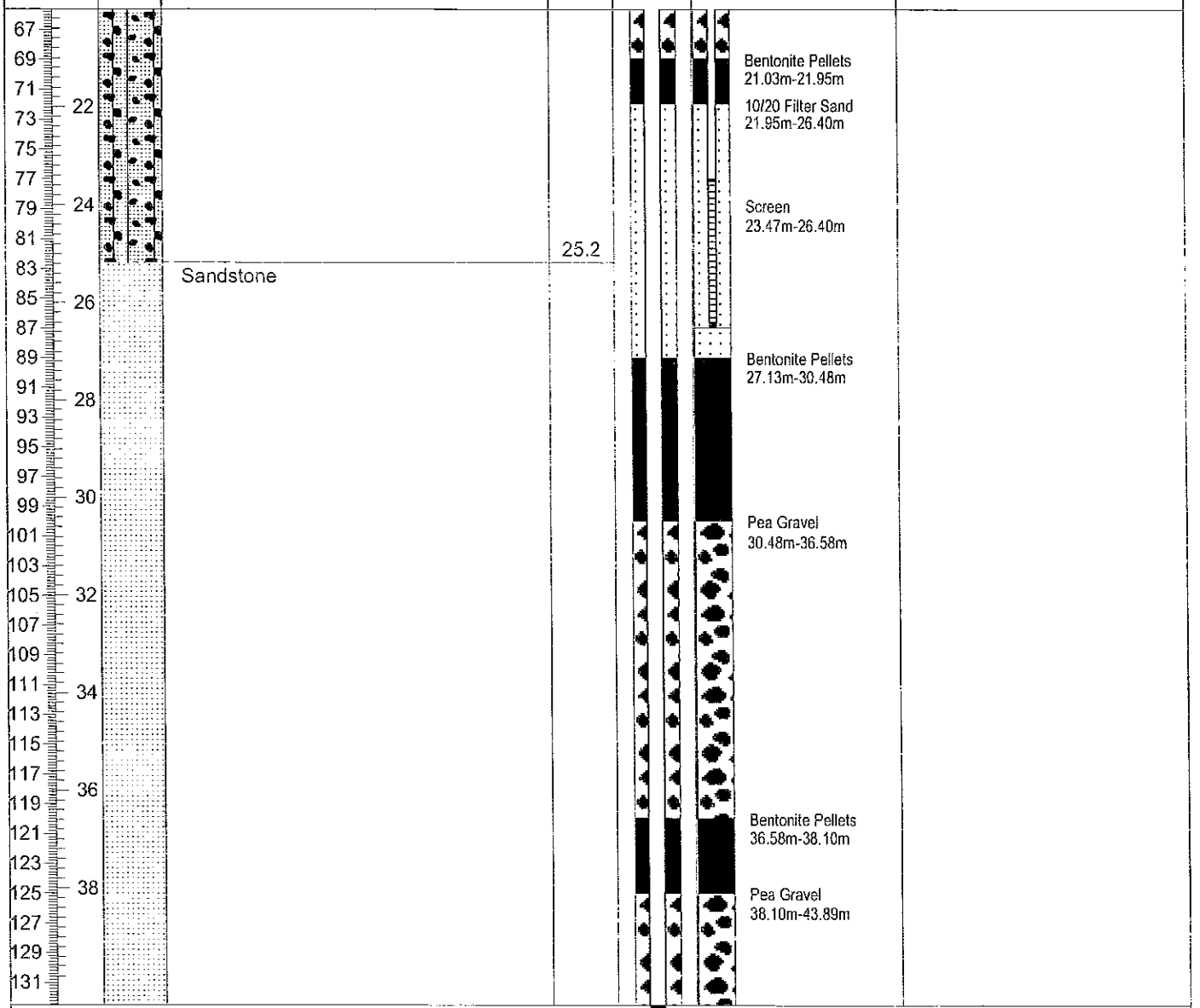
Borehole ID: P08-13

Project #: 885-1
Project: Quinsam Coal Groundwater Monitoring
Client: Quinsam Coal/ Hillsborough Resources
Location: 7 South

Northing: 5535188
Easting: 323887
Ground Elevation: 220.40m
Steel Casing: 6 inch



Drilled By: Drillwell Enterprises
Drill Method: Downhole Hammer
Geologists: M. Storey
Drill Date: March 3, 2008

Hole Size: 7 in (0-25.5m), 5.5 in (25.5m-EOH)
PVC Casing: Well A: 2 inch,Well B: 1-1/4inch
Well Installation Date: April 20, 2010
Sheet: 2 of 3

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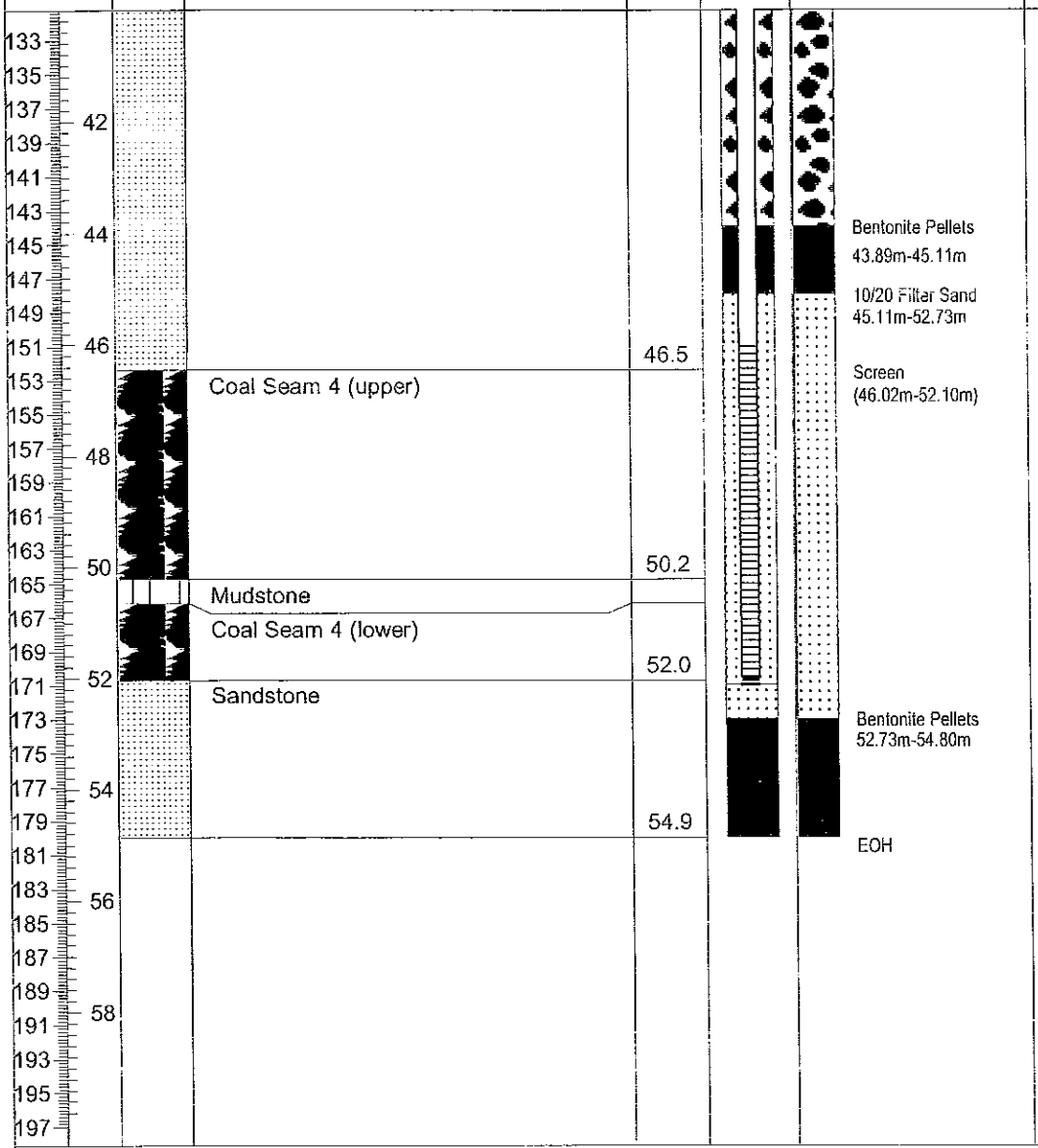
Borehole ID: P08-13

Project #: 885-1
Project: Quinsam Coal Groundwater Monitoring
Client: Quinsam Coal/ Hillsborough Resources
Location: 7 South

Northing: 5535188
Easting: 323887
Ground Elevation: 220.40m
Steel Casing: 6 inch



Drilled By: Drillwell Enterprises
Drill Method: Downhole Hammer
Geologists: M. Storey
Drill Date: March 3, 2008

Hole Size: 7 in (0-25.5m), 5.5 in (25.5m-EOH)
PVC Casing: Well A: 2 inch,Well B: 1-1/4inch
Well Installation Date: April 20, 2010
Sheet: 3 of 3

Enterprise Geoscience Services Ltd.

Borehole Log of QU-08-21G

Date Started	: May 20, 2008	Drilled by	: Drillwell Enterprises
Date Completed	: May 21, 2008	Northing Coord.	: 102802
Hole Diameter	: 140 mm	Easting Coord.	: 101917
Drilling Method	: Air Rotary with wireline coring	Survey By	: McElhanney
Sampling Method	: Core	Logged By	: C.G. Cathyl-Bickford

Water Levels
- QU-08-21G-S 213.14 m (10-Nov-10)
- QU-08-21G-D 212.86 m (10-Nov-10)

Well1: QU-08-21G-S
Well2: QU-08-21G-D
Elev. m: 213.66

Depth (m)	Elev. m	USCS	Material Description
0	213.66		NOT CORED
20	193	SS	SANDSTONE - light grey to dark brown, medium to coarse grained, non-calcareous
		SL	COAL SEAM 6- dull to bright, with siltstone/mudstone lenses
			SILTSTONE & MUDSTONE interbeds - medium brown to black, carbonaceous
30	183	SS	SANDSTONE - 26.7-34m: light to medium grey, medium to coarse grained, with conglomerate lenses. 34-52m: light to dark grey, fine to coarse grained. Top of Dunsmuir 'E' Sandstone at 34m
50	163		

Pea gravel
Bentonite chips
Pea gravel
PVC 2"/Schedule 40
Bentonite chips
PVC 1.25"/Schedule 40
Pea gravel
Bentonite chips
Pea gravel
Bentonite chips
Pea gravel
Bentonite chips
Pea gravel

Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

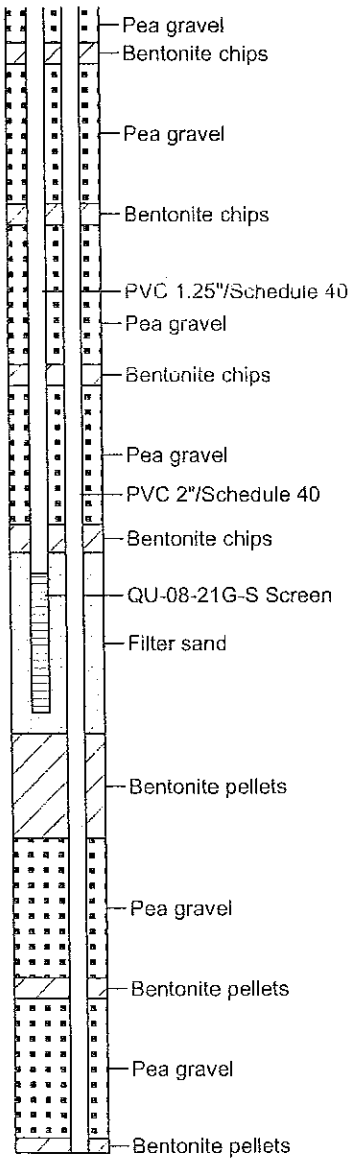
Borehole Log of QU-08-21G

Date Started	: May 20, 2008	Drilled by	: Drillwell Enterprises
Date Completed	: May 21, 2008	Northing Coord.	: 102802
Hole Diameter	: 140 mm	Easting Coord.	: 101917
Drilling Method	: Air Rotary with wireline coring	Survey By	: McElhanney
Sampling Method	: Core	Logged By	: C.G. Cathyl-Bickford

Water Levels
- QU-08-21G-S 213.14 m (10-Nov-10)
- QU-08-21G-D 212.86 m (10-Nov-10)

Well1: QU-08-21G-S
Well2: QU-08-21G-D
Elev. m: 213.66

Depth (m)	Elev. m 213.66	USCS	Material Description
50	163	SS	
			COAL SEAM 5 - 52-53.3m: bright to dull, minor sandstone lensing; 53.3-55.1m: bright ot dull, with pyrite and mudstone lenses.
55	158		SANDSTONE - light grey to brown, fine to coarse grained
60	153		
65	148	SS	
70	143		
75	138	SL	COAL SEAM 4R - dull to bright. Top of Dunsmuir member middle division
			SILTSTONE - dark grey, with mudstone lenses
			COAL SEAM 4/4L - 76.9-8m: dull to bright, with mudstone beds; 79-80.4m: dull to bright, with sandstone and mudstone beds.
80	133		SANDSTONE - 80.4-92.1m: light grey to black, fine to coarse grained; Top of Dunsmuir 'C' sandstone at 81.7m; Minor siltstone/mudstone interbeds at 86m, 92m depths
85	128	SS	
90	123		
			COAL SEAM 4B- bright to dull with sandstone interbeds
95	118	SS	SANDSTONE - light grey to black, fine to coarse grained, carbonaceous
100			



Quinsam Coal
Assessment of Underground Disposal of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

Borehole Log of QU-08-21G

Date Started	: May 20, 2008	Drilled by	: Drillwell Enterprises
Date Completed	: May 21, 2008	Northing Coord.	: 102802
Hole Diameter	: 140 mm	Easting Coord.	: 101917
Drilling Method	: Air Rotary with wireline coring	Survey By	: McElhanney
Sampling Method	: Core	Logged By	: C.G. Cathyl-Bickford

Water Levels
- QU-08-21G-S 213.14 m (10-Nov-10)
- QU-08-21G-D 212.86 m (10-Nov-10)

Well1: QU-08-21G-S
Well2: QU-08-21G-D
Elev. m: 213.66

Depth (m)	Elev. m 213.66	USCS	Material Description
100	113		
		SS	SANDSTONE - light grey to black, fine to coarse grained, carbonaceous
105	108		
110	103		
115	98		
120	93		
125	88	SL	COAL SEAM 3R - bright, with carbonaceous mudstone interbeds/at top of sequence.
		SL	SILTSTONE & MUDSTONE - dark brown to grey, interbedded
130	83	SL	COAL SEAM 3 - bright to dull, with mudstone lenses at top and bottom of sequence.
			SILTSTONE - medium to dark brown, with mudstone interbeds
135	78		COAL SEAM 3L - dull to bright, interlaminated with mudstone at top of sequence.
			SILTSTONE - 130-133m: dark brown, with dark brown mudstone beds - minor coal lenses at 131m and between 132.7 and 133m
140	73	SS	SANDSTONE - 133-154.6m: light to dark grey, fine to coarse grained, top of Dunsmuir 'A' sandstone at 133m.
145	68		147-149m: dark brown mudstone lenses
150			

Well1: QU-08-21G-S / Well2: QU-08-21G-D

- Pea Gravel
- Bentonite Pellets
- Pea Gravel
- Bentonite Pellets
- Pea Gravel
- Bentonite Pellets
- Pea Gravel
- PVC 2"/Schedule 40
- Bentonite Pellets
- Pea Gravel
- Bentonite Pellets
- Pea Gravel
- Bentonite Pellets
- Pea Gravel

Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

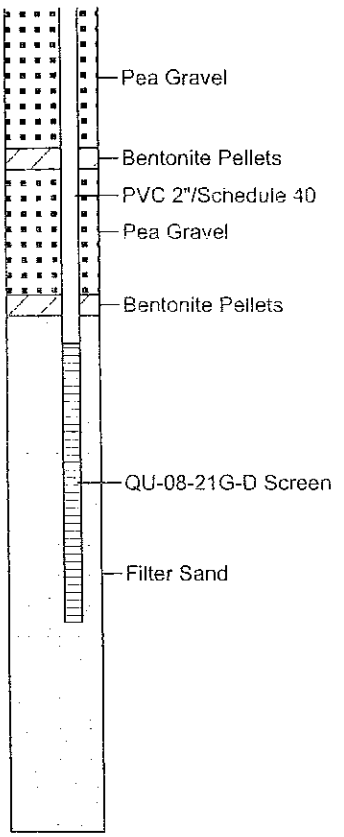
Borehole Log of QU-08-21G

Date Started	: May 20, 2008	Drilled by	: Drillwell Enterprises
Date Completed	. May 21, 2008	Northing Coord.	: 102802
Hole Diameter	: 140 mm	Easting Coord.	: 101917
Drilling Method	: Air Rotary with wireline coring	Survey By	: McElhanney
Sampling Method	: Core	Logged By	: C.G. Cathyl-Bickford

Water Levels
- QU-08-21G-S 213.14 m (10-Nov-10)
- QU-08-21G-D 212.86 m (10-Nov-10)

Well1: QU-08-21G-S
Well2: QU-08-21G-D
Elev. m: 213.66

Depth (m)	Elev. m 213.66	USCS	Material Description
150	63	SS	
155	58	MS / SL	MUDSTONE - grey brown, with siltstone lenses, medium brown, carbonaceous COAL SEAM 2 - bright to dull, dirty at base (155 0-156.1m)
160	53	SS	SILTSTONE - 156-157.3m: dark grey, with dark brown mudstopbe interbeds SANDSTONE, IRONSTONE and SILTSTONE interbeds - dark grey to brown. Possible fault at 157.3m
165	48		
170	43	MS / SL	COAL SEAM 1 - 171.6-172.7m: dull to bright, dirty, with mudstone lensese at top and bottom of sequence (Quinsam No. 1 coal bed)
175	38	SL	MUDSTONE - 172.7-173.6m: medium brown with siltstone lense at top of sequence -floor of upper bench/top of main parting at 172.9m -interlaminated coal and mudstone between 173.4m and 173.6m -base of main parting at 173.5m
180	33		
185	28		IRONSTONE, SILTSTONE and MUDSTONE - dark grey to brown SANDY SILT, COALY ROCK (Coal Seam 1L). SILTSTONE, IRONSTONE, SANDSTONE and MUDSTONE interbeds - 176.9-177.8m: bright coal bands 176.9-184m: dark grey to dark brown conglomerate with sandstone bed at base, dark green, coarse grained EOH @ 185.8m
190	23		
195	18		
200			



Quinsam Coal
Assessment of Underground Disposal of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

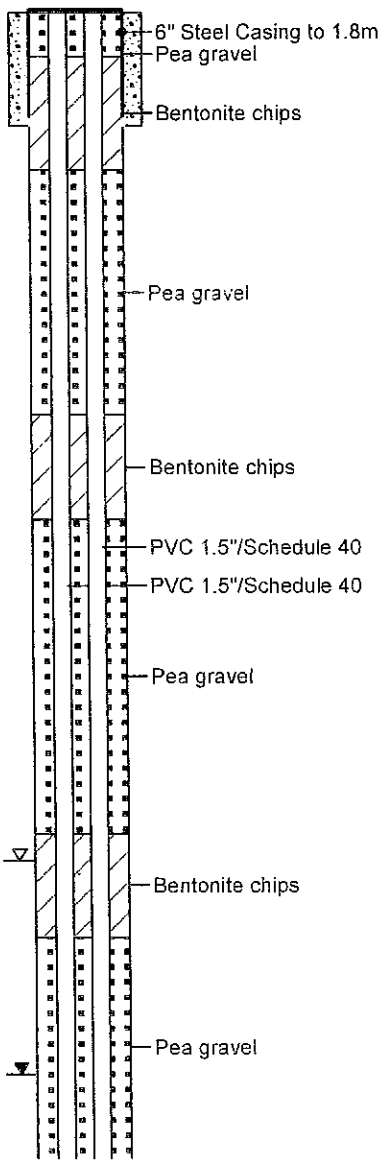
Borehole Log of QU-10-07

Date Started	: Sept 28, 2010	Drilled by	: Drillwell Enterpirses
Date Completed	: Sept 29, 2010	Northing Coord.	: 101137
Hole Diameter	: 150mm/85mm core	Easting Coord.	: 99263
Drilling Method	: Air Rotary with wireline coring	Survey By	: McElhanney
Sampling Method	: Grab sample/core log	Logged By	: O. Quinn

Water Levels
- QU-10-07-S 18.538m (11/19/2010)
- QU-10-07-D 14.805m (11/19/2010)

Well1: QU-10-07-S
Well2: QU-10-07-D
Elev. m: 317.61

Depth (m)	Elev. m 317.61	USCS	Material Description
0	317		SANDY SILT (TILL) - red-brown, loose, moist.
			SANDSTONE -
			0.1-3.1m light grey, weathered, fine to medium grained.
			3.1-6.1m light grey, medium grained.
5	312		No water at 6.0m.
			6.1-9.1m medium grey, coarse-grained, moderately weathered with dark grey siltstone lens.
			9.1-12.2m medium grey, medium-coarse grained, fresh.
10	307	SS	No water at 12.2m.
			12.2-21.3m medium grey, fresh.
15	302		
20			



Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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Borehole Log of QU-10-07

Date Started	: Sept 28, 2010	Drilled by	: Drillwell Enterpirses
Date Completed	: Sept 29, 2010	Northing Coord.	: 101137
Hole Diameter	: 150mm/85mm core	Easting Coord.	: 99263
Drilling Method	: Air Rotary with wireline coring	Survey By	: McElhanney
Sampling Method	: Grab sample/core log	Logged By	: O. Quinn

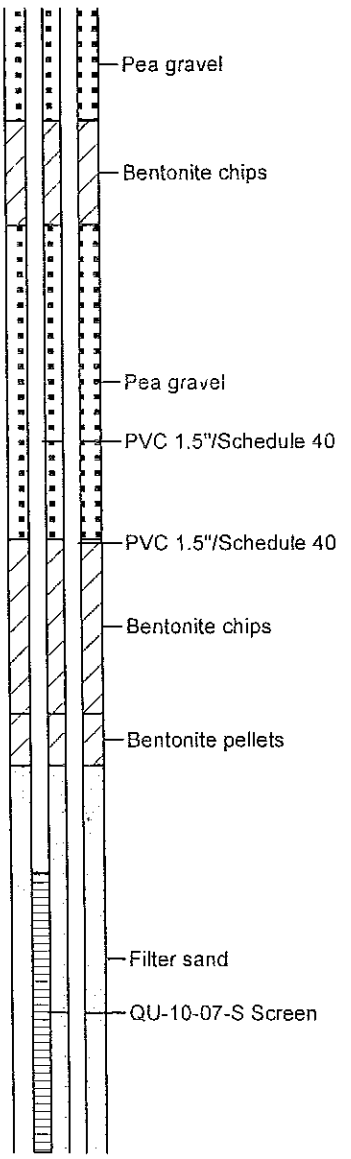
Water Levels

▼ QU-10-07-S 18.538m (11/19/2010)

▽ QU-10-07-D 14.805m (11/19/2010)

Well1: QU-10-07-S
Well2: QU-10-07-D
Elev. m: 317.61

Depth (m)	Elev. m 317.61	USCS	Graphic Symbol	Material Description
20	297			No water at 21.3m. 21.3-24.4m light grey, fine-medium grained, moderately weathered.
				24.4-30.5m light grey, fine-medium grained, fresh.
25	292			
30	287	SS		30.5-36.6m very light grey, fine-grained, fresh, siltstone lens.
35	282			36.6-39.6m very light grey, fine-medium grained, moderately weathered.
40				39.6-48.8m very light grey, fine-medium grained, fresh.



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Campbell River, B.C.

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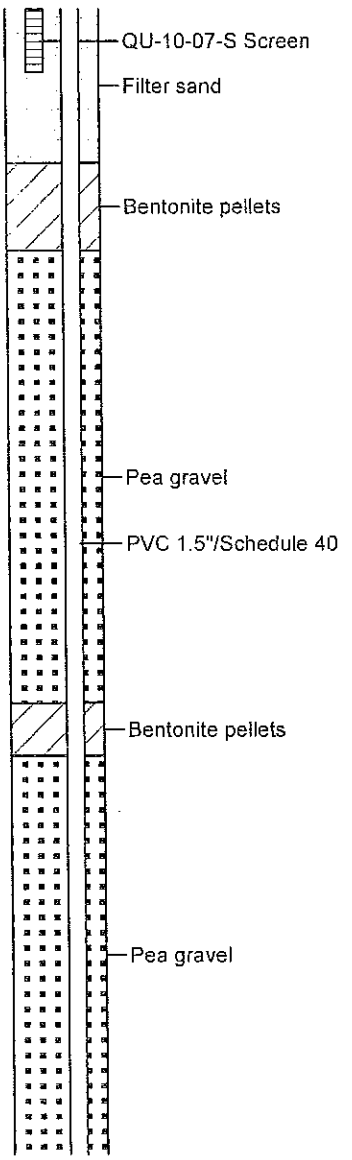
Borehole Log of QU-10-07

Date Started	: Sept 28, 2010	Drilled by	: Drillwell Enterpirses
Date Completed	: Sept 29, 2010	Northing Coord.	: 101137
Hole Diameter	: 150mm/85mm core	Easting Coord.	: 99263
Drilling Method	: Air Rotary with wireline coring	Survey By	: McElhanney
Sampling Method	: Grab sample/core log	Logged By	: O. Quinn

Water Levels
- QU-10-07-S 18.538m (11/19/2010)
- QU-10-07-D 14.805m (11/19/2010)

Well1: QU-10-07-S
Well2: QU-10-07-D
Elev. m: 317.61

Depth (m)	Elev. m 317.61	USCS	Graphic Symbol	Material Description
40	277			
45	272			
50	267	SS		48.8-54.9m medium grey, fine to medium grained, fresh.
55	262			No water at 54.9m. 54.9-57.9m medium grey, fine to medium grained, moderately weathered.
60				57.9-61.0m fine grained, dark grey, fresh.



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Campbell River, B.C.

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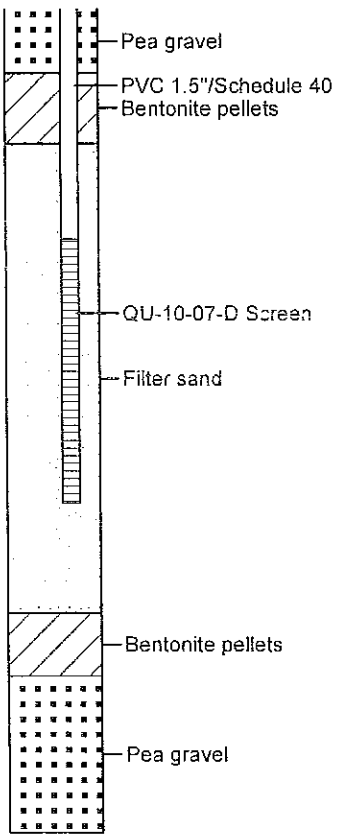
Borehole Log of QU-10-07

Date Started	: Sept 28, 2010	Drilled by	: Drillwell Enterpirses
Date Completed	: Sept 29, 2010	Northing Coord.	: 101137
Hole Diameter	: 150mm/85mm core	Easting Coord.	: 99263
Drilling Method	: Air Rotary with wireline coring	Survey By	: McElhanney
Sampling Method	: Grab sample/core log	Logged By	: O. Quinn

Water Levels
- QU-10-07-S 18.538m (11/19/2010)
- QU-10-07-D 14.805m (11/19/2010)

Well1: QU-10-07-S
Well2: QU-10-07-D
Elev. m: 317.61

Depth (m)	Elev. m 317.61	USCS	Graphic Symbol	Material Description
60	257	SS		61.0-64.9m medium-dark grey, fine-medium grained, fresh.
65	252			COAL - Rapid drill penetration. Water in coal seam ~0.5 US GPM.
		MS		COAL/MUDSTONE. Borehole cored from 67.7m to 74.4m (5.5inch diameter)
		SS		Heavily fractured 67.7-69.8m: (2.1m/ 0.6m rec'y). Lost remainder of core run to 69.8m.
70	247	SL		SANDSTONE, medium grey.
				SILTSTONE,
				69.8-70.4m fine grained, dark grey, fresh, heavily fractured 69.8-70.3m, then massive.
				69.8-71.3m: (1.52m/1.4m rec'y).
		SS		heavily fractured 71.3-72.5m.
				71.3-72.7m: (1.37m/1.2m rec'y).
				70.4-71.9m SILTSTONE/SANDSTONE, fine grained, dark grey, fresh.
75	242			grey, SANDSTONE, light grey, medium-coarse grained, fresh. -72.5
				minor fractures 72.5-73.9m.
				Heavily fractured 73.9-74.4m.
				72.7-74.4m: (1.7m/1.75m rec'y).
				Flow 0.75 GPM at 74.4m.
				EOH @ 74.4m
80				



Quinsam Coal
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Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

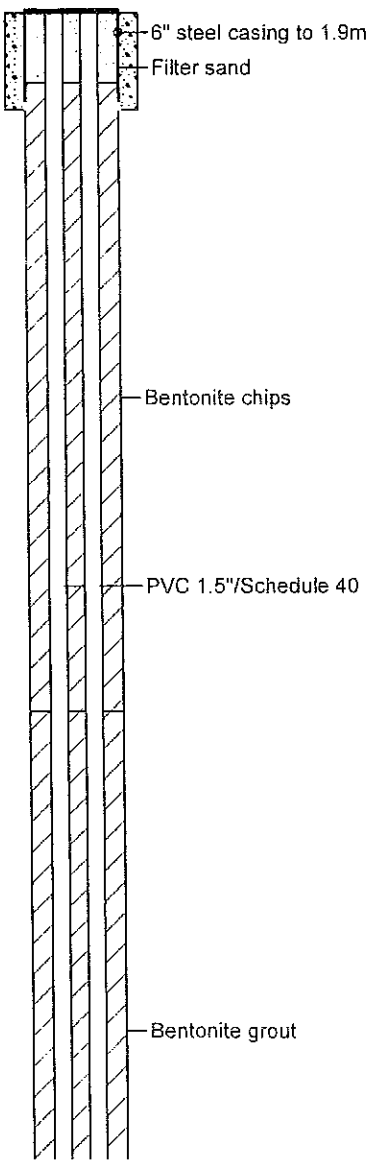
Borehole Log of QU-10-08

Date Started	: Sept 29, 2010	Drilling Company	: Drillwell Enterpirses
Date Completed	: Sept 30, 2010	Northing Coord.	: 100893
Hole Diameter	: 150 mm/85 mm core	Easting Coord.	: 98905
Drilling Method	: Air Rotary with wireline coring	Survey By	: McElhanney
Sampling Method	: Grab sample/core log	Logged By	: O. Quinn

Water Levels
- QU-10-08-S: 307.50m (11/19/2010)
- QU-10-08-D: 306.54m (11/19/2010)

Well1: QU-10-08-S
Well2: QU-10-08-D
Elev. m: 339.17

Depth (m)	Elev. m 339.17	USCS	Graphic Symbol	Material Description
0	339			SANDSTONE - 0-1.8m: green-grey, medium-coarse, fresh
				1.8-7.3m: medium-grey, fine grained, moderately weathered, non-carbonaceous
5	334			
				7.3-18.9m: dark grey, fine grained, fresh, non-carbonaceous
10	329	SS		
15	324			
				18.9-21.3m: dark grey, fine-grained, slightly weathered, non-carbonaceous
20	319			
				21.3-37.2m: medium: grey, fine-medium: grained, fresh, non-carbonaceous
25				



Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

Borehole Log of QU-10-08

Date Started	: Sept 29, 2010	Drilling Company	: Drillwell Enterpirses
Date Completed	: Sept 30, 2010	Northing Coord.	: 100893
Hole Diameter	: 150 mm/85 mm core	Easting Coord.	: 98905
Drilling Method	: Air Rotary with wireline coring	Survey By	: McElhanney
Sampling Method	: Grab sample/core log	Logged By	: O. Quinn

Water Levels

▼ QU-10-08-S: 307.50m (11/19/2010)

▽ QU-10-08-D: 306.54m (11/19/2010)

Well1: QU-10-08-S
Well2: QU-10-08-D
Elev. m: 339.17

Depth (m)	Elev. m 339.17	USCS	Graphic Symbol	Material Description
25	314			
30	309			
35	304	SS		37.2-64.0m: light grey, coarse-grained, fresh, slightly carbonaceous. Hole dry at resumption of drilling next day (Sept 30/10)
40	299			
45	294			
50				

PVC 1.5"/Schedule 40

Bentonite grout

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Campbell River, B.C.

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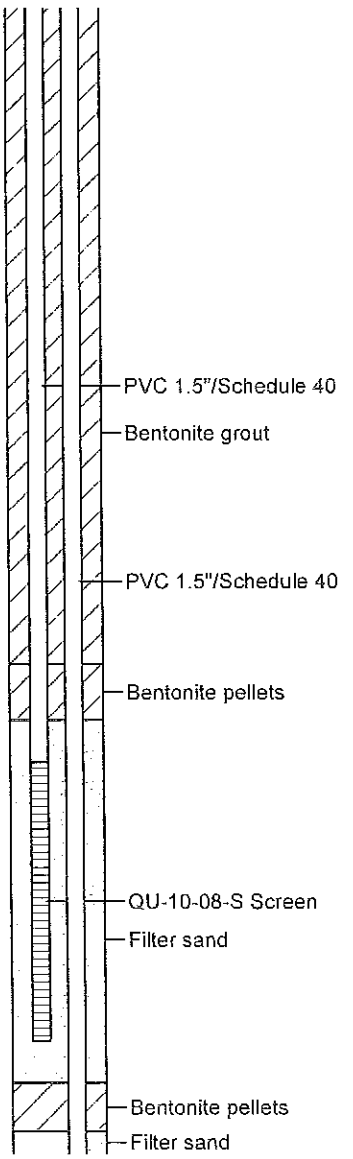
Sampling Method	: Grab sample/core log	Logged By	: O. Quinn

Water Levels
- QU-10-08-S: 307.50m (11/19/2010)
- QU-10-08-D: 306.54m (11/19/2010)

Well1: QU-10-08-S
Well2: QU-10-08-D
Elev. m: 339.17

Depth (m)	Elev. m 339.17	USCS	Graphic Symbol	Material Description
50	289			
55	284			
60	279	SS		64.0-66.4m: light grey, coarse-grained, fresh, not carbonaceous
65	274			66.4-71.5m: medium: grey, coarse grained, fresh, non-carbonaceous
70	269			Dry hole at 71.3m. Borehole cored from 71.3m to EOH 71.5-73.6m: light grey, coarse grained, fresh, non-carbonaceous, moderately fractured. (2.13 m/2.06 rec'y) 73.6-75.7m: light grey, coarse grained, fresh, non-carbonaceous, massive fracture
75				



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Campbell River, B.C.

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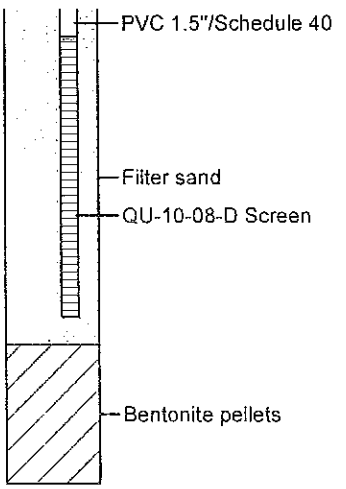
Borehole Log of QU-10-08

Date Started	: Sept 29, 2010	Drilling Company	: Drillwell Enterpirses
Date Completed	: Sept 30, 2010	Northing Coord.	: 100893
Hole Diameter	: 150 mm/85 mm core	Easting Coord.	: 98905
Drilling Method	: Air Rotary with wireline coring	Survey By	: McElhanney
Sampling Method	: Grab sample/core log	Logged By	: O. Quinn

Water Levels
- QU-10-08-S: 307.50m (11/19/2010)
- QU-10-08-D: 306.54m (11/19/2010)

Well1: QU-10-08-S
Well2: QU-10-08-D
Elev. m: 339.17

Depth (m)	Elev. m 339.17	USCS	Graphic Symbol	Material Description
75	264	SS		
		SL		SILTSTONE/COAL Interface
				COAL SEAM 3- heavily fractured
		MS		COAL SEAM 3 and MUDSTONE lenses - heavily fractured 76.4-79.1m: (2.74 m/2.74 rec'y)
80	259			COAL Seam 3 - minor pyrite, heavily fractured 79.1-81.1m: (1.98 m/0.71 rec'y)
		SS		SANDSTONE - 81.1-82.6m: (1.52 m/1.52 rec'y) 81.4-82.6m: dark grey, fine to medium: grained with thin coal stringers (1/8 to 1/2 inch), heavily fractured 82.6-82.9m: light grey, very coarse grained, fresh, minor fractures 82.6-84.1m: (1.52 m/1.42 rec'y) 82.9-85.3m: light-medium: grey, med-coarse grained, massive, fresh 84.1-85.6m: (1.52 m/1.52 rec'y)
85	254			EOH @ 85.3m
90	249			
95	244			
100				



Quinsam Coal
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Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

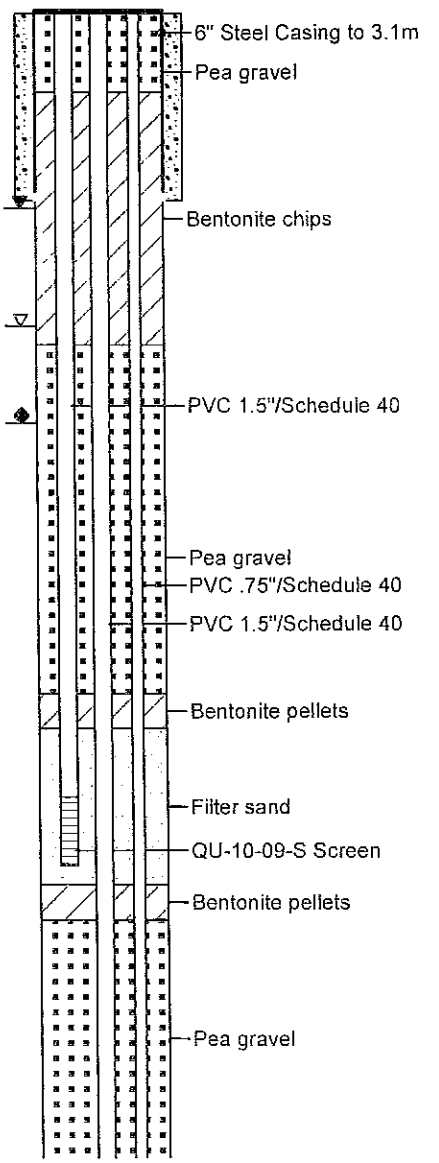
Borehole Log of QU-10-09

Date Started	: Oct 1, 2010	Drilled By	: Drillwell Enterprises
Date Completed	: Oct 5, 2010	Northing Coord.	: 101346
Hole Diameter	: 150 mm	Easting Coord.	: 98931
Drilling Method	: Air Rotary with wireline coring	Survey By	: McElhanney
Sampling Method	: Grab sample/core log	Logged By	: O. Quinn

Water Levels
- QU-10-09-S: 300.91m
- QU-10-09-D: 298.84m
- QU-10-09-P: 291.48m

Well1: QU-10-09-S
Well2: QU-10-09-D
Well3: QU-10-09-P
Elev. m: 304.31

Depth (m)	Elev. m 304.31	USCS	Graphic Symbol	Material Description
0	304	f42		Sandy SILT (TILL) - with boulders, red-brown
		ss		SANDSTONE -
				3.05-6.1m: light to dark grey, medium grained, fresh, non-carbonaceous
5	299			6.1-9.14m: light to dark grey, medium-coarse grained
				8 thin coal stringers (3.18mm) between 6.55-6.71m in weathered siltstone lens
				quartz vein at 7.3m
				9.1-12.2m: light grey, coarse grained
10	294			iron-stained quartz vein fracture zones at 11.1-11.6m
				conglomerate inclusions between 11.7-11.9m
				12.2-15.2m: light grey, coarse grained
				15.2-18.3m:
				interval.
				conglomerate inclusions 13.3-14.0m and 14.5-14.8m
				weathered zone at 14.3m
15	289			18.3-22.6m: light grey, medium coarse grained
				conglomerate lense at 17.7m
				22.6-23.5m: light grey, medium coarse grained
20				



Quinsam Coal
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Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

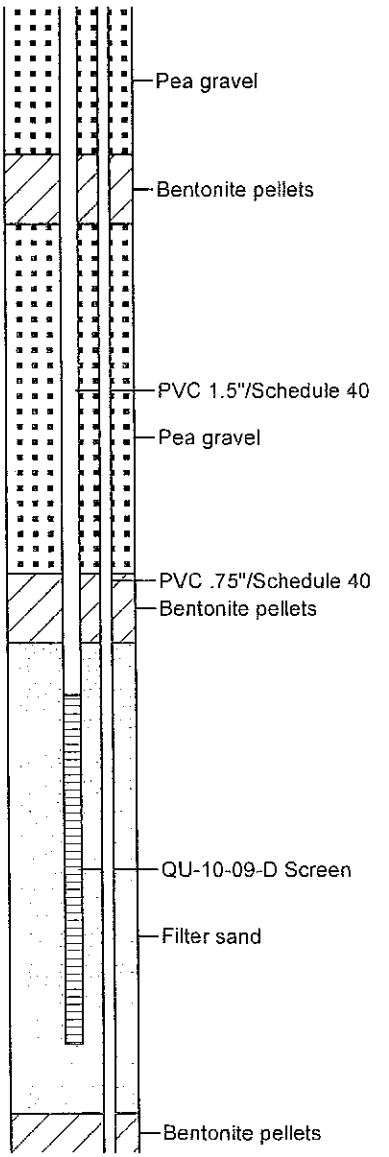
Borehole Log of QU-10-09

Date Started	: Oct 1, 2010	Drilled By	: Drillwell Enterprises
Date Completed	: Oct 5, 2010	Northing Coord.	: 101346
Hole Diameter	: 150 mm	Easting Coord.	: 98931
Drilling Method	: Air Rotary with wireline coring	Survey By	: McElhanney
Sampling Method	: Grab sample/core log	Logged By	: O. Quinn

Water Levels
- QU-10-09-S: 300.91m
- QU-10-09-D: 298.84m
- QU-10-09-P: 291.48m

Well1: QU-10-09-S
Well2: QU-10-09-D
Well3: QU-10-09-P
Elev. m: 304.31

Depth (m)	Elev. m 304.31	USCS	Material Description
20	284	SS	conglomerate lense 20.3-20.4m
			23.5-27.4m: weathered
			27.4-29.6m: medium grey, fine-medium grained, with thin shale stingers
25	279		minor conglomerate inclusions @ 25.3m
			29.6-32m: light to medium grey, fine to medium grained
30	274		32-33.5m: medium grey, medium grained with disseminated shale stringers
			33.5-38.1m: light to medium grey, medium-coarse grained, fractures 32-33.2m COAL seam (1" thick) at 32.2m
			38.1-39.3m: light to medium grey, weathered mudstone lense @ 112 to 112.5 ft, fractures from 117.5 to 124
35	269		flow 9 GPM at 37.8m
		MS	MUDSTONE - dark brown, multiple fractures
40		SS	SANDSTONE - 39.3-42.7m: light to medium grey, medium grained



Quinsam Coal
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Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

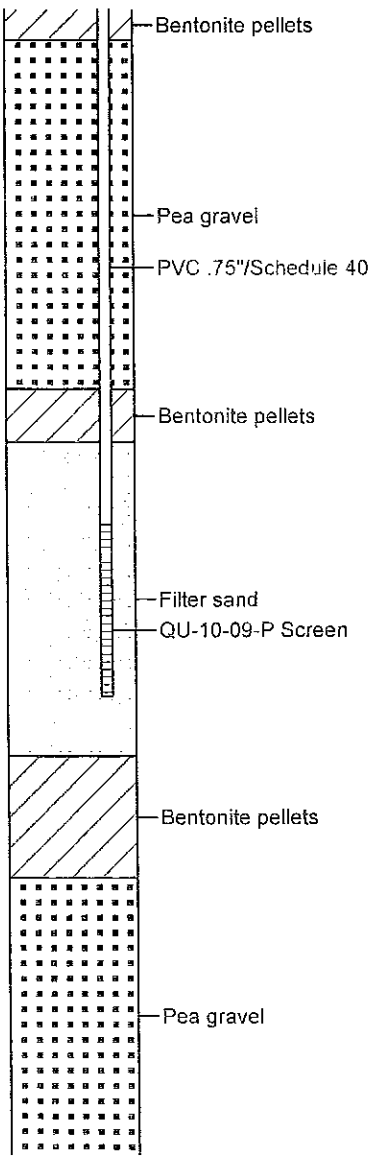
Borehole Log of QU-10-09

Date Started	: Oct 1, 2010	Drilled By	: Drillwell Enterprises
Date Completed	: Oct 5, 2010	Northing Coord.	: 101346
Hole Diameter	: 150 mm	Easting Coord.	: 98931
Drilling Method	: Air Rotary with wireline coring	Survey By	: McElhanney
Sampling Method	: Grab sample/core log	Logged By	: O. Quinn

Water Levels
- QU-10-09-S: 300.91m
- QU-10-09-D: 298.84m
- QU-10-09-P: 291.48m

Well1: QU-10-09-S
Well2: QU-10-09-D
Well3: QU-10-09-P
Elev. m: 304.31

Depth (m)	Elev. m 304.31	USCS	Material Description
40	264		fractured at 40.2m
		SS	42.7-45.7m: light to medium grey, medium grained, heavily fractured, MUDSTONE bed (20 cm thick, dark brown) thin COAL stringer @43.1m
45	259		45.7-49.2m: light grey, coarse grained, heavily fractured
			47.6-47.8m: mudstone bed (dark brown)
50	254		COAL SEAM 2, heavily fractured with mudstone and coal stringers at base flow 12 GPM at 49.4m
		MS	MUDSTONE - dark brown, heavily fractured, with coal stringers over 6" interval. Flow 16 GPM at 50.3m
55	249	SL	SILTSTONE - 54.9-57.3m: dark brown, heavily fractured. 6 inches of light grey unweathered SILTSTONE at base coal stringers at 55.2m. Thin coal stringers in weathered mudstone between 55.2-56.1m
		MS	MUDSTONE - dark brown, fractured on 15.24cm spacing, disseminated COAL stringers (1 ft interval) at base of 91.4m moderately fractured mudstone sequence, mudstone heavily fractured at base. Flow 28 GPM at 57.3m
60		SL	



Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

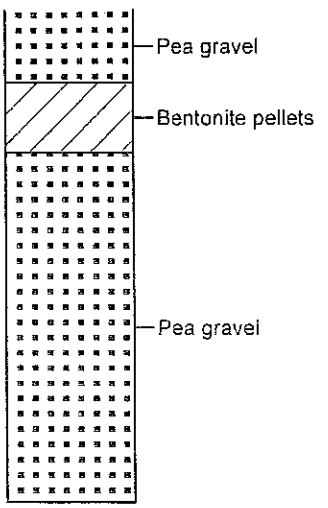
Borehole Log of QU-10-09

Date Started	: Oct 1, 2010	Drilled By	: Drillwell Enterprises
Date Completed	: Oct 5, 2010	Northing Coord.	: 101346
Hole Diameter	: 150 mm	Easting Coord.	: 98931
Drilling Method	: Air Rotary with wireline coring	Survey By	: McElhanney
Sampling Method	: Grab sample/core log	Logged By	: O. Quinn

Water Levels
- QU-10-09-S: 300.91m
- QU-10-09-D: 298.84m
- QU-10-09-P: 291.48m

Well1: QU-10-09-S
Well2: QU-10-09-D
Well3: QU-10-09-P
Elev. m: 304.31

Depth (m)	Elev. m 304.31	USCS	Material Description
60	244		SILTSTONE -
			59.7-61.6m: grey-brown, heavily fractured. Flow 24 GPM at 196m
			fractured 60.3-60.5m
			coal lenses (61.0-91.4cm) between 60.8-61.6m
			61.6-64.3m: light to dark brown
			moderately fractured between 61.7-62.6m with thin coal stringers in fracture zones
		SL	heavily fractured to base at 64.3m
65	239		64.3-68.6m: grey-brown
			moderately fractured between 64.3-65.4m
			heavily fractured 65.4-65.7m
			moderately fractured 65.7-66.3m
			highly fractured 66.3-66.5m
			moderately fractured 66.5-67.1m
70	234		EOH @ 68.6m. Flow 30 GPM at 68.6m.
75	229		
80			



Quinsam Coal
Assessment of Underground Disposal of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

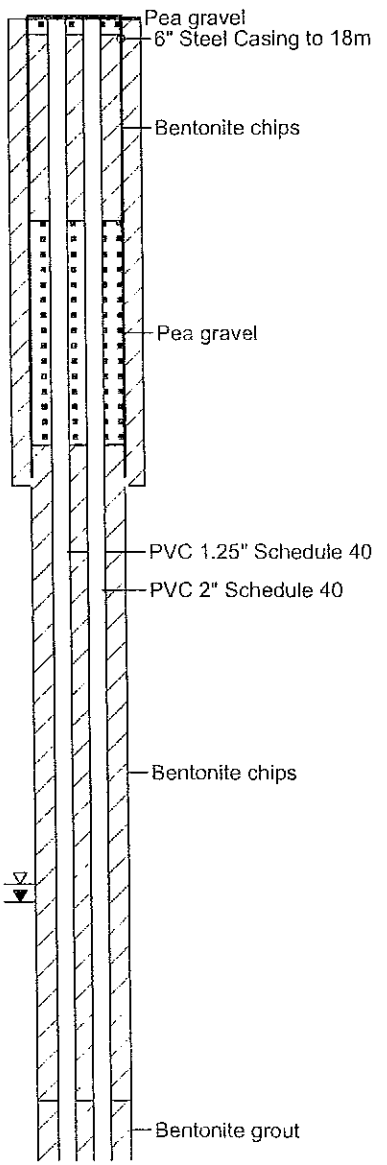
Borehole Log of QU-10-10

Date Started	: Oct 6, 2010	Drilled by	: Drillwell Enterprises
Date Completed	: Oct 7, 2010	Northing Coord.	: 102903
Hole Diameter	: 150 mm	Easting Coord.	: 101506
Drilling Method	: Air Rotary	Survey By	: McElhanney
Sampling Method	: Grab sample	Logged By	: O. Quinn

Water Levels
- QU-10-10-S: 210.55M (11/19, 2010)
- QU-10-10-D: 210.44M (11/18/2010)

Well1: QU-10-10-S
Well2: QU-10-10-D
Elev. m: 244.26

Depth (m)	Elev. m 244.26	USCS	Material Description
0	244		Silty, sandy TILL - with boulders, red-brown
5	239		TILL - grey, with boulders
10	234		
15	229		
20	224	SS	SANDSTONE - 17.7-24.4m: light grey, fine-medium grained, slightly weathered, slighily carbonaceous to 21.3m
25	219	SS	24.4-29.3m: medium grey, fined grained, fresh
30	214	SL	SILTSTONE - dark grey, fresh
35	209	SS	SANDSTONE - 31.1-34.8m: dark grey, fine grained, fresh; 34.8-38.1m: light grey, fine-medium grained, moderately weathered; flow 0.25 US GPM at 36.6m
40	204	SS	COAL SEAM 5 - shiny, with light grey/brown, coarse-grained sandstone; SANDSTONE - 38.4-42.7m: medium grey, fine-med grained, fresh; 42.7-57.9m: grey, medium-coarse grained, fresh; Flow 7.5 US GPM at 42.7m
45			



Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

Borehole Log of QU-10-10

Date Started	: Oct 6, 2010	Drilled by	: Drillwell Enterprises
Date Completed	: Oct 7, 2010	Northing Coord.	: 102903
Hole Diameter	: 150 mm	Easting Coord.	: 101506
Drilling Method	: Air Rotary	Survey By	: McElhanney
Sampling Method	: Grab sample	Logged By	: O. Quinn

Water Levels
- QU-10-10-S: 210.55M (11/19, 2010)
- QU-10-10-D: 210.44M (11/18/2010)

Well1: QU-10-10-S
Well2: QU-10-10-D
Elev. m: 244.26

Depth (m)	Elev. m 244.26	USCS	Material Description
45	199		
50	194	SS	Flow 10 US GPM at 48.8m
55	189		
			COAL (No. 4 Seam). Flow 10 US GPM at 57.91m
60	184		SANDSTONE - 58.2-63.1m: grey, fine-medium grained, fresh
			63.1-80.8m: light grey, medium-coarse grained, fresh
65	179		Flow 10 US GPM at 67.1m
70	174	SS	
75	169		
80	164	MS	MUDSTONE - dark brown, weathered
			COAL (No. 4 B) - shiny, interbedded with dark grey MUDSTONE
		MS	MUDSTONE - dark grey, fresh
85	159		SANDSTONE - 84.73-105.77m: light grey, coarse grained, fresh
		SS	
90			

Bentonite grout
PVC 1.25" Schedule 40
Bentonite chips
Bentonite pellets
Filter sand
QU-10-10-S Screen
Bentonite pellets
PVC 2" Schedule 40
Pea gravel
Bentonite pellets
Pea gravel
Bentonite pellets
Pea gravel
Bentonite pellets
Pea gravel

Quinsam Coal
Assessment of Underground Disposal of Coarse Coal Refuse

Campbell River, B.C.

03-09-2011 C:\Users\John Balfour\Documents\PROJECTS\2009 Projects\09010 Lorax\2010 Work\Borehole logs\QU-10-10a.bor

Enterprise Geoscience Services Ltd.

Borehole Log of QU-10-10

Date Started	: Oct 6, 2010	Drilled by	: Drillwell Enterprises
Date Completed	: Oct 7, 2010	Northing Coord.	: 102903
Hole Diameter	: 150 mm	Easting Coord.	: 101506
Drilling Method	: Air Rotary	Survey By	: McElhanney
Sampling Method	: Grab sample	Logged By	: O. Quinn

Water Levels
- QU-10-10-S: 210.55m (11/19, 2010)
- QU-10-10-D: 210.44m (11/18/2010)

Well1: QU-10-10-S
Well2: QU-10-10-D
Elev. m: 244.26

Depth (m)	Elev. m 244.26	USCS	Material Description
90	154	SS	SANDSTONE (cont'd)
95	149	SS	
100	144	SS	
105	139	SS	
			COAL - shiny, interbedded with dark brown MUDSTONE
110	134	SL	SILTSTONE - dark brown, fresh
			COAL SEAM 3R - dull to shiny with light brown, weathered mudstone
		SL	SILTSTONE - dark brown, fresh
115	129		COAL SEAM 3 - shiny
		MS	MUDSTONE - dark brown, fresh
120	124	SS	SANDSTONE - 118.3-118.9m: light grey, coarse grained with dull COAL SEAM 3L.
		MS	118.9-120.1m: light grey, fine-medium grained, fresh
			MUDSTONE - dark brown, fresh
125	119	SS	SANDSTONE - 121.9-132.9m: light grey, medium grained, fresh, with interbedded dark brown, fresh, carbonaceous MUDSTONE
			Flow 10 US GPM at 128.0m
130	114	SS	132.9-141.1m: light to medium grey. fine-coarse grained, fresh
135			

Pea Gravel
Bentonite pellets
Pea Gravel
Bentonite pellets
Pea Gravel
Bentonite pellets
PVC 2" Schedule 40
Pea Gravel
Bentontie pellets
Pea Gravel
Bentonite pellets
Pea Gravel
Bentonite pellets
Pea Gravel
Bentonite pellets

Quinsam Coal
Assessment of Underground Disposal of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

Borehole Log of QU-10-10

Date Started	: Oct 6, 2010	Drilled by	: Drillwell Enterprises
Date Completed	: Oct 7, 2010	Northing Coord.	: 102903
Hole Diameter	: 150 mm	Easting Coord.	: 101506
Drilling Method	: Air Rotary	Survey By	: McElhanney
Sampling Method	: Grab sample	Logged By	: O. Quinn

Water Levels
- QU-10-10-S: 210.55m (11/19, 2010)
- QU-10-10-D: 210.44m (11/18/2010)

Well1: QU-10-10-S
Well2: QU-10-10-D
Elev. m: 244.26

Depth (m)	Elev. m 244.26	USCS	Material Description	Well
135	109	SS		Bentonite pellets
				Pea Gravel
140	104		Flow 12 US GPM at 140.2m	
		MS	MUDSTONE - dark brown, fresh	Bentonite pellets
			COAL SEAM 2 - shiny, with dark brown, fresh MUDSTONE	
145	99		MUDSTONE -	Pea Gravel
			144.3-148.7m: medium brown, fresh	PVC 2" Schedule 40
			148.7-149.0m: COAL lens	Bentonite pellets
			148.7-150.3m: dark brown	
150	94	MS	150.3-156.7m: dark brown, with grey-green, fine-medium grained SILTSTONE, fresh	Pea Gravel
155	89		156.7-160.9m: dark brown, fresh	Bentonite pellets
			Flow 12 US GPM at 158.5m	
160	84		COAL SEAM 2L/1R - shiny, with light brown, fresh MUDSTONE	Pea Gravel
		MS	MUDSTONE -	Bentonite pellets
			162.5-165.4m: light brown, fresh	
165	79		Flow 12 US GPM at 164.6m	
		MS	COAL SEAM 1- shiny	QU-10-10-D Screen
			MUDSTONE - grey-brown, fresh	Sand Pack
		MS	COAL SEAM 1 - shiny, with medium-brown, fresh, MUDSTONE	
170	74	MS	MUDSTONE - dark brown-grey, fresh	
			COAL - shiny, with medium-brown, fresh, MUDSTONE	
			MUDSTONE - dark brown-grey, fresh	
175	69	SL	COAL SEAM 1L - shiny with medium-brown. fresh MUDSTONE	Bentonite pellets
			SILTSTONE -	Pea Gravel.
			173.1-177.7m: green-grey, fresh	
180			EOH @ 179.83m (Flow 12 US GPM)	

Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

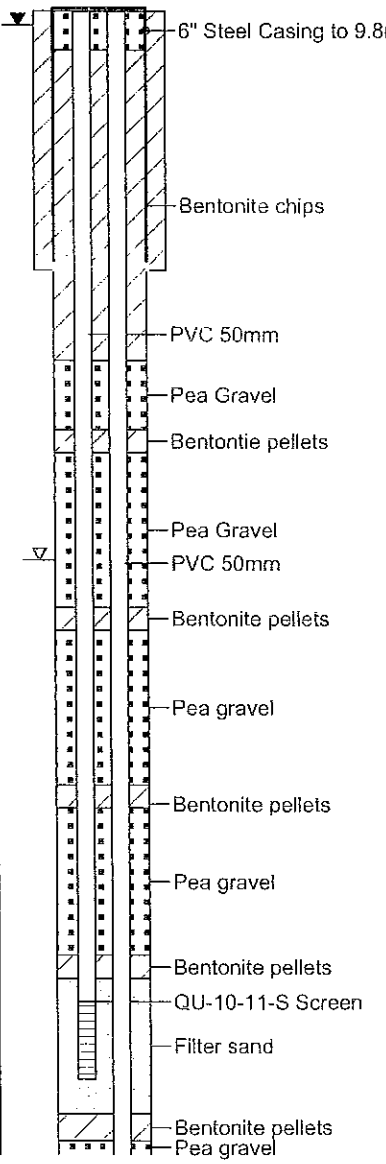
Borehole Log of QU-10-11

Date Started	: Oct 8, 2010	Drilled by	: Drillwell Enterprises
Date Completed	: Oct 13, 2010	Northing Coord.	: 103177
Hole Diameter	: 150 mm	Easting Coord.	: 101451
Drilling Method	: Air Rotary	Survey By	: McElhanney
Sampling Method	: Grab sample	Logged By	: O. Quinn

Water Levels
- QU-10-11-S 248.939 m (21/01/2011)
- QU-10-11-D 227.892 m (08/02/2011)

Well1: QU-10-11-S
Well2: QU-10-11-D
Elev. m: 249.5

Depth (m)	Elev. m 249.5	USCS	Graphic Symbol	Material Description
0	249	f42		sandy SILT TILL - with boulders 0-3.7m red brown 3.7-9.1m grey-brown
5	244			
10	239	ss		SANDSTONE - 9.1-17.4m light grey, coarse-grained, highly weathered
15	234			17.4-18.9m greenish grey, medium grained
20	229			18.9-25.9m light grey, medium grained
25	224			25.9-34.4m light grey, medium grained, moderately weathered
30	219			Hole dry at 33.5m
35	214			34.1-45.7m light-medium grey, medium to coarse grained, fresh
40	209			flow at fracture (40.8m) 30 US GPM
45				



Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

Borehole Log of QU-10-11

Date Started	: Oct 8, 2010	Drilled by	: Drillwell Enterprises
Date Completed	: Oct 13, 2010	Northing Coord.	: 103177
Hole Diameter	: 150 mm	Easting Coord.	: 101451
Drilling Method	: Air Rotary	Survey By	: McElhanney
Sampling Method	: Grab sample	Logged By	: O. Quinn

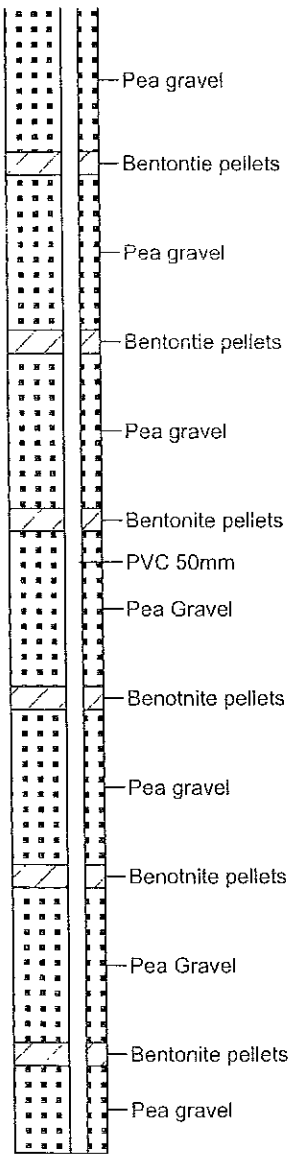
Water Levels

▼ QU-10-11-S 248.939 m (21/01/2011)

▽ QU-10-11-D 227.892 m (08/02/2011)

Well1: QU-10-11-S
Well2: QU-10-11-D
Elev. m: 249.5

Depth (m)	Elev. m 249.5	USCS	Material Description
45	204	SS	45.7-47.5m dark grey, fine-medium grained, fresh, carbonaceous
			COAL SEAM - dirty
50	199		SANDSTONE - 47.8-71.3m grey to grey-brown, medium-coarse to medium grained, fresh flow 30 US GPM at 48.8m
55	194		flow 30 US GPM at 54.9m
60	189	SS	
65	184		flow 20 US GPM at 67.1m (water was flowing out of adjacent exploration hole, QU-05-10 during this measurement)
70	179	MS	COAL SEAM 4B- with SILTSTONE/MUDSTONE
			MUDSTONE - dark brown, fresh
			COAL (No. 4 B Seam) - with SILTSTONE/MUDSTONE
75	174		SANDSTONE - 72.85-86.26m grey brown to grey, medium to coarse grained, fresh
80	169	SS	flow 15 US GPM at 79.25m
85	164		86.26-91.44m dark brown, fine grained, fresh
90			



Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

Borehole Log of QU-10-11

Date Started	: Oct 8, 2010	Drilled by	: Drillwell Enterprises
Date Completed	: Oct 13, 2010	Northing Coord.	: 103177
Hole Diameter	: 150 mm	Easting Coord.	: 101451
Drilling Method	: Air Rotary	Survey By	: McElhanney
Sampling Method	: Grab sample	Logged By	: O. Quinn

Water Levels

▼ QU-10-11-S 248.939 m (21/01/2011)

▽ QU-10-11-D 227.892 m (08/02/2011)

Well1: QU-10-11-S
Well2: QU-10-11-D
Elev. m: 249.5

Depth (m)	Elev. m 249.5	USCS	Material Description
90	159	SS	SANDSTONE (cont'd) - 91.44-94.49m dark grey, medium grained, fresh. flow 12 US GPM at 91.44m. (QU-10-05 flowing during measurement).
95	154	SS	COAL SEAM 3R - shiny, with dark brown, fresh MUDSTONE
			SANDSTONE - medium grey
		MS	MUDSTONE - 96.93-102.11m dark brown, fresh
100	149		flow 30 US GPM at 97.54m (QU-10-05 flowing during measurement).
			COAL SEAM 3L - shiny, with dark brown, fresh MUDSTONE
		MS	MUDSTONE - 103.02-106.07m dark brown, fresh
105	144	SS	flow 18 US GPM at 103.63m (QU-10-05 flowing during measurement).
		MS	SANDSTONE - light grey, fine-medium grained with dark brown mudstone
110	139		MUDSTONE - 108.21-109.73m dark brown, fresh, with minor COAL seams
			flow 30 US GPM at 109.73m (QU-10-05 flowing during measurement).
115	134		SANDSTONE - 109.73-115.21m grey, fine to medium grey, with dark brown MUDSTONE lenses
			115.21-130.45m grey, fine to medium grained, fresh
120	129	SS	flow 12 US GPM at 115.82m (QU-10-05 flowing during measurement).
			COAL stringers at 118.87m and 121.62-121.92m
			flow 7 US GPM at 121.92m (QU-10-05 flowing during measurement).
125	124		flow 9 US GPM at 128.02m (QU-10-05 flowing during measurement).
130	119	SL	SILTSTONE - 130.45-132.89m dark brown, fresh
			flow 6 US GPM at 132.59m (QU-10-05 flowing during measurement).
		MS	MUDSTONE - dark brown
135			

Pea gravel
Bentonite pellets
Pea gravel
Bentonite pellets
Pea gravel
Bentonite pellets
PVC 2"/Schedule 40
Pea gravel
Bentonite pellets
Pea gravel
Bentonite pellets
Pea gravel
Bentonite pellets
Pea gravel
Bentonite pellets

Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd

Borehole Log of QU-10-11

Date Started	: Oct 8, 2010	Drilled by	: Drillwell Enterprises
Date Completed	: Oct 13, 2010	Northing Coord.	: 103177
Hole Diameter	: 150 mm	Easting Coord.	: 101451
Drilling Method	: Air Rotary	Survey By	: McElhanney
Sampling Method	: Grab sample	Logged By	. O. Quinn

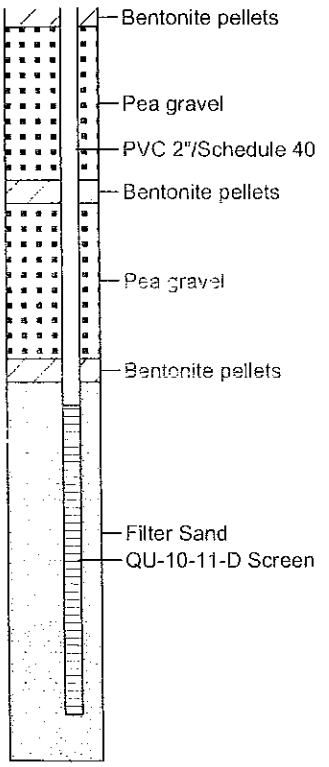
Water Levels

▼ QU-10-11-S 248.939 m (21/01/2011)

▽ QU-10-11-D 227.892 m (08/02/2011)

Well1: QU-10-11-S
Well2: QU-10-11-D
Elev. m: 249.5

Depth (m)	Elev. m 249.5	USCS	Material Description
135	114	MS	coal beds at 134.11, 136.25 and 138.07m
140	109	MS	COAL SEAM 2 - shiny, with MUDSTONE
			MUDSTONE - flow 4 US GPM at 140.21m (QU-10-05 flowing during measurement).
		MS	COAL SEAM 2- shiny, with MUDSTONE
145	104		MUDSTONE - fresh
			COAL SEAM 2L/1U
		MS	MUDSTONE - medium grey-brown, with shiny COAL stringers
150	99		flow 16 US GPM at 146.3m (QU-10-05 flowing during measurement).
			COAL SEAM 1 - shiny with MUDSTONE flow 4 US GPM at 152.4m (QU-10-05 flowing during measurement).
155	94	MS	MUDSTONE - light brown to green/grey
			COAL SEAM 1L - shiny with MUDSTONE
160	89	SS	SANDSTONE - greenish grey, fine-medium grained, fresh
			flow 11 GPM at 158.5m (QU-10-05 flowing during measurement).
		SH	SHALE - red-brown, fresh
165	84		EOH @ 164.59m, flow 11 GPM
170	79		
175	74		
180			



Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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LOG FOR DRILLHOLE #: Qu10-13 Page: 1 of 5

Client: Hillsborough Resources
Project: 7S Permit
Drilling Method: Rotary
Drilling Contractor: DrillWell
Engineer: M Cullen, L Fletcher
Date Started: Nov 5, 2011

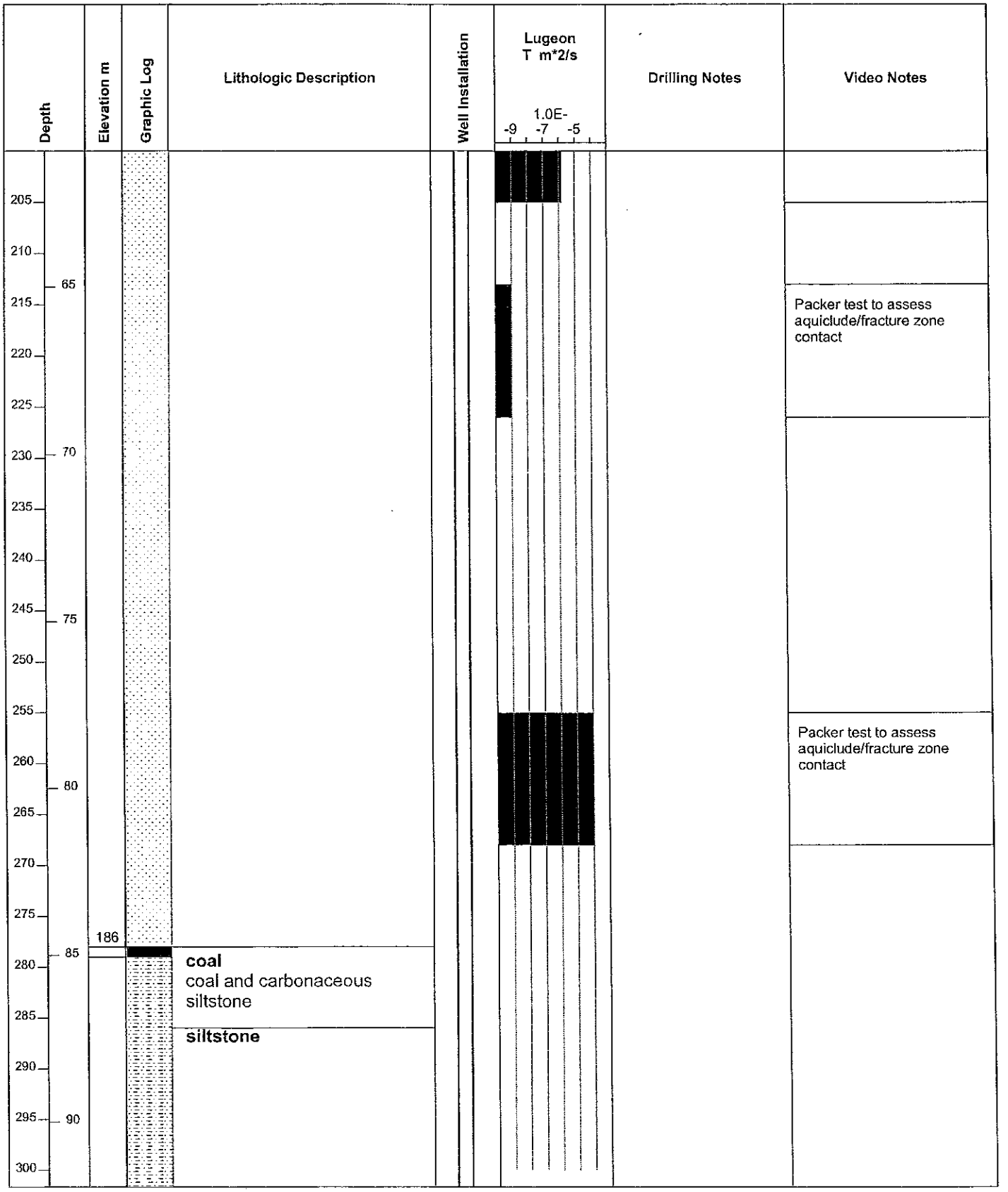
Co-ordinates:
Collar Elev.: 270.68
Dip/Dip direction: vert
Total Depth: 483
Casing Depth: 5
Hole dia:

Depth (ft / m)	Elevation m	Graphic Log	Lithologic Description	Well Installation	Lugeon T m*2/s (1.0E-9 … 1.0E-5)	Drilling Notes	Video Notes
0 ft / 0 m	271		Ground Surface				
			overburden				
5	269		**sedimentary sequence** Dunsmuir Formation				
10							
15 / 5							
20							
25							
30 / 10							
35							
40							horiz fractures: staining, pre-existing, possible open
45							
50 / 15							
55							
60							
65 / 20							
70							
75							
80 / 25							
85							
90							, no fractures evident
95							
100 / 30							

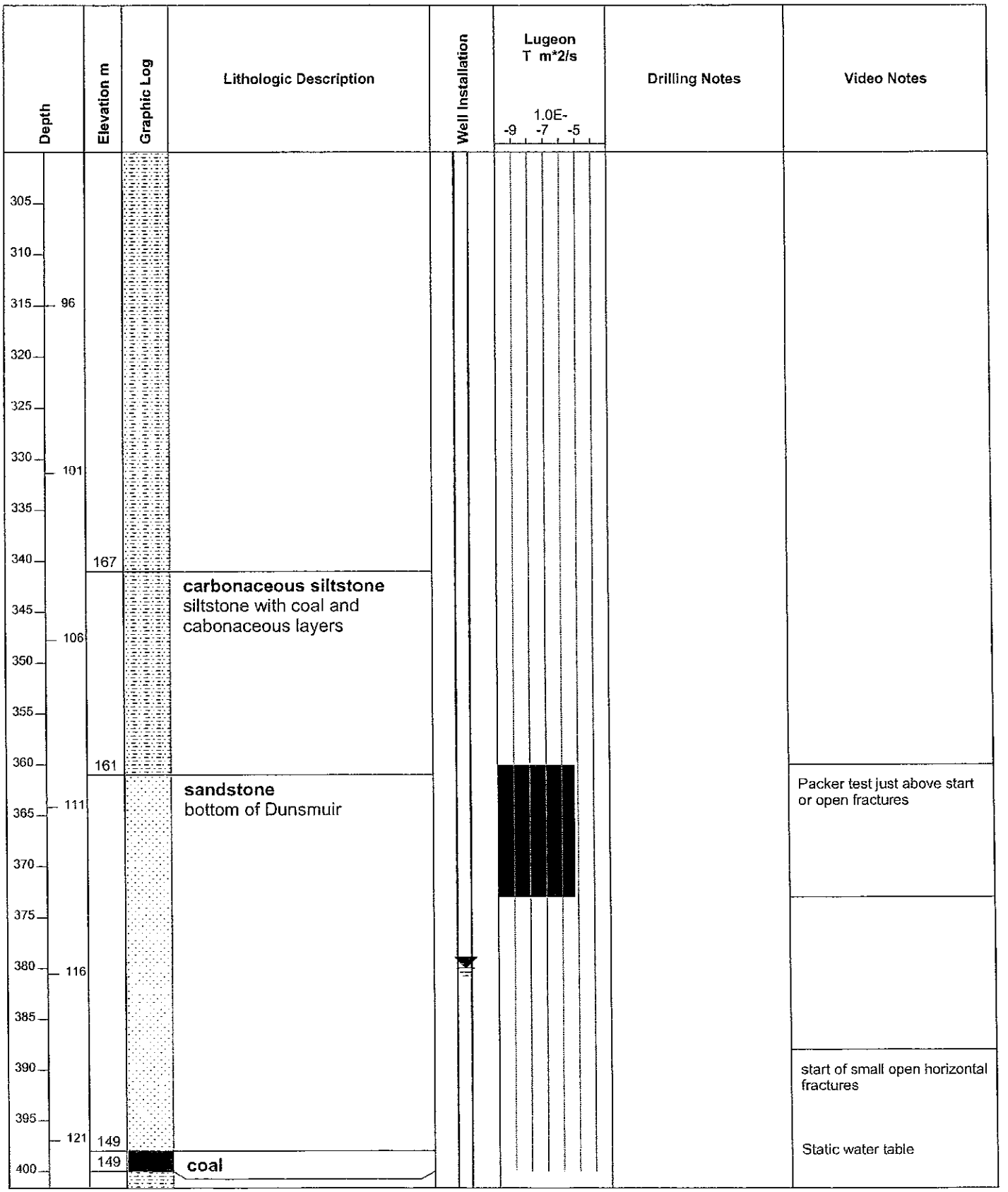
LOG FOR DRILLHOLE #: Qu10-13 **Page: 2 of 5**

Depth	Elevation m	Graphic Log	Lithologic Description	Well Installation	Lugeon T m*2/s (1.0E-9 -7 -5)	Drilling Notes	Video Notes
105							
110							
115 — 35							
120							sections of rough drill hole wall from 120 to 234 ft
125							
130 — 40							
135							
140							
145							
150 — 45							Packer testing over sections of rough DH wall to test for aquiclude
155							
160							
165 — 50							
170							Packer testing over piezometer location and dilated zone
175							
180 — 55							small open fractures; possible new
185							
190							
195							Packer testing over dilated zone
200 — 60							

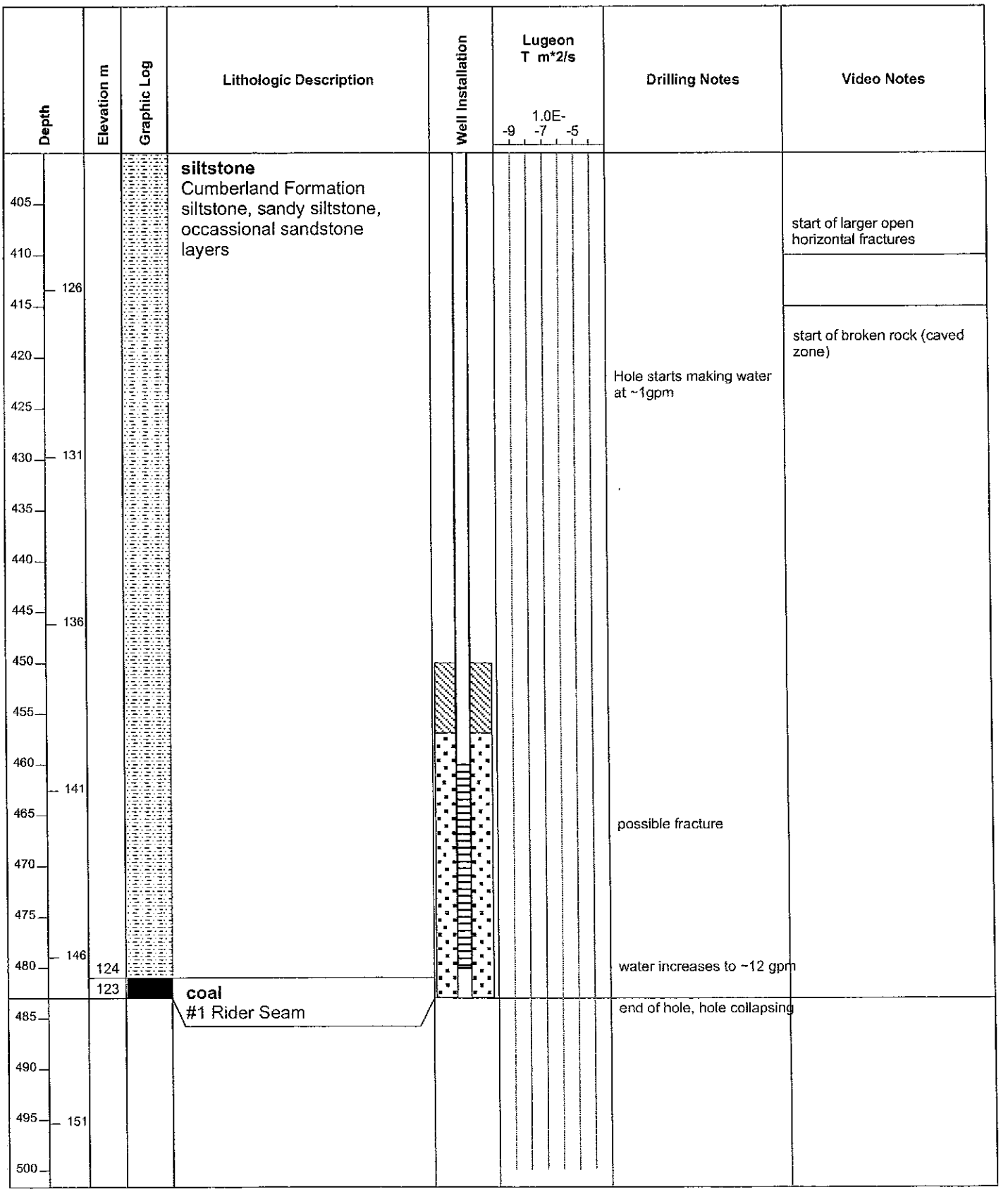
LOG FOR DRILLHOLE #: Qu10-13 **Page: 3 of 5**



LOG FOR DRILLHOLE #: Qu10-13 **Page: 4 of 5**



LOG FOR DRILLHOLE #: Qu10-13 **Page: 5 of 5**



Enterprise Geoscience Services Ltd.

Borehole Log of QU-11-01 (4 South)

Date Started	: 4 Jan 2011	Drilled By	: Dirtiwell Enterprises
Date Completed	: 6 Jan 2011	Northing Coord.	: 101056.7
Hole Diameter	: 140 mm	Easting Coord.	: 99134.6
Drilling Method	: Air rotary with wireline coring	Survey By	: Quinsam
Sampling Method	: Core	Logged By	: N. Bazowski

Water Levels

▼ QU-11-01: 290 01 m (19-Feb-11)

▽

Well: QU-11-01
Elev. m: 316.368

Depth (m)	Elev. m 316.368	USCS	Graphic Symbol	Material Description	Remarks
65	251.37				
		SP			
70	246.37				
		SS			+ Shale traps at 73 m.
75	241.37				+ Shale traps at 76 m.
80	236.37	SM			
		SS			+ Hole intersects minedrift at 85.2 m.
85	231.37			EOH @ 85.2 m	
90					

4" PVC

Screen

Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

03-09-2011 C:\Users\John Balfour\Documents\PROJECTS\2009 Projects\09010 Lorax\2010 Work\Borehole logs\QU-11-01.bor

Enterprise Geoscience Services Ltd.

Borehole Log of QU-11-03 (2 North)

Date Started	: Jan 12, 2011	Drilled By	: Drillwell Enterprises
Date Completed	:	Northing Coord.	: n/a
Hole Diameter	: 150 mm / 140 mm core	Easting Coord.	: n/a
Drilling Method	: Air rotary with wireline coring	Survey By	:
Sampling Method	: Grab sample / Core	Logged By	: N. Bazowski

Water Levels

▼ QU-11-03: 42.21 m bTOC (18-Jan-2011)

▽

Well: QU-11-03
Elev. m: xxx

Depth (m)	Elev. m 304	USCS	Graphic Symbol	Material Description	Remarks
65	239				
				From 0 - 69.34 m not logged SANDSTONE, zone of silty sandstone, from: 71.52 - 73.64 m and 74.18 - 75.44 m Conglomerate at base from: 81.58 - 81.75 m	+ Completion details to follow.
70	234				
		SP			
75	229				
					4" PVC
80	224				
		SS		SILTSTONE	
85	219				
		SM		SILTSTONE, Coaly siltstone and coal, Coal layers from: 86.48-86.54 m 86.66-87.57 m 87.67-87.98 m 89.71-90.08 m	
90					

Quinsam Coal
Assessment of Underground Disposal of Coarse Coal Refuse

Campbell River, B.C.

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03-09-201

Enterprise Geoscience Services Ltd

Borehole Log of QU-11-03 (2 North)

Date Started	: Jan 12, 2011	Drilled By	: Drillwell Enterprises
Date Completed	.	Northing Coord.	: n/a
Hole Diameter	: 150 mm / 140 mm core	Easting Coord.	: n/a
Drilling Method	: Air rotary with wireline coring	Survey By	:
Sampling Method	: Grab sample / Core	Logged By	: N. Bazowski

Water Levels

▼ QU-11-03: 42.21 m bTOC (18-Jan-2011)

▽

Well: QU-11-03
Elev. m: xxx

Depth (m)	Elev. m 304	USCS	Graphic Symbol	Material Description	Remarks
90	214	SM		SILTSTONE, Sandstone and Conglomerate	
95	209				
100	204	SS			
105	199				
110	194	CO		Coaly siltstone	+ Hole intersetcs mine void.
115				EOH @ 110.64 m	

4" PVC

Screen

Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd

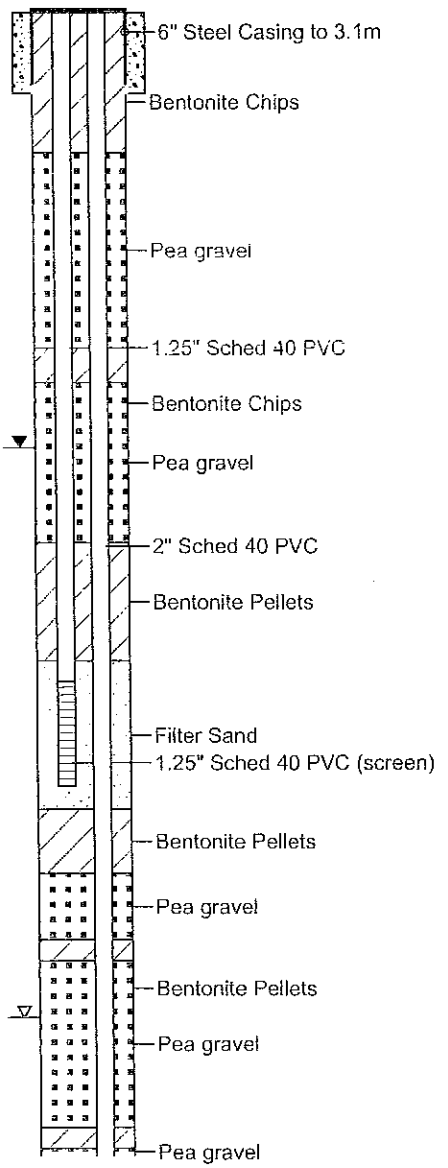
Borehole Log of QU-11-05

Date Started	: Feb 15, 2011	Drilled By	: Drillwell Enterprise
Date Completed	: Feb 18, 2011	Northing Coord.	: 102648.3
Hole Diameter	: 140 mm	Easting Coord.	: 101075.9
Drilling Method	: Air rotary with wireline coring	Survey By	: QCC
Sampling Method	: Core	Logged By	: N. Bazowski

Water Levels
- QU-11-05-S: 19.00 m (8-Mar-11)
- QU-11-05-D: 43.95 m (8-Mar-11)

Well1: QU-11-05-S
Well2: QU-11-05-D
Elev. m: 228.39

Depth (m)	Elev. m 228.39	USCS	Material Description
0	228		NOT CORED
5	223	SW	SANDSTONE
10	218		10-10.06 m: Coaly Siltstone
			10.14-10.31m: Coaly Siltstone
15	213		10.31-10.57m: Siltstone
20	208		
25	203		23.55-23.72m: Conglomerate
			24.54-24.73m: Conglomerate
			24.9-24.97m: Conglomerate
30	198		25.47-25.55m: Conglomerate
		SW	30.45-30.51m: Coaly Siltstone (fractured)
			COAL
35	193		SANDSTONE
			COAL - 4B Coal Seam
			SANDSTONE
40	188	SW	32.75-33.04 m: Silty Coaly Sandstone
45	183		
50			



Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

Bentonite Pellets

05-05-201 ers\John Balfour\Documents\PROJECTS\2009 Projects\09010 Lorax\2010 Work\Borehole logs\QU-11-05.bo

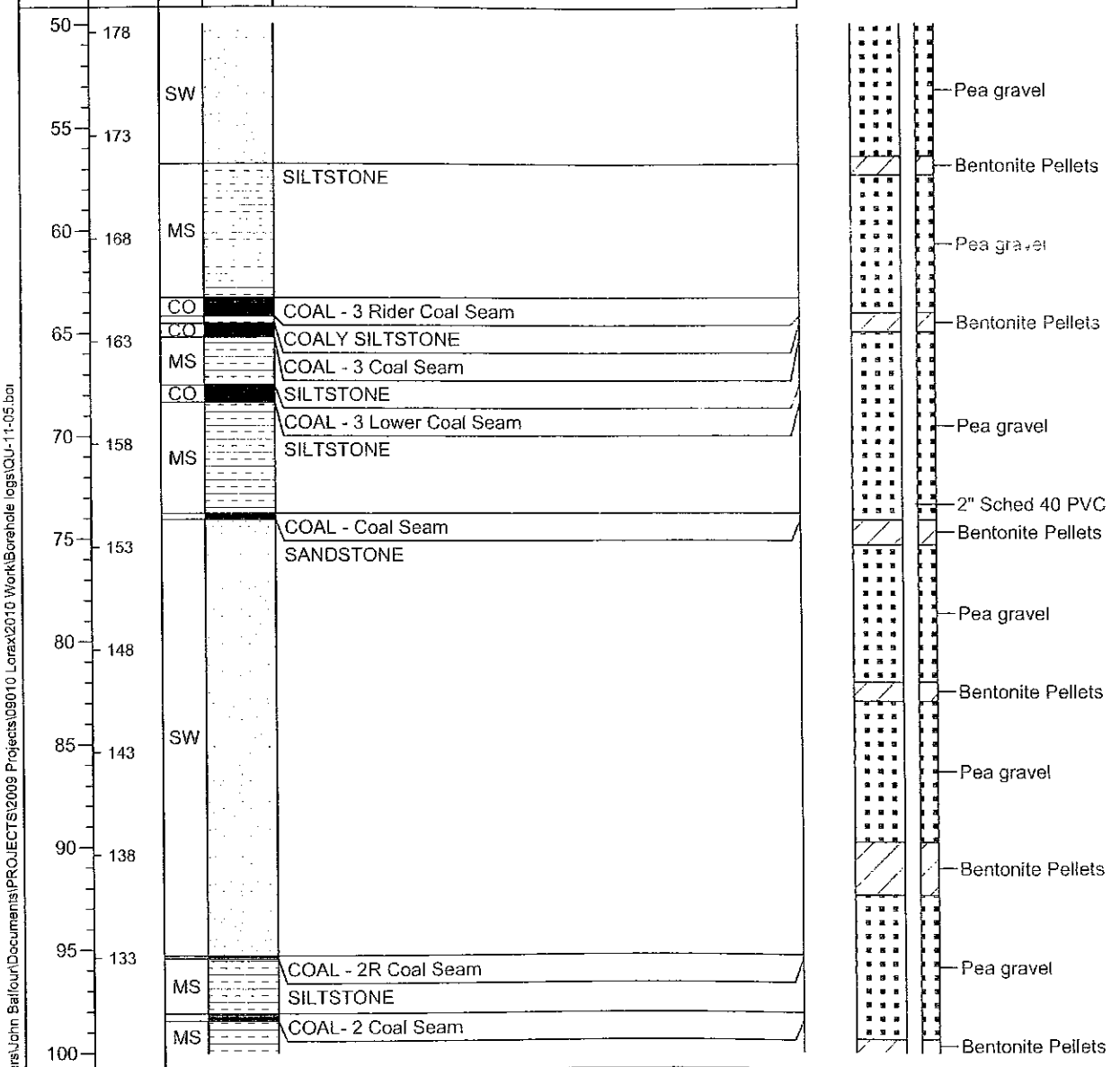
Enterprise Geoscience Services Ltd.

Borehole Log of QU-11-05

Date Started	: Feb 15, 2011	Drilled By	: Drillwell Enterprise
Date Completed	: Feb 18, 2011	Northing Coord.	: 102648.3
Hole Diameter	: 140 mm	Easting Coord.	: 101075.9
Drilling Method	: Air rotary with wireline coring	Survey By	: QCC
Sampling Method	: Core	Logged By	: N. Bazowski

Water Levels
- QU-11-05-S: 19.00 m (8-Mar-11)
- QU-11-05-D: 43.95 m (8-Mar-11)

Well1: QU-11-05-S
Well2: QU-11-05-D
Elev. m: 228.39



Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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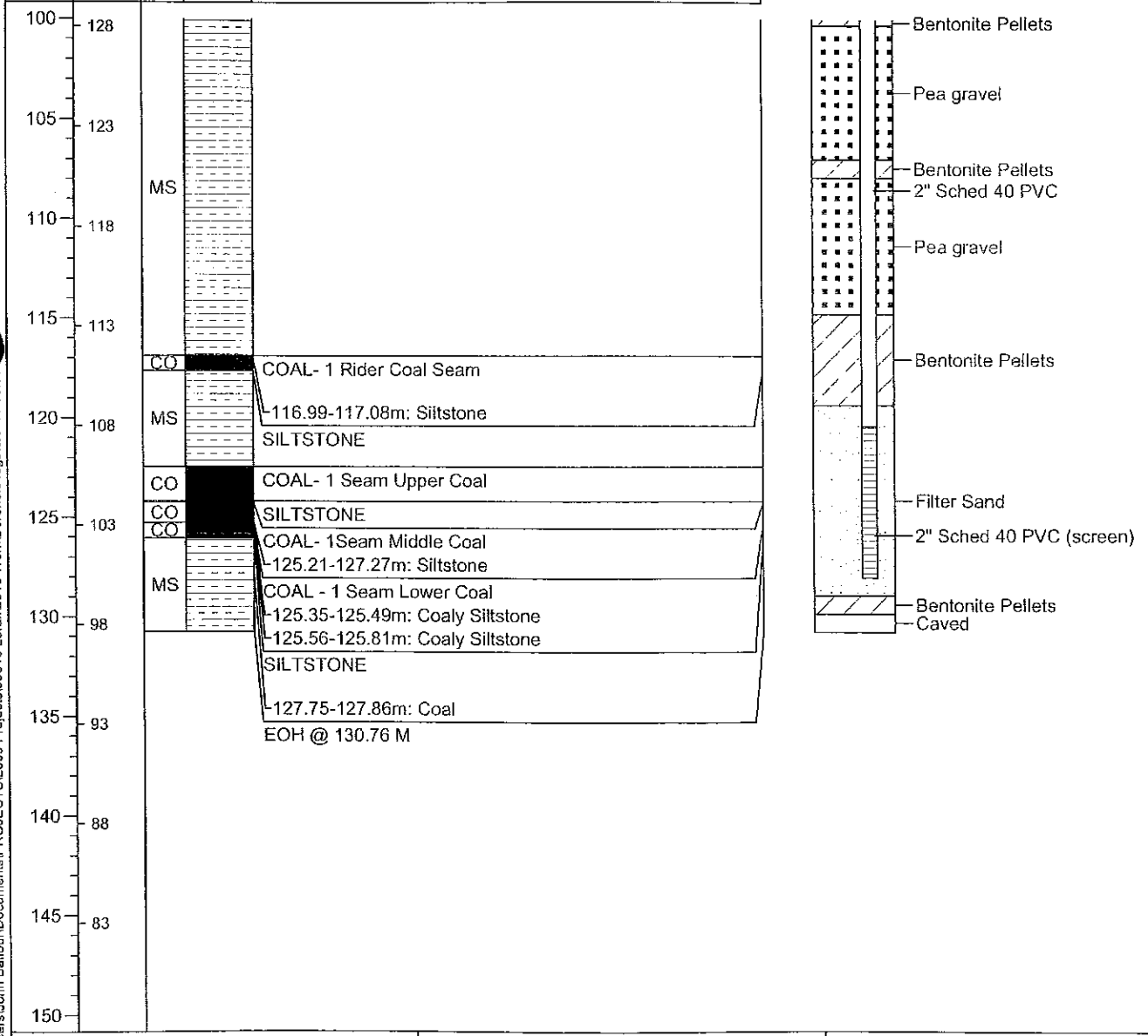
Enterprise Geoscience Services Ltd.

Borehole Log of QU-11-05

Date Started	: Feb 15, 2011	Drilled By	: Drillwell Enterprise
Date Completed	: Feb 18, 2011	Northing Coord.	: 102648.3
Hole Diameter	: 140 mm	Easting Coord.	: 101075.9
Drilling Method	: Air rotary with wireline coring	Survey By	: QCC
Sampling Method	: Core	Logged By	: N. Bazowski

Water Levels
- QU-11-05-S: 19.00 m (8-Mar-11)
- QU-11-05-D: 43.95 m (8-Mar-11)

Well1: QU-11-05-S
Well2: QU-11-05-D
Elev. m: 228.39



Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

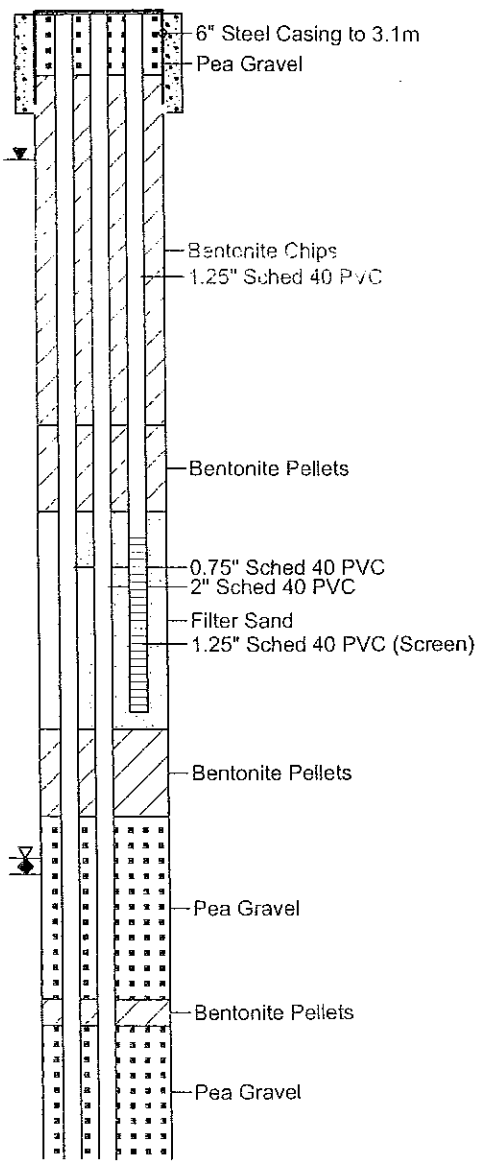
Borehole Log of QU-11-09

Date Started	:	Drilled By	: Drillwell Enterprise
Date Completed	: March 8, 2011	Northing Coord.	: 102561.8
Hole Diameter	: 152 mm / 140 mm	Easting Coord.	: 100736
Drilling Method	: Air rotary with wireline coring	Survey By	: QCC
Sampling Method	: Grab sample and core	Logged By	: N. Bazowski

Water Levels
- QU-10-09-S: 5.05 m
- QU-10-09-D: 29.52 m
- QU-10-09-P: 30.08 m

Well1: QU-10-09-S
Well2: QU-10-09-D
Well3: QU-10-09-P
Elev. m: 226.297

Depth (m)	Elev. m	USCS	Material Description
0	226		OVERBURDEN
5	221		
10	216		
15	211	MS	SILTSTONE
			SANDSTONE
20	206		
25	201	SW	
30	196		
35	191		
40			



Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd

Borehole Log of QU-11-09

Date Started	:	Drilled By	: Drillwell Enterprise
Date Completed	: March 8, 2011	Northing Coord.	: 102561.8
Hole Diameter	: 152 mm / 140 mm	Easting Coord.	: 100736
Drilling Method	: Air rotary with wireline coring	Survey By	: QCC
Sampling Method	: Grab sample and core	Logged By	: N. Bazowski

Water Levels
- QU-10-09-S: 5.05 m
- QU-10-09-D: 29.52 m
- QU-10-09-P: 30.08 m

Well1: QU-10-09-S
Well2: QU-10-09-D
Well3: QU-10-09-P
Elev. m: 226.297

Depth (m)	Elev. m 226.297	USCS	Material Description
40	186	SW	
45	181	MS	SILTSTONE
50	176	SW	SANDSTONE
55	171		
60	166		
65	161		at 67.16 m coring starts
70	156		
75	151	MS	SILTSTONE
		CO	COAL - 1 RiderSeam
		MS	SILTSTONE
80		CO	COAL - 1 Seam Upper

Pea Gravel
Bentonite Pellets
Pea Gravel
Bentonite Pellets
Pea Gravel
Bentonite Pellets
2" Sched 40 PVC
0.75" Sched 40 PVC
Pea Gravel
Bentonite Pellets
Pea Gravel
Bentonite Pellets
Filter Sand
2" Sched 40 PVC (Screen)

Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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Enterprise Geoscience Services Ltd.

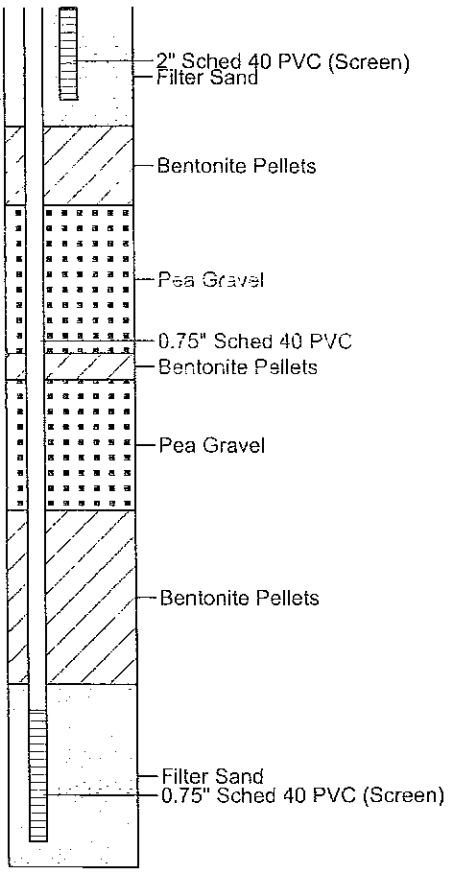
Borehole Log of QU-11-09

Date Started	:	Drilled By	: Drillwell Enterprise
Date Completed	: March 8, 2011	Northing Coord.	: 102561.8
Hole Diameter	: 152 mm / 140 mm	Easting Coord.	: 100736
Drilling Method	: Air rotary with wireline coring	Survey By	: QCC
Sampling Method	: Grab sample and core	Logged By	: N. Bazowski

Water Levels
- QU-10-09-S: 5.05 m
- QU-10-09-D: 29.52 m
- QU-10-09-P: 30.08 m

Well1: QU-10-09-S
Well2: QU-10-09-D
Well3: QU-10-09-P
Elev. m: 226.297

Depth (m)	Elev. m 226.297	USCS	Material Description
80	146	CO	
		MS	SILTSTONE
			COAL- 1 Seam Lower
			SILTSTONE
85	141		
		MS	
90	136		
95	131		
		GC	CONGLOGERATE 96.2-96.64 m: Very Coarse Grained Sandstone 97.08-967.45 m: Very Coarse Grained Sandstone
100	126	MS	SILTSTONE
		SW	SANDSTONE
105	121	GC	COGLOMERATE
110	116		EOH @ 110.19
115	111		
120			



Quinsam Coal
Assessment of Underground Disposal
of Coarse Coal Refuse

Campbell River, B.C.

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Borehole Log of QU11-18

HILLSBOROUGH Resources Limited

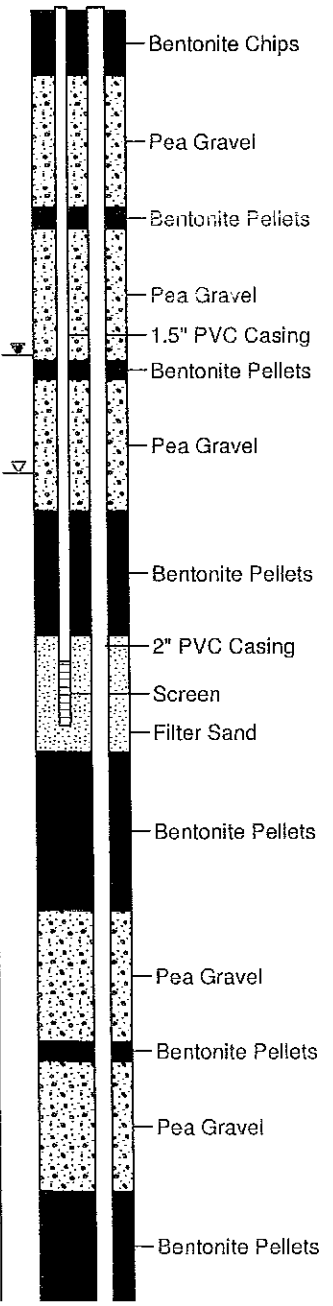
Quinsam Coal Corporation
Project #: J885-7

Date Drilled	: August 2011	Mine Grid Northing (m)	: 100690.81
Date Installed	: Dec 12, 2011	Mine Grid Easting (m)	: 100542.84
Hole Diameter	: 150 mm/ 85 mm core	Logged By	: N. Bazowski (QCC)
Drilling Method	: Air Rotary w/ wireline coring	Surveyed By	: QCC
Drilling Company	: Drillwell Enterprises	Installed By	: M. Storey (Lorax)

Water Levels
- QU11-18S: 283.59 m (Mar 19, 2012)
- QU11-18D: 278.09 m (Mar 19, 2012)

Well1: MW11-18S PVC Stickup 0.16m
Well2: MW11-18D PVC Stickup 0.16m
Elev.: 299.71 m (ground surface)

Depth (m)	Elev. (m asl) 299.71	Cored Interval	GRAPHIC	DESCRIPTION
0	299			TILL (not logged)
5	294			
10	289			
15	284			
20	279			
25	274			
30	269			
35	264			Drilled with casing, not logged
40	259			SANDSTONE, grey, fine to medium grained Fault zone 37.2-37.7 m with fractures infilled with rusty clays, little water flow inferred
45	254			Coal (4 Seam) with some calcite, few surfaces display powdery orange mineral (realgar) in minor amounts SILTSTONE COAL (4L Seam), dirty dull to bright clean, pyrite noted in limited intervals SILTSTONE, medium grey
50	249			
55	244			COAL (4B Seam) SILTSTONE, medium grey
60				



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Borehole Log of QU11-18

HILLSBOROUGH Resources Limited

Quinsam Coal Corporation
Project #: J885-7

Date Drilled	: August 2011	Mine Grid Northing (m)	: 100690.81
Date Installed	: Dec 12, 2011	Mine Grid Easting (m)	: 100542.84
Hole Diameter	: 150 mm/ 85 mm core	Logged By	: N. Bazowski (QCC)
Drilling Method	: Air Rotary w/ wireline coring	Surveyed By	: QCC
Drilling Company	: Drillwell Enterprises	Installed By	: M. Storey (Lorax)

Water Levels
- QU11-18S: 283.59 m (Mar 19, 2012)
- QU11-18D: 278.09 m (Mar 19, 2012)

Well1: MW11-18S PVC Stickup 0.16m
Well2: MW11-18D PVC Stickup 0.16m
Elev.: 299.71 m (ground surface)

Depth (m)	Elev. (m asl) 299.71	Cored Interval	GRAPHIC	DESCRIPTION
60	239			
				SANDSTONE, medium grey, fine grained, tight
65	234			SILSTONE, medium to dark grey, trace coal
				Airlift yield increased 12 GPM at 66.8 m
70	229			COAL (3 Zone)
75	224			Discrepancy between geophysical log and chip log
80	219			SILTSTONE, mostly grey interbedded with some brown, 5% calcite, 5% coal, fault zone
85	214			SILTSTONE, fractures noted 88-88.5 m and 94.3 m
90	209			
95	204			
100	199			SANDSTONE, greenish grey, fine to medium grained
				CONGLOMERATE
105	194			SILSTONE, with minor mudstone, some fractures
				BENSON CONGLOMERATE, both clast and matrix supported
110	189			SILSTONE, hematitic and dark green, 20 cm fault zone at 111.7 m
				CONGLOMERATE
115	184			EOH 115.2 m.
120				

Bentonite Pellets
PVC Casing
Screen
Filter Sand
Bentonite Pellets
Pea Gravel
Bentonite Pellets
Pea Gravel
Bentonite Pellets
Pea Gravel
Bentonite Pellets
Pea Gravel
Bentonite Pellets
Pea Gravel

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Borehole Log of QU11-36D

HILLSBOROUGH Resources Limited

Quinsam Coal Corporation
Project #: J885-7

Date Drilled	: December 2011	Mine Grid Northing (m)	: 100111.42
Date Installed	: Dec 20, 2011	Mine Grid Easting (m)	: 100322.46
Hole Diameter	: 150 mm/ 85 mm core	Logged By	: N. Bazowski (QCC)
Drilling Method	: Air Rotary w/ wireline coring	Surveyed By	: QCC
Drilling Company	: Drillwell Enterprises	Installed By	: M. Storey (Lorax)

Water Levels
▼ QU11-36D: Water level 260.86 m (Mar 19, 2012)
▽

Well: MW11-36D PVC Stickup 0.22 m
Elev.: 285.89 m (ground surface)

Depth (m)	Elev. (m asl) 285.89	Cored Interval	GRAPHIC	DESCRIPTION
0	285			TILL (not logged)
5	280			
10	275			BR (drilled)
15	270			
20	265			
				COAL (5 Seam)
25	260			BR
30	255			SANDSTONE, medium to coarse grained, fractured with oxidation surfaces throughout Possible fault at ~33.6 m
35	250			
40	245			
				SANDSTONE, fine to medium grained, with overlying pyritic SILSTONE (top 5 cm)
45				

Bentonite Chips
Pea Gravel
Bentonite Pellets
Pea Gravel
Bentonite Pellets
Pea Gravel
Bentonite Pellets
Pea Gravel
2" PVC Casing
Bentonite Pellets
Pea Gravel
Bentonite Pellets
Pea Gravel
Bentonite Pellets
Pea Gravel

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Borehole Log of QU11-36D

HILLSBOROUGH Resources Limited

Quinsam Coal Corporation
Project #: J885-7

Date Drilled	: December 2011	Mine Grid Northing (m)	: 100111.42
Date Installed	: Dec 20, 2011	Mine Grid Easting (m)	: 100322.46
Hole Diameter	: 150 mm/ 85 mm core	Logged By	: N. Bazowski (QCC)
Drilling Method	: Air Rotary w/ wireline coring	Surveyed By	: QCC
Drilling Company	: Drillwell Enterprises	Installed By	: M. Storey (Lorax)

Water Levels
▼ QU11-36D: Water level 260.86 m (Mar 19, 2012)
▽

Well: MW11-36D PVC Stickup 0.22 m
Elev.: 285.89 m (ground surface)

Depth (m)	Elev. (m asl) 285.89	Cored Interval	GRAPHIC	DESCRIPTION
45	240			
50	235			SANDSTONE
				COAL (4L Seam)
55	230			BR (drilled)
60	225			COAL (4B Seam)
				BR (drilled)
65	220			
70	215			
75	210			
80	205			BENSON CONGLOMERATE
				EOH 80.0 m
85	200			
90				

Pea Gravel
Bentonite Pellets
Pea Gravel
2" PVC Casing
Bentonite Pellets
filter sand
Screen
Bentonite Pellets
Pea Gravel

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LORAX ENVIRONMENTAL

Borehole Log of MW12-23

HILLSBOROUGH Resources Limited

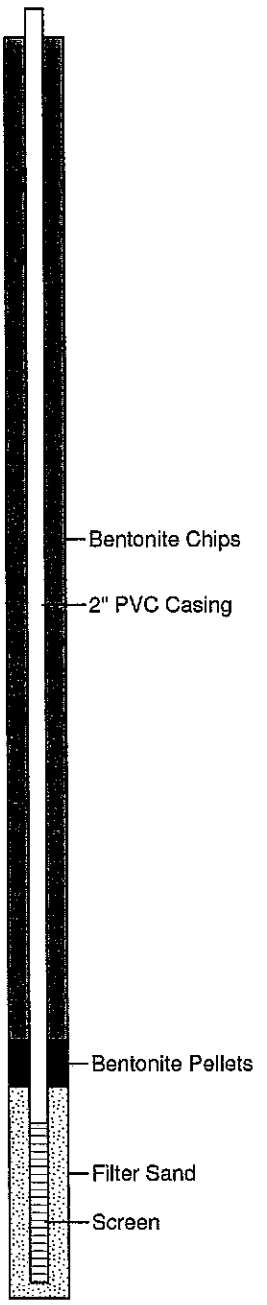
Quinsam Coal Corporation
Project #: A305-3

Date Drilled	: Oct 3, 2012	Mine Grid Northing (m)	: 101584.912
Date Installed	: Oct 4, 2012	Mine Grid Easting (m)	: 97205.970
Hole Diameter	: 150 mm	Logged By	: L.Findlater
Drilling Method	: Air rotary	Surveyed By	: QCC
Drilling Company	: Drillwell Enterprises	Installed By	: L. Findlater

Water Levels
▼ MW12-23: dry (Oct 23, 2012)
▽

Well: MW12-23 PVC Stickup 0.55 m
Elev.: 334.299 m (ground surface).

Depth (m)	Elev. (m asl) 334.299	GRAPHIC	DESCRIPTION
0	334		FILL and OVERBURDEN (not logged)
			SILTSTONE, brownish grey, slightly weathered
			SILTSTONE, as above, fresh
5	329		SILTSTONE, dark grey, fresh
			SILTSTONE, medium grey with pink flecks, sandy
			SILTSTONE, medium grey, interbedded with light grey, fine SANDSTONE
			SILTSTONE, medium brownish grey
10	324		SILTSTONE, interbedded tan-grey, fine sandy and dark grey
			SILTSTONE, interbedded reddish brown and greenish grey fine sandy siltstone layers, greenish grey layer trending to silty fine sandstone
15	319		
20	314		Hole drilled with water; no noticeable fractures or water bearing zones encountered during drilling. Drilling dusty throughout.
25			EOH at 24.4 m



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LORAX ENVIRONMENTAL

Borehole Log of MW12-24

HILLSBOROUGH Resources Limited

Quinsam Coal Corporation
Project #: A305-3

Date Drilled	: Oct 3, 2012	Mine Grid Northing (m)	: 101583.676
Date Installed	: Oct 4, 2012	Mine Grid Easting (m)	: 97207.129
Hole Diameter	: 150 mm	Logged By	: L.Findlater
Drilling Method	: Air rotary	Surveyed By	: QCC
Drilling Company	: Drillwell Enterprises	Installed By	: L. Findlater

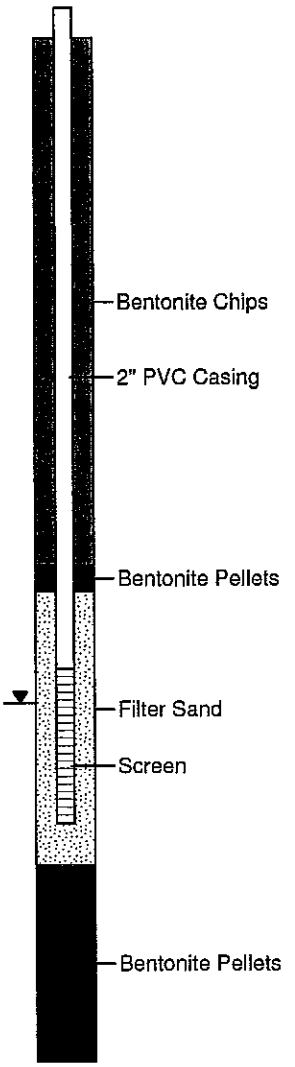
Water Levels

▼ MW12-24: 13.448 m bTOC (Oct 23, 2012).

▽

Well: MW12-24 PVC Stickup 0.58 m
Elev.: 334.354 m (ground surface).

Depth (m)	Elev. (m asl) 334.354	GRAPHIC	DESCRIPTION
0	334		FILL and OVERBURDEN (not logged)
			SILTSTONE, dark brown-grey, slightly weathered
5	329		SILTSTONE, dark grey, fresh
			SILTSTONE, light tan-grey, fine sandy
			SILTSTONE, as above, with pink flecks and trending towards silty fine sandstone
			SILTSTONE, grey
10	324		SILTSTONE, greenish grey, fine sandy
			SILTSTONE, interbedded reddish brown and greenish grey fine sandy siltstone layers, greenish grey layer somewhat trending to silty fine sandstone
15	319		Hole drilled with air only, dusty drilling throughout with no noticeable fractures. Some water dripping at collar at 60 ft rod change,however no water at end of discharge pipe
20	314		EOH at 19.8 m
25			



Appendix D

List of Graphs

Graph 1 In-Situ 2-North Water Elevation @ QU10-13 D

Graph 2 In-Situ 2-North Monitoring Wells - Dissolved Arsenic

Graph 3 In-Situ 2-North Monitoring Wells - Dissolved Iron

Graph 4 In-Situ 2-North Monitoring Wells - Dissolved Manganese

Graph 5 In-Situ 2-North Monitoring Wells - Dissolved Sulphate

Graph 6 Ex-Situ 2-North Monitoring Wells - Dissolved Arsenic

Graph 7 Ex-Situ 2-North Monitoring Wells - Dissolved Iron

Graph 8 Ex-Situ 2-North Monitoring Wells - Dissolved Sulphate

Graph 9 Ex-Situ 2-North Monitoring Wells - Sulphide as H_2S

Graph 10 Ex-Situ 2-North Monitoring Wells - Dissolved Sodium

Graph 11 Ex-Situ 2-North Monitoring Wells - Dissolved Chloride

Graph 12 RBP Mine Pool Water Elevation @ QU11-09 M

Graph 13 RBP Monitoring Wells - Dissolved Arsenic

Graph 14 RBP Monitoring Wells - Dissolved Iron

Graph 15 RBP Monitoring Wells - Dissolved Manganese

Graph 16 RBP Monitoring Wells - Dissolved Sulphate

Graph 17 RBP Monitoring Wells - Sulphide as H_2S

Graph 18 Plant Monitoring Wells - Dissolved Arsenic

Graph 19 Plant Monitoring Wells - Dissolved Iron

Graph 20 Plant Monitoring Wells - Dissolved Sulphate

Graph 21 Plant Monitoring Wells - Sulphide as H_2S

Graph 22 In-Situ 7-South PAG Elevation and Water Elevation @ QU14-10

Graph 23 7-South In-Situ Monitoring Wells - Dissolved Arsenic

Graph 24 7-South In-Situ Monitoring Wells - Dissolved Iron

Graph 25 7-South In-Situ Monitoring Wells - Dissolved Sulphate

Graph 26 7-South In-Situ Monitoring Wells - Sulphide as H_2S

List of Graphs

Graph 27 7-South Ex-Situ Monitoring Wells - Dissolved Arsenic

Graph 28 7-South Ex-Situ Monitoring Wells - Dissolved Iron

Graph 29 7-South Ex-Situ Monitoring Wells - Dissolved Sulphate

Graph 30 7-South Ex-Situ Monitoring Wells - Sulphide as H_2S

Graph 31 In-Situ 2-South Groundwater and Mine Pool Water Elevations

Graph 32 In-Situ 2-South Monitoring Wells - Dissolved Iron

Graph 33 In-Situ 2-South Monitoring Wells - Dissolved Sulphate

Graph 34 In-Situ 2-South Monitoring Wells - Sulphide as H_2S

Graph 35 Ex-Situ 2/3-South Monitoring Wells - Dissolved Iron

Graph 36 Ex-Situ 2/3-South Monitoring Wells - Dissolved Manganese

Graph 37 Ex-Situ 2/3-South Monitoring Wells - Dissolved Sulphate

Graph 38 Ex-Situ 2/3-South Monitoring Wells - Sulphide as H_2S

Graph 39 In-Situ 4-South Water Elevation @ QU11-01

Graph 40 In-Situ 4-South Monitoring Wells - Dissolved Arsenic

Graph 41 In-Situ 4-South Monitoring Wells - Dissolved Iron

Graph 42 In-Situ 4-South Monitoring Wells - Dissolved Manganese

Graph 43 In-Situ 4-South Monitoring Wells - Dissolved Sulphate

Graph 44 In-Situ 4-South Monitoring Wells - Sulphide as H_2S

Graph 45 Ex-Situ 4-South Monitoring Wells - Dissolved Arsenic

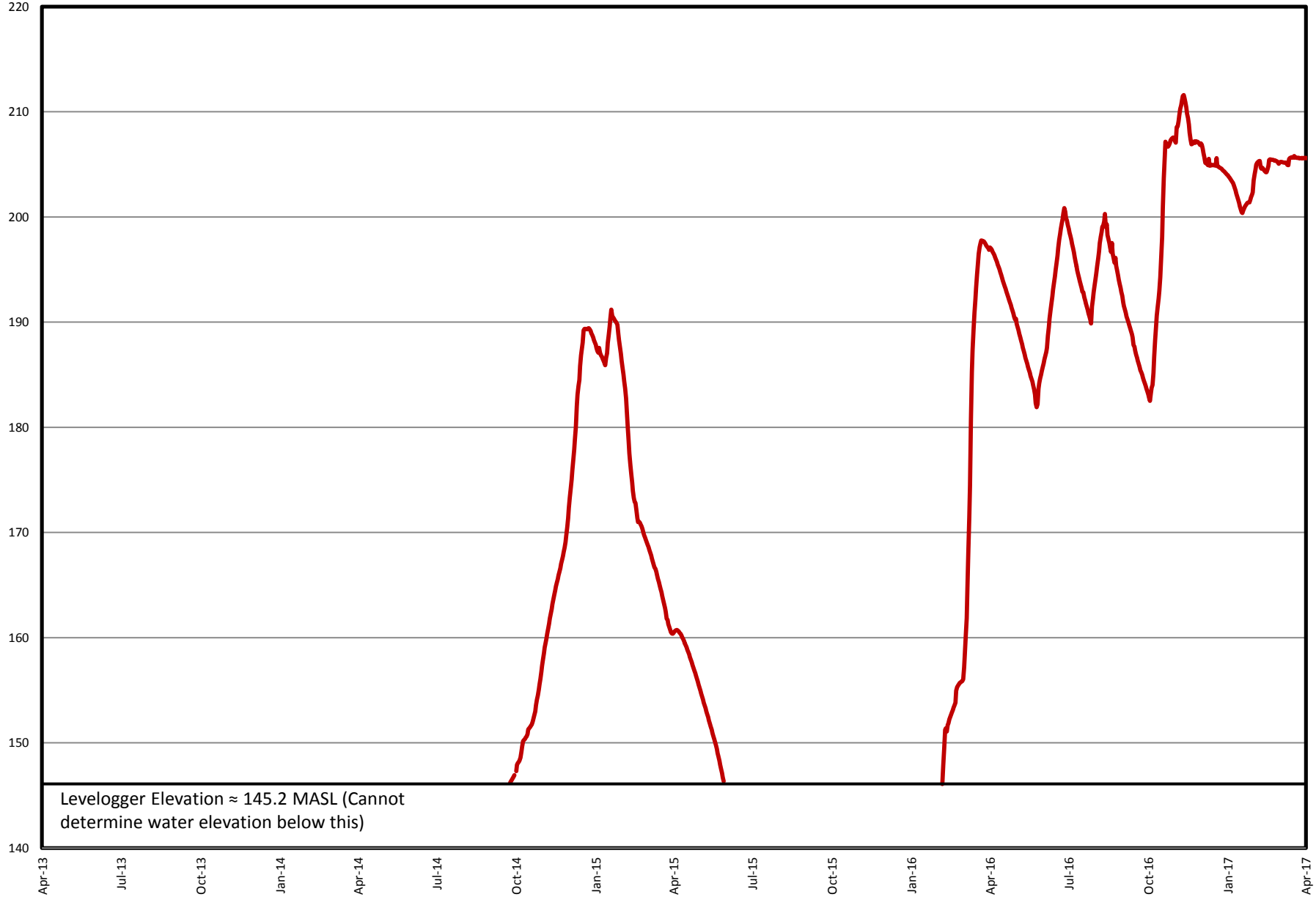
Graph 46 Ex-Situ 4-South Monitoring Wells - Dissolved Iron

Graph 47 Ex-Situ 4-South Monitoring Wells - Dissolved Manganese

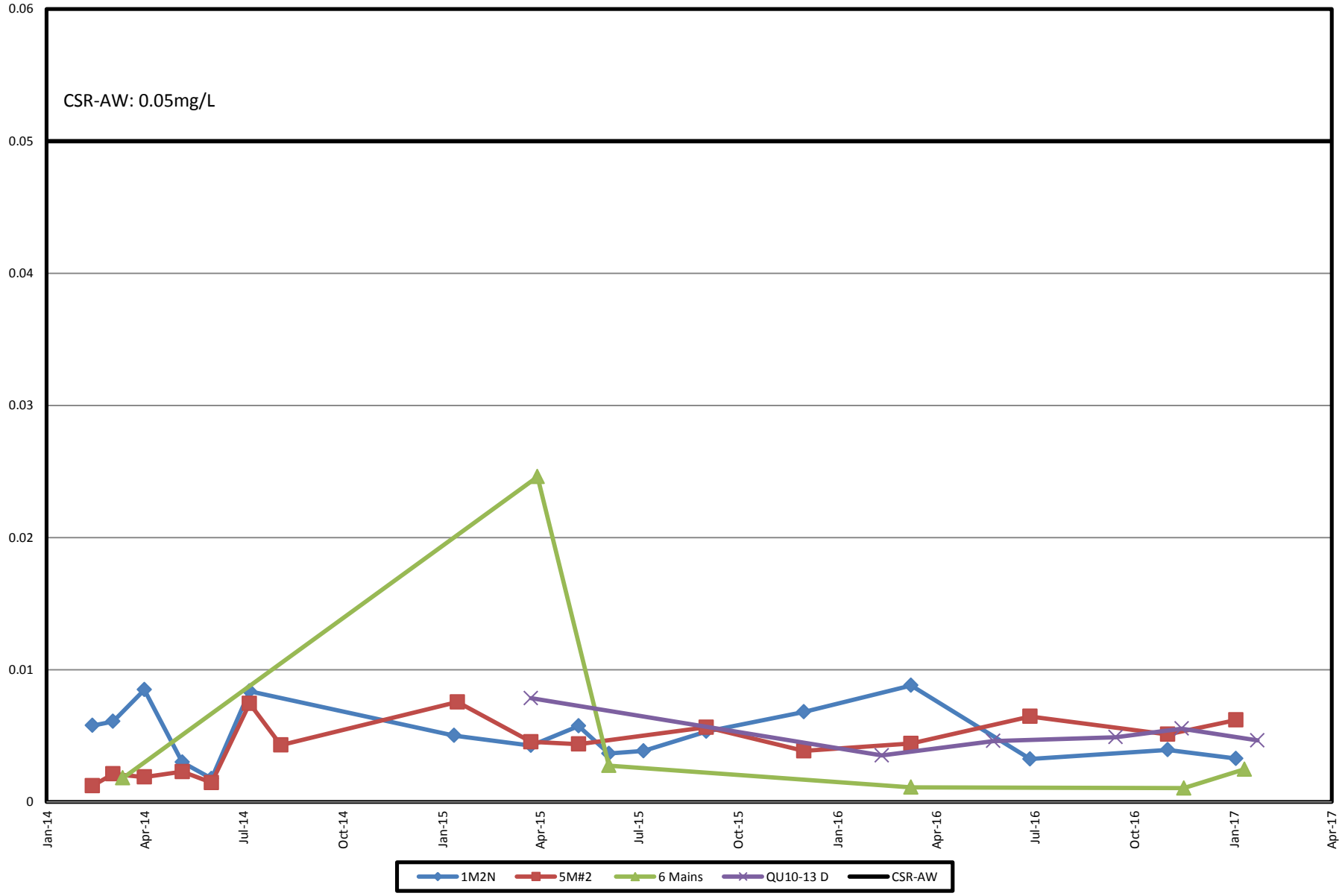
Graph 48 Ex-Situ 4-South Monitoring Wells - Dissolved Sulphate

Graph 49 Ex-Situ 4-South Monitoring Wells - Sulphide as H2S

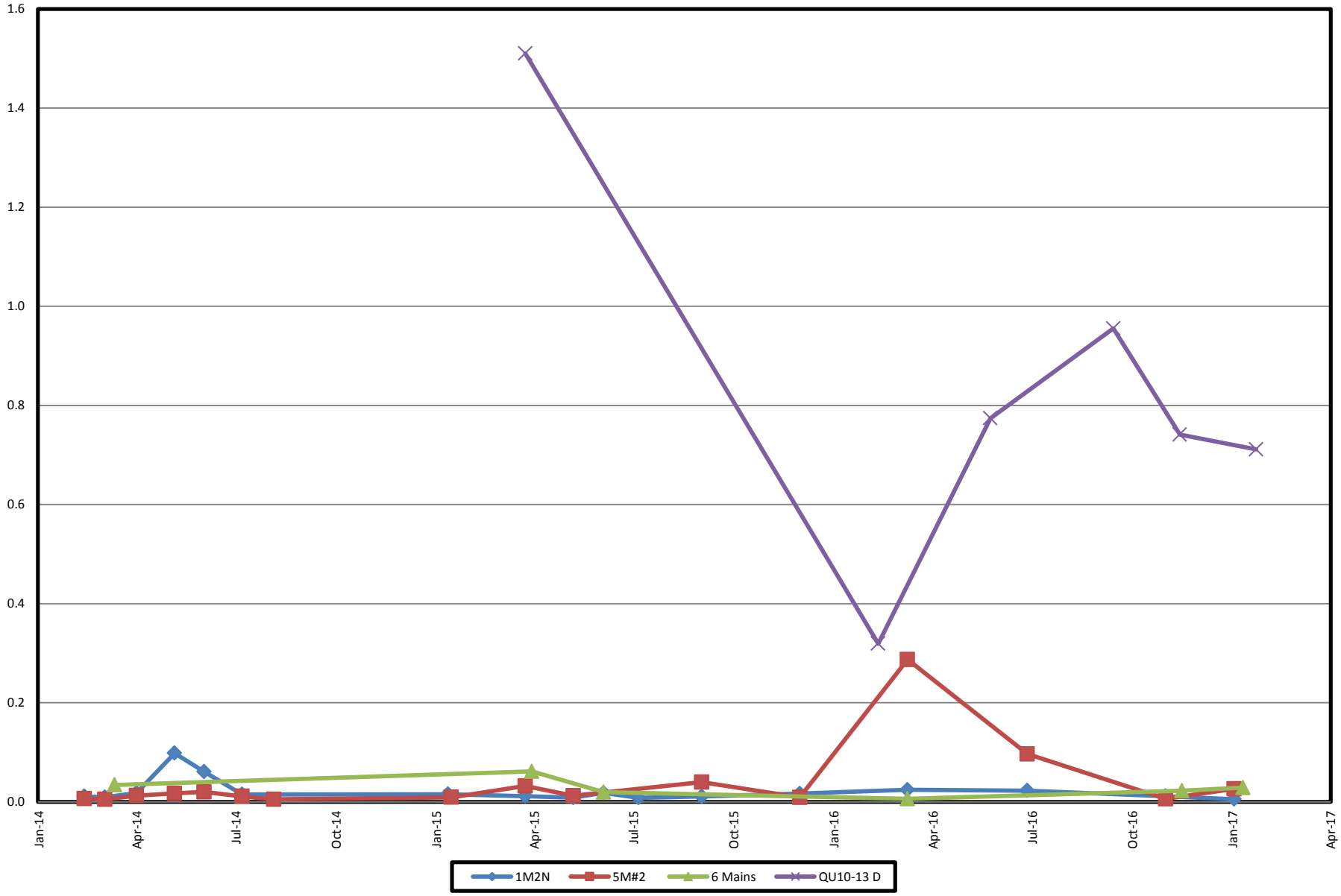
Graph 1
In-Situ 2-North Water Elevation @ QU10-13 D (Metres Above Sea Level)



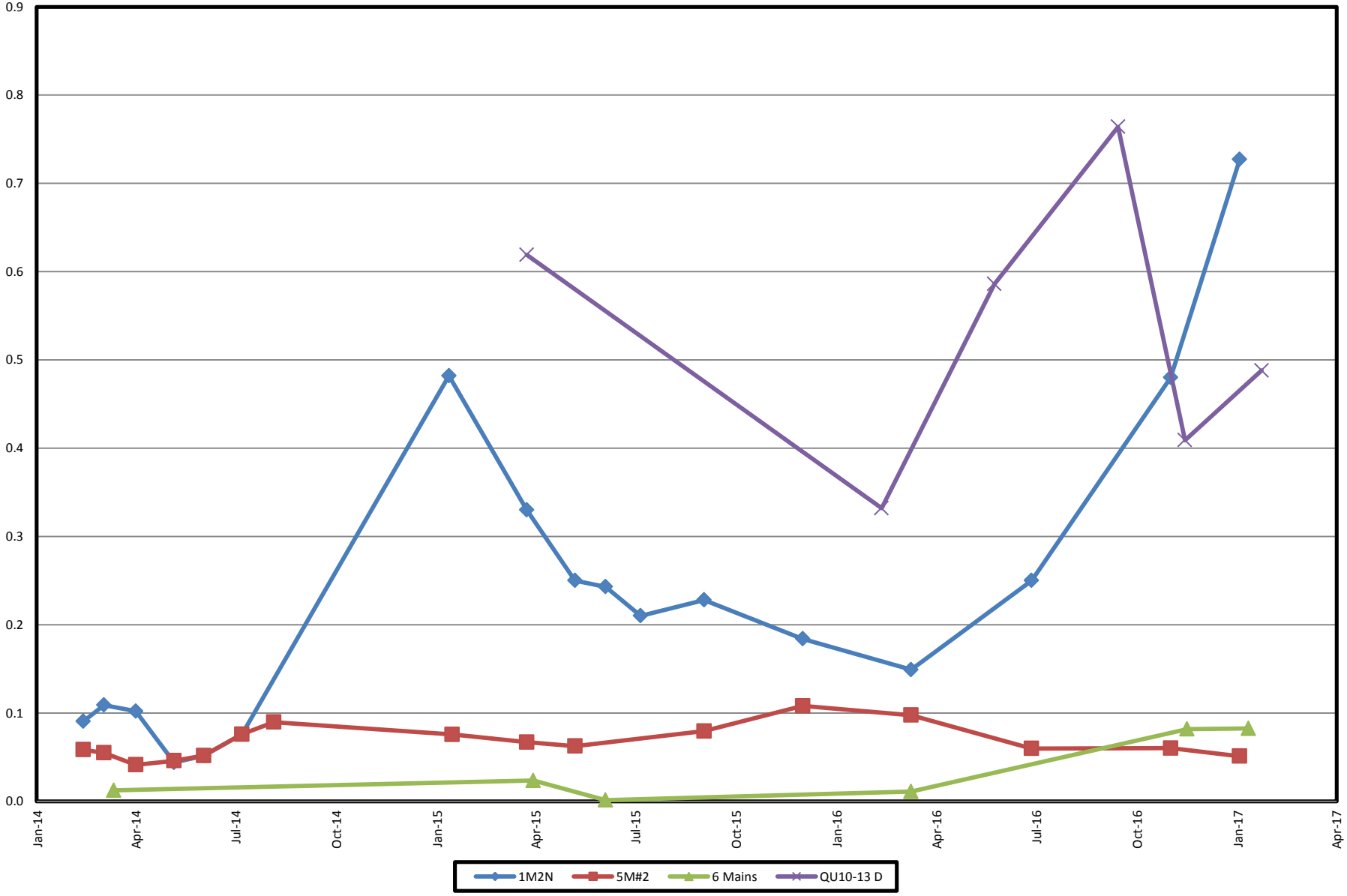
Graph 2
In-Situ 2-North Monitoring Wells - Dissolved Arsenic (mg/L)



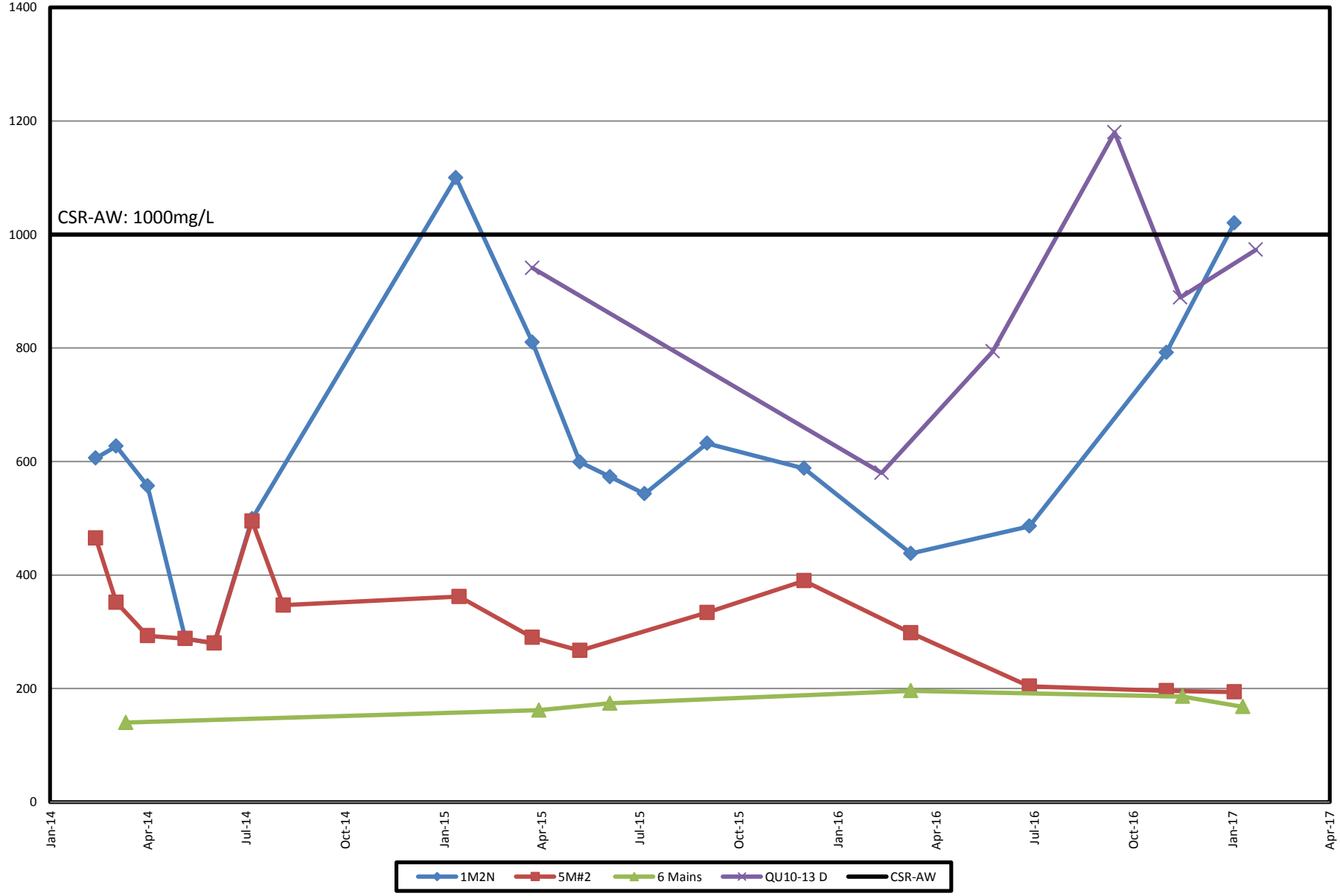
Graph 3
In-Situ 2-North Monitoring Wells - Dissolved Iron (mg/L)



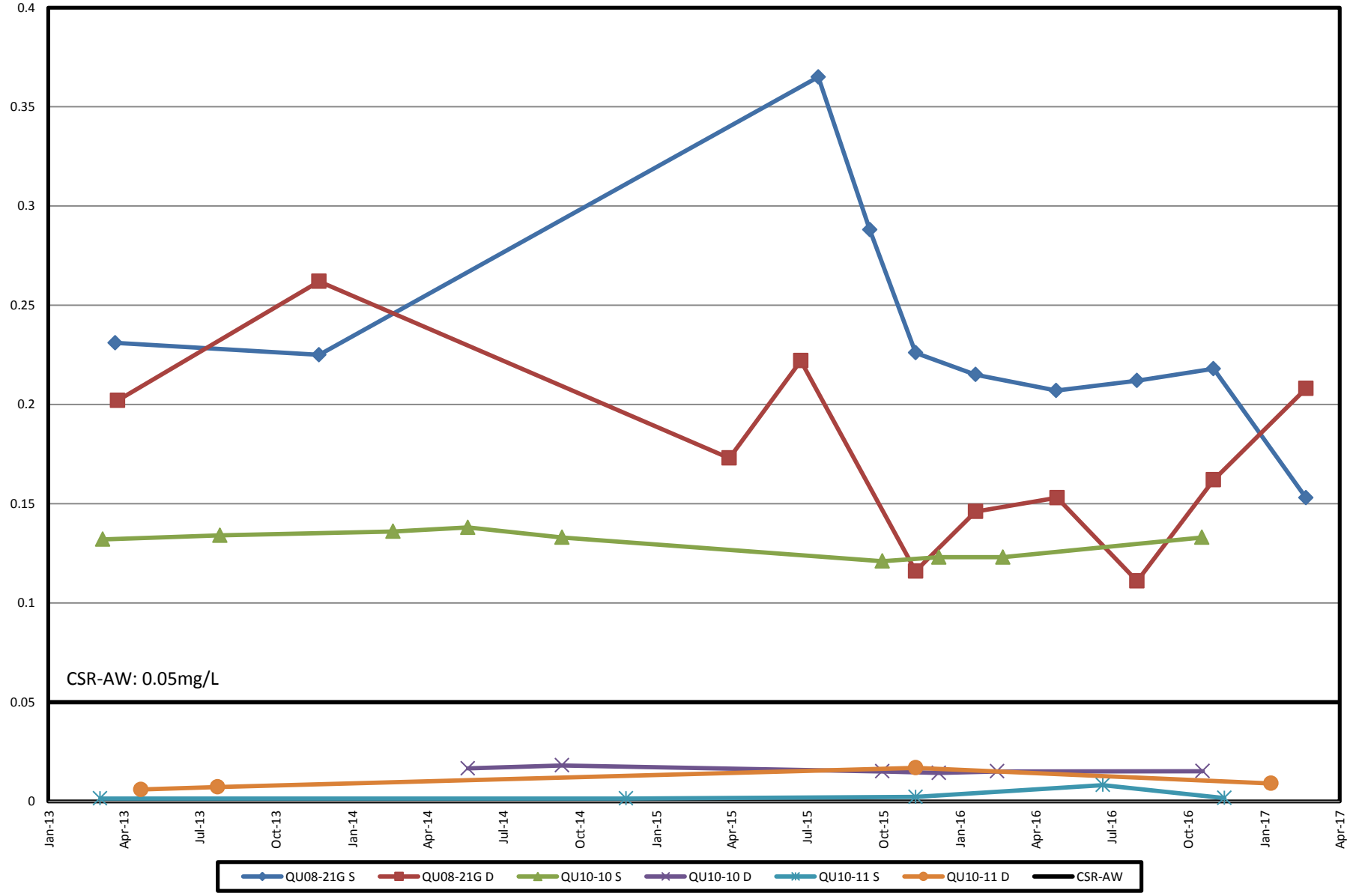
Graph 4
In-Situ 2-North Monitoring Wells - Dissolved Manganese (mg/L)



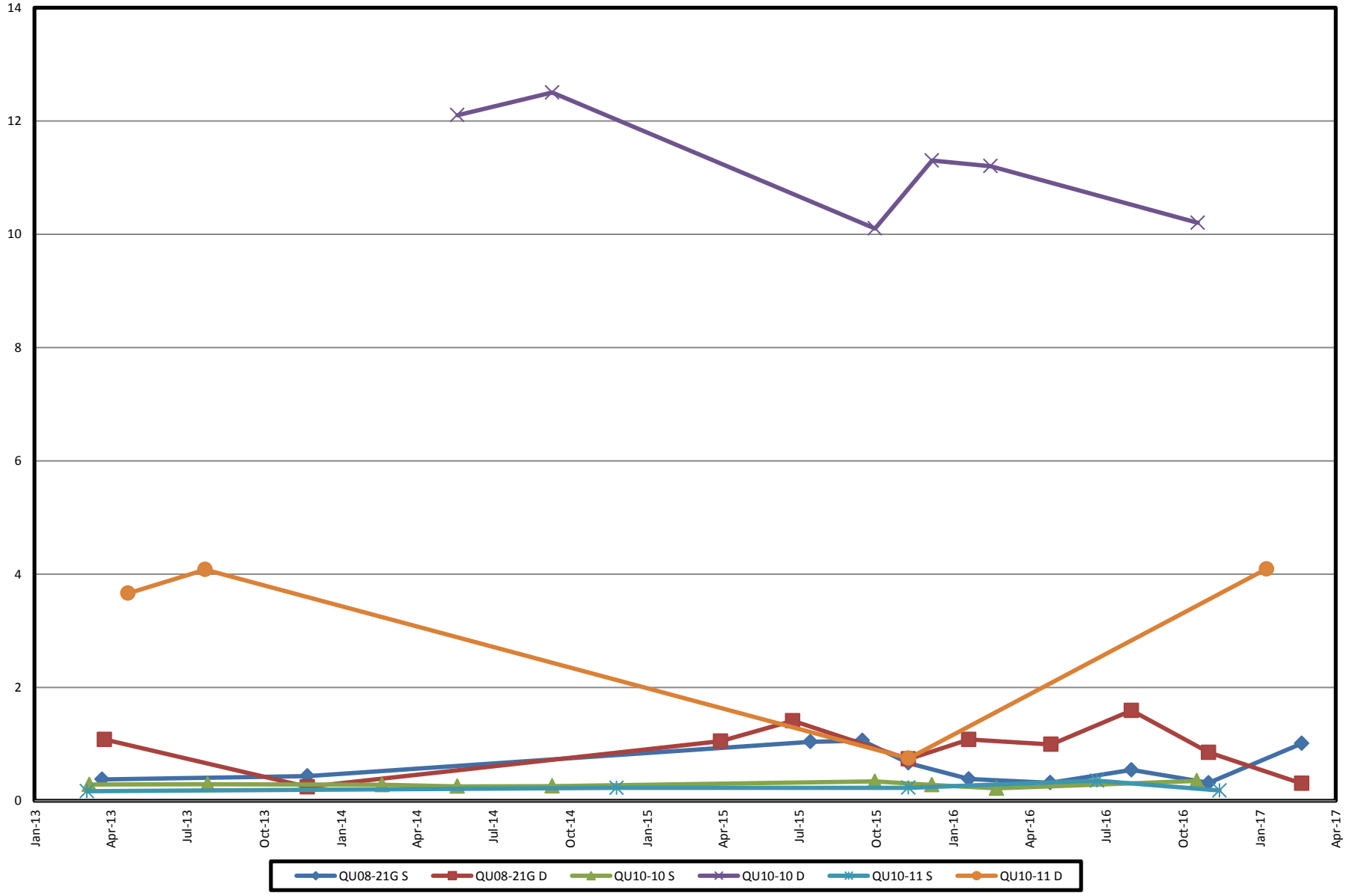
Graph 5
In-Situ 2-North Monitoring Wells - Dissolved Sulphate (mg/L)



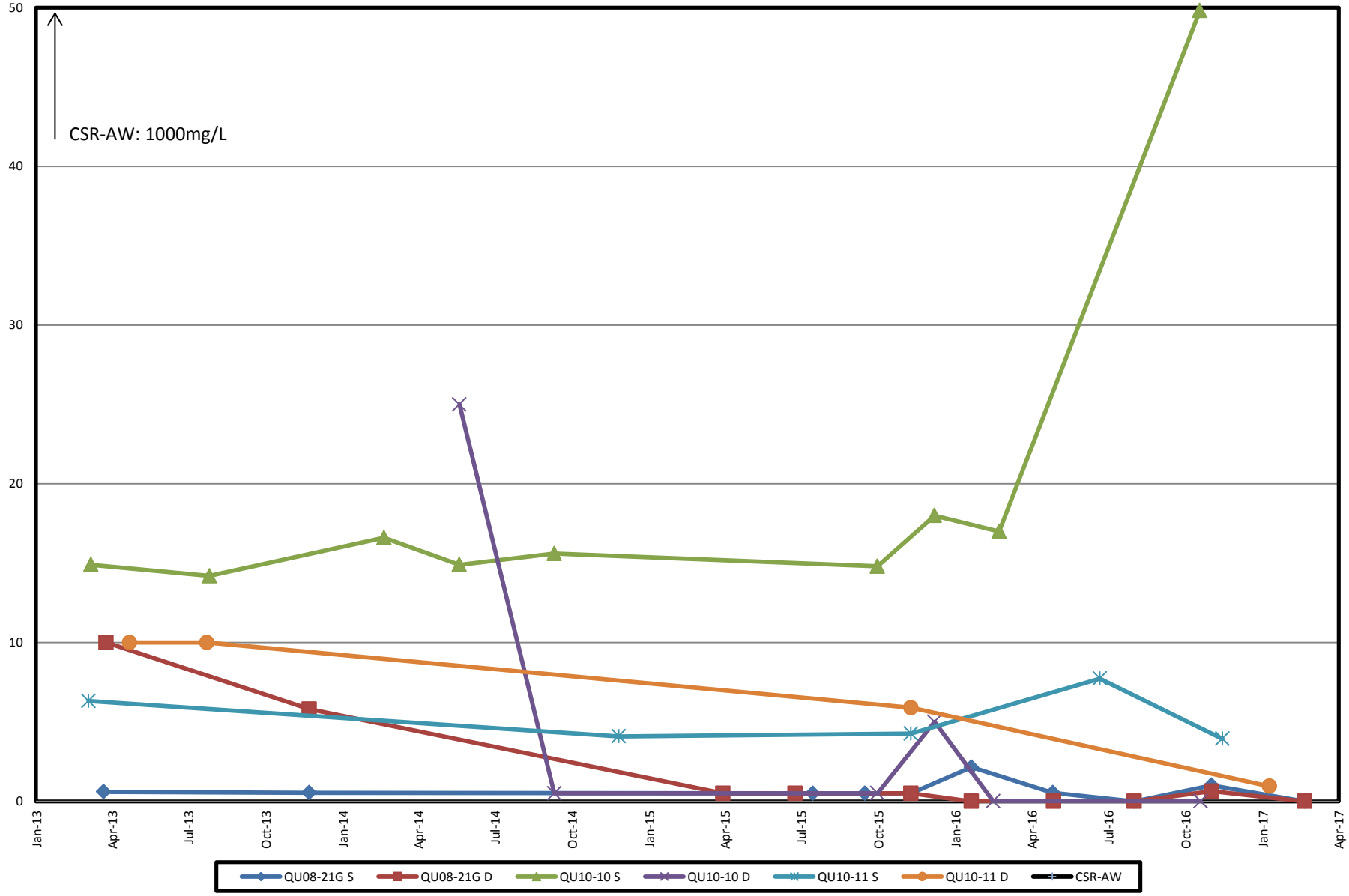
Graph 6
Ex-Situ 2-North Monitoring Wells - Dissolved Arsenic (mg/L)



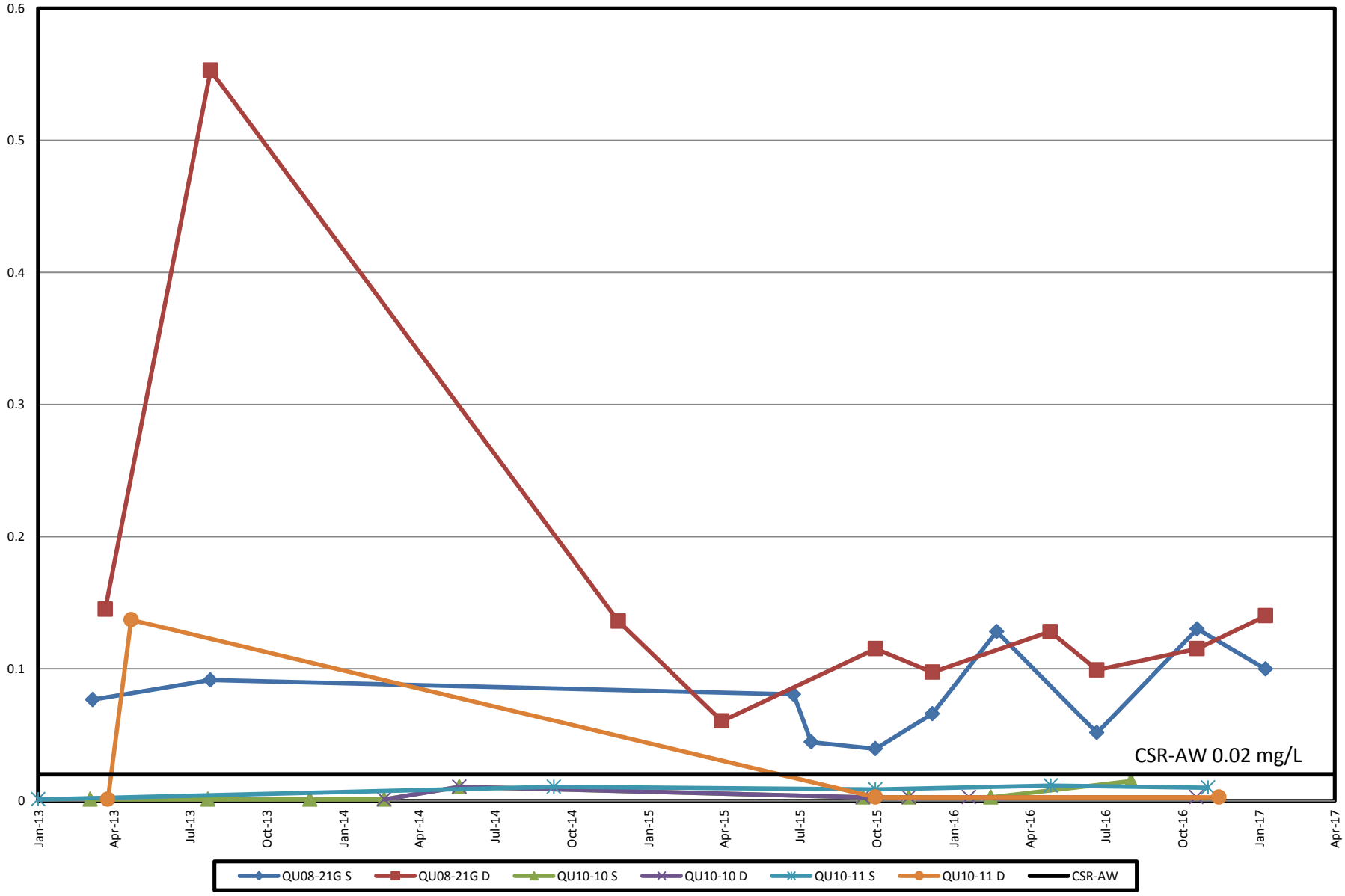
Graph 7
Ex-Situ 2-North Monitoring Wells - Dissolved Iron (mg/L)



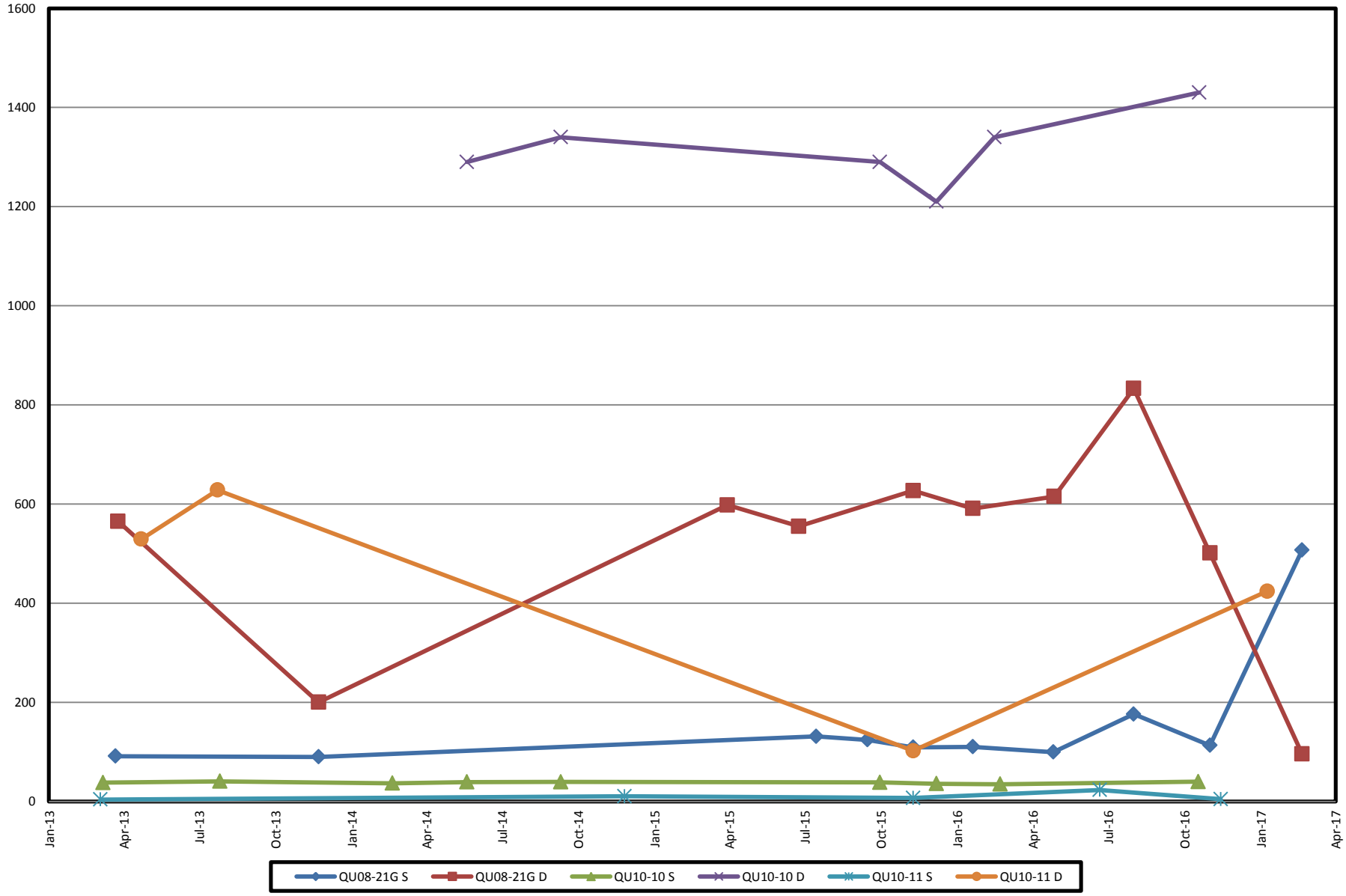
Graph 8
Ex-Situ 2-North Monitoring Wells - Dissolved Sulphate (mg/L)



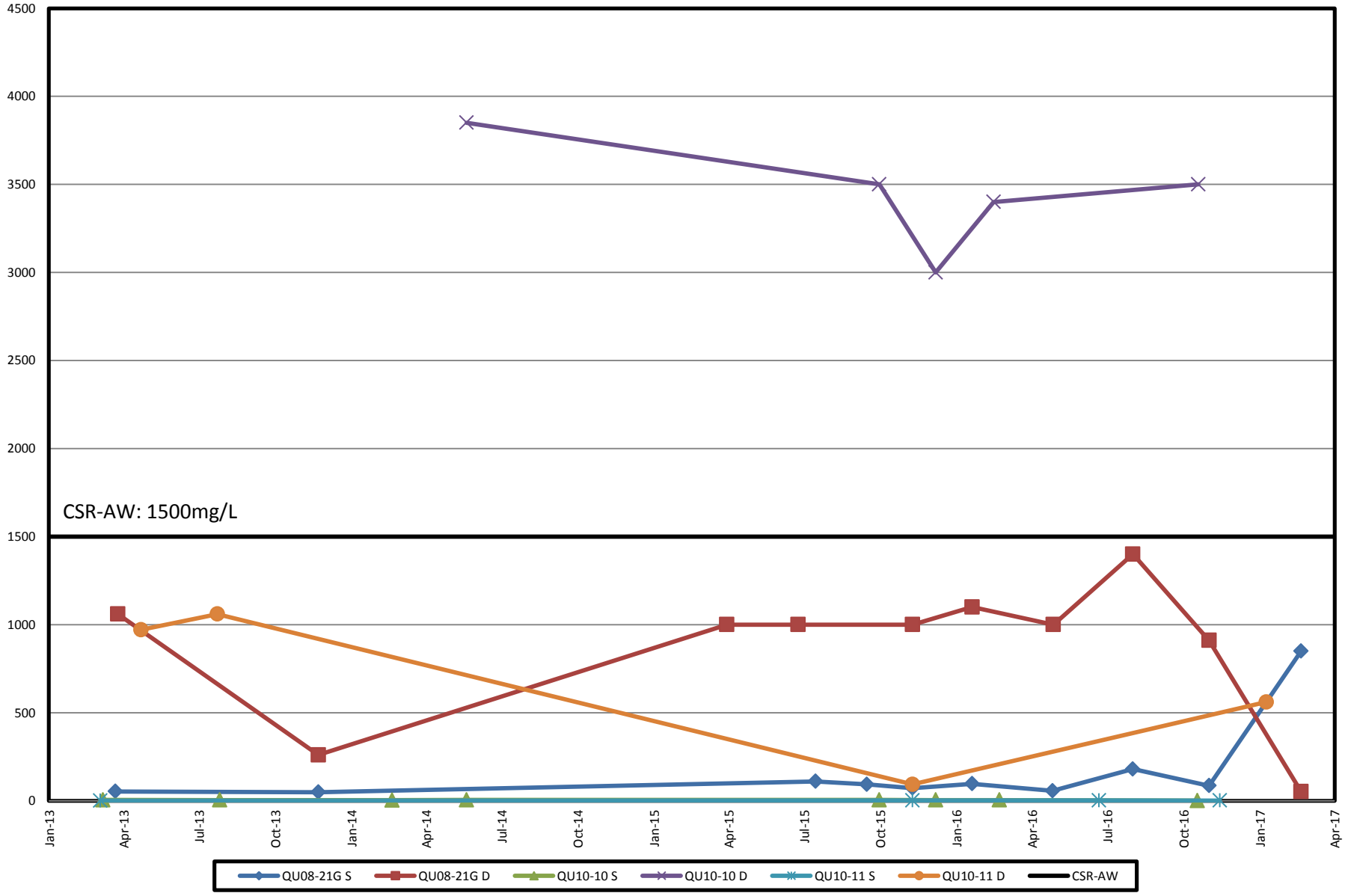
Graph 9
Ex-Situ 2-North Monitoring Wells - Sulphide as H_2S (mg/L)



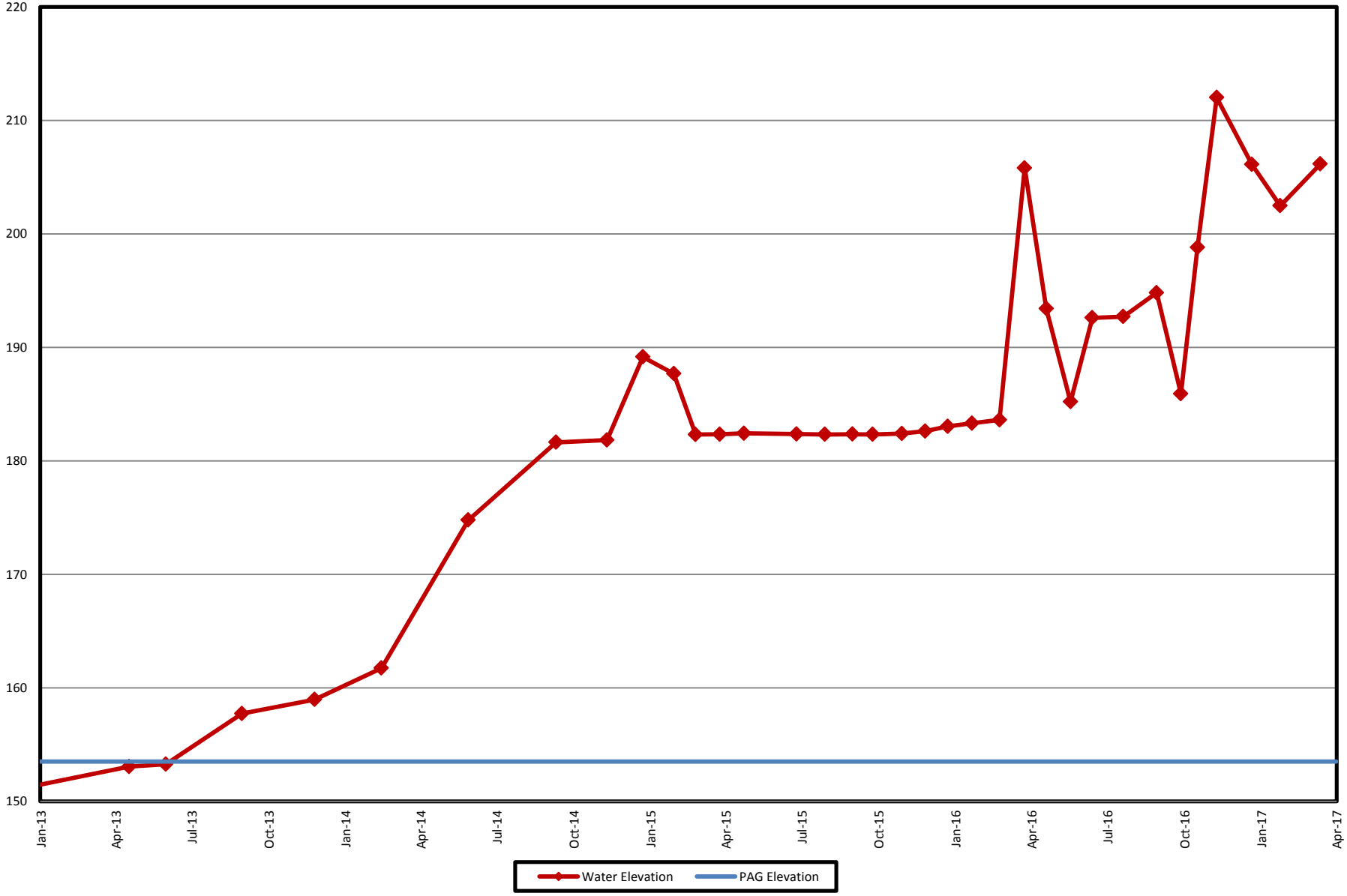
Graph 10
Ex-Situ 2-North Monitoring Wells - Dissolved Sodium (mg/L)



Graph 11
Ex-Situ 2-North Monitoring Wells - Dissolved Chloride (mg/L)

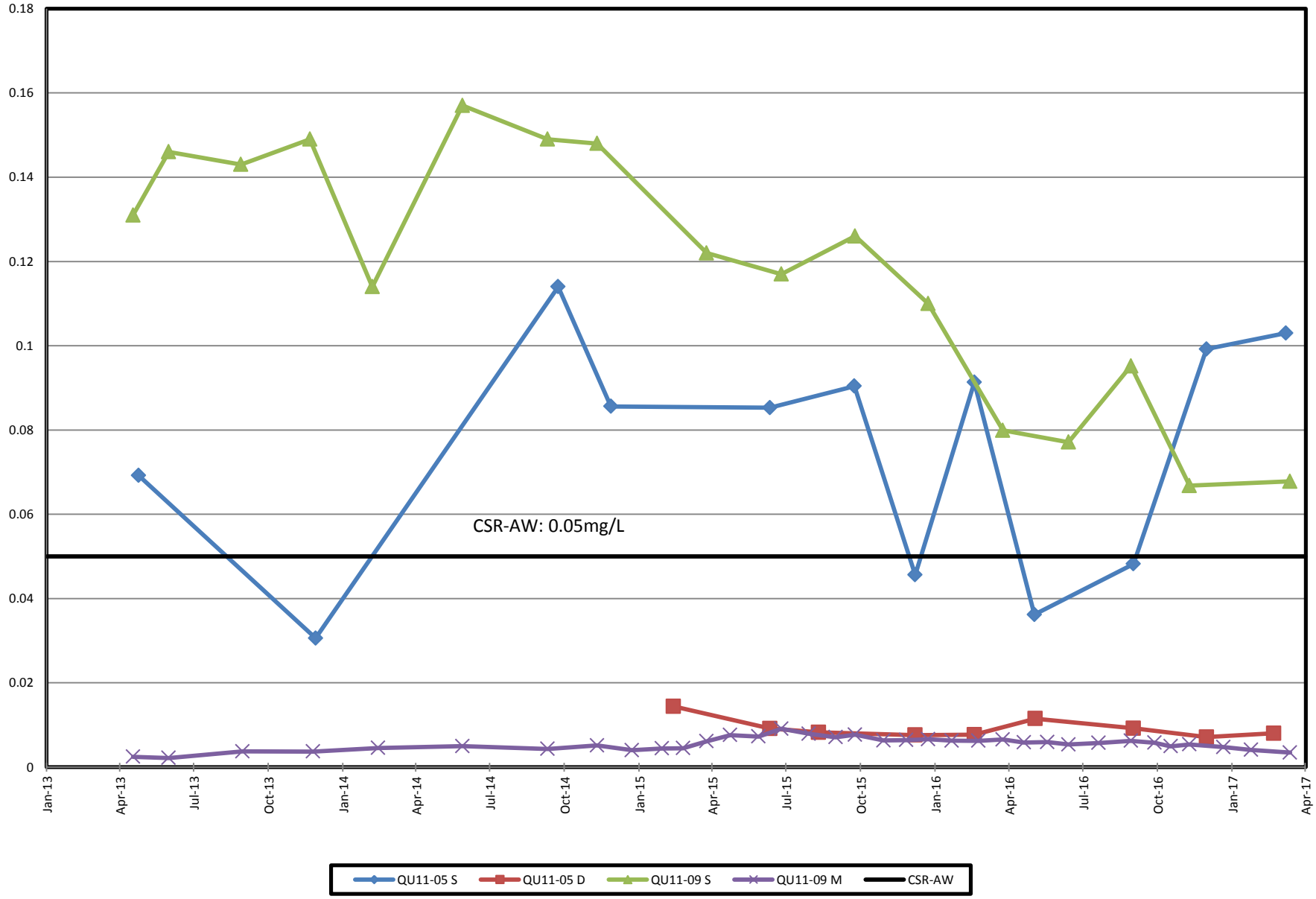


Graph 12
RBP Mine Pool Water Elevation @ QU11-09 M (Metres Above Sea Level)

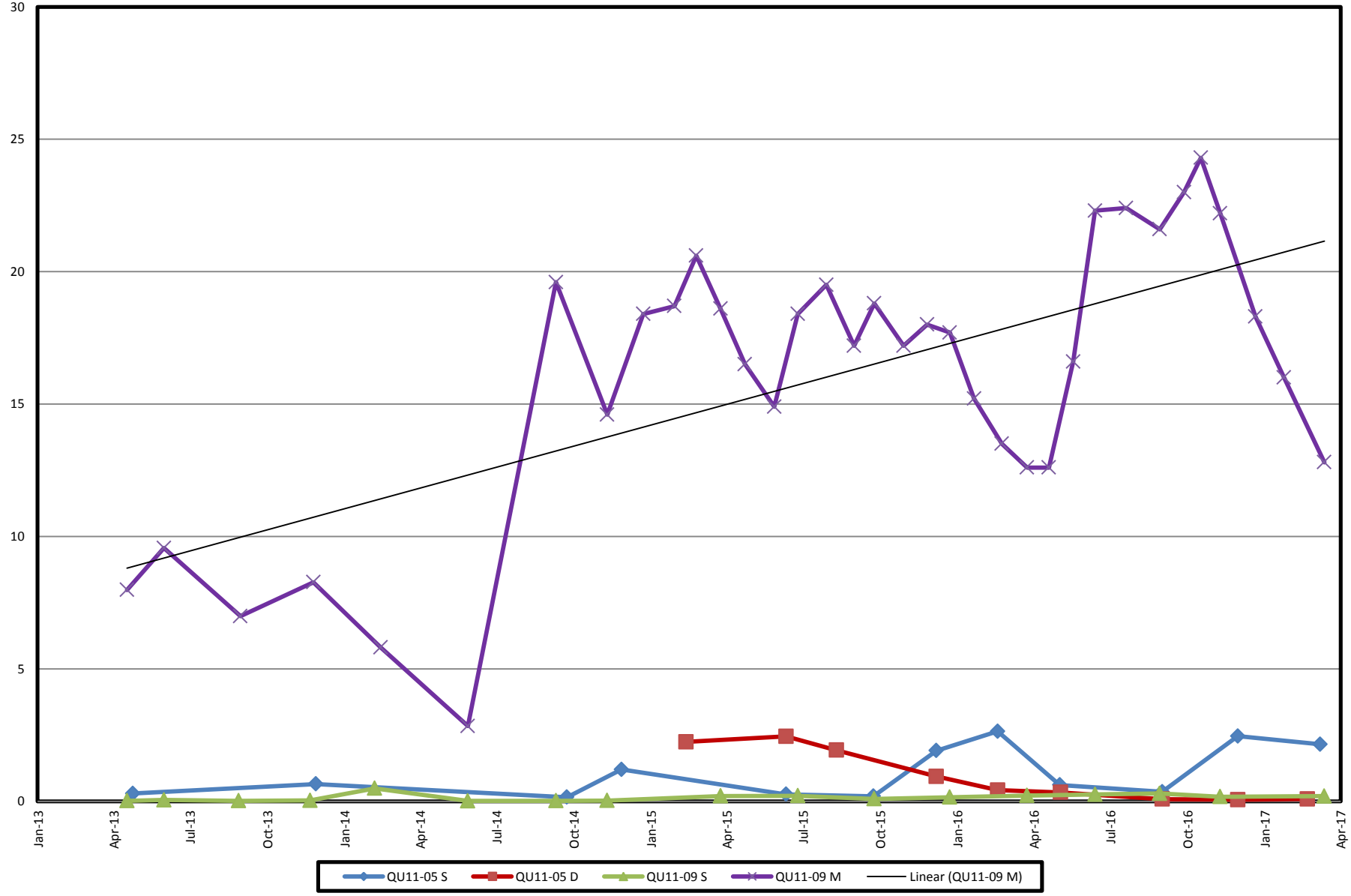


Grpah 13

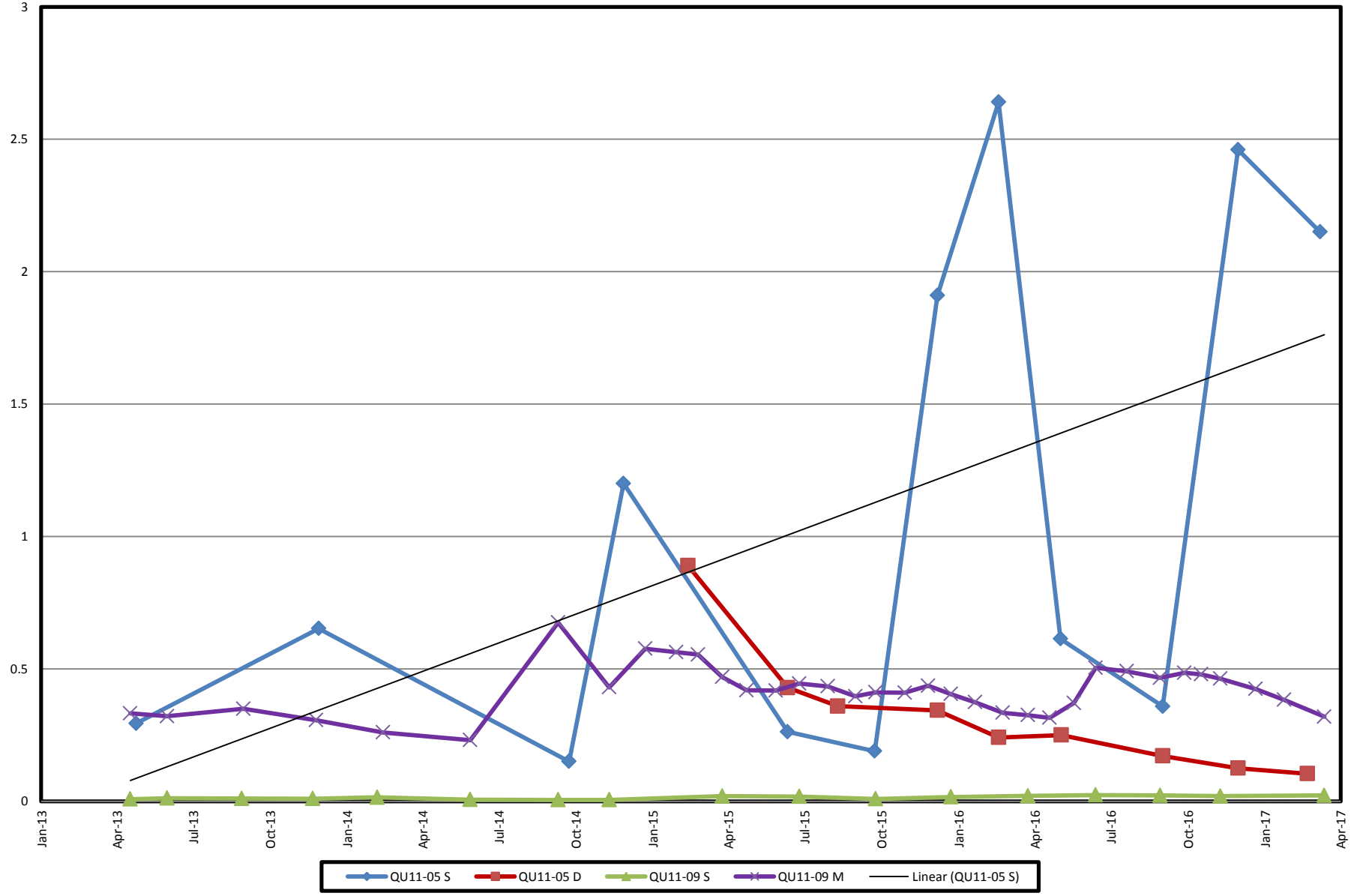
RBP Monitoring Wells - Dissolved Arsenic (mg/L)



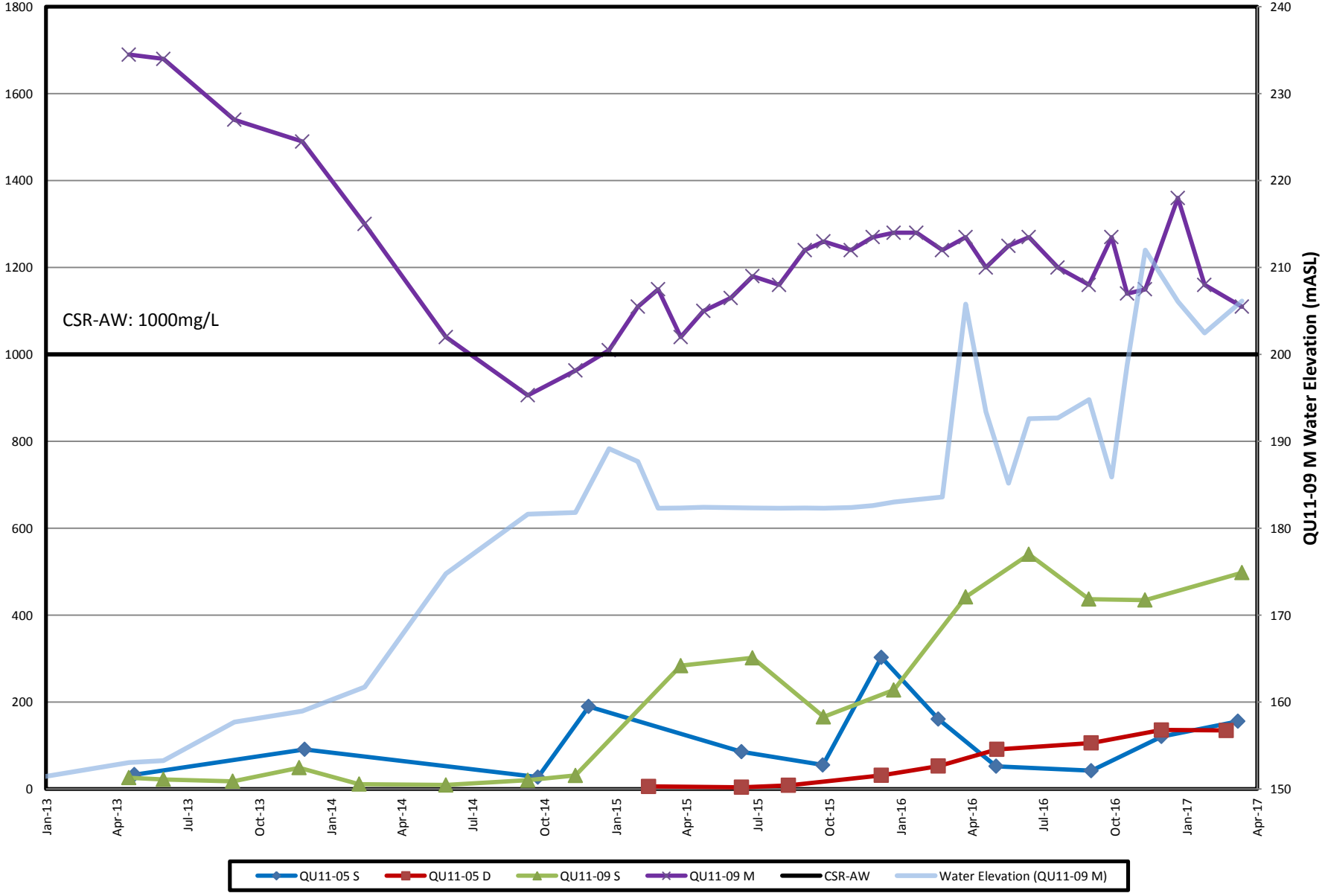
Graph 14
RBP Monitoring Wells - Dissolved Iron (mg/L)



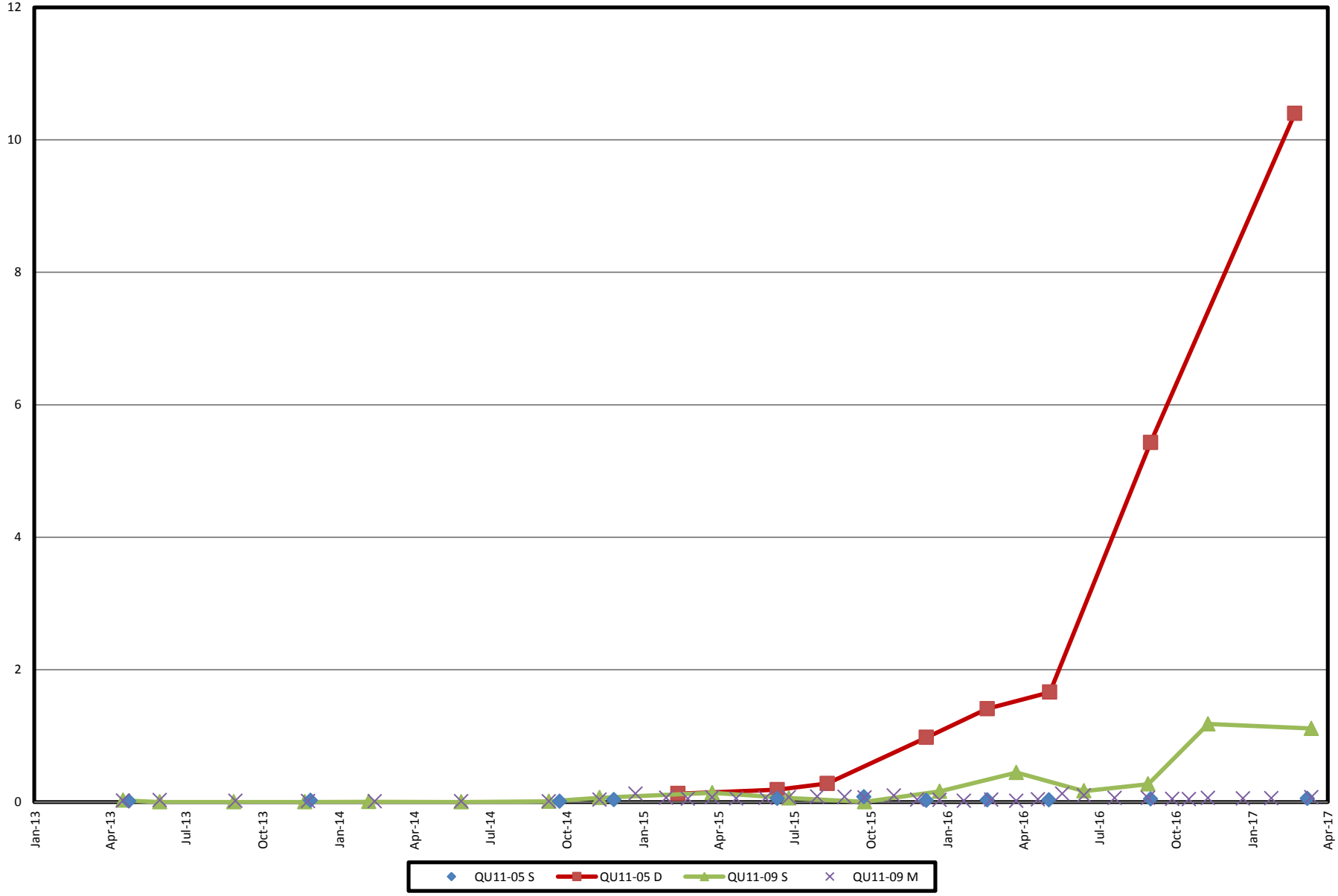
Graph 15
RBP Monitoring Wells - Dissolved Manganese (mg/L)



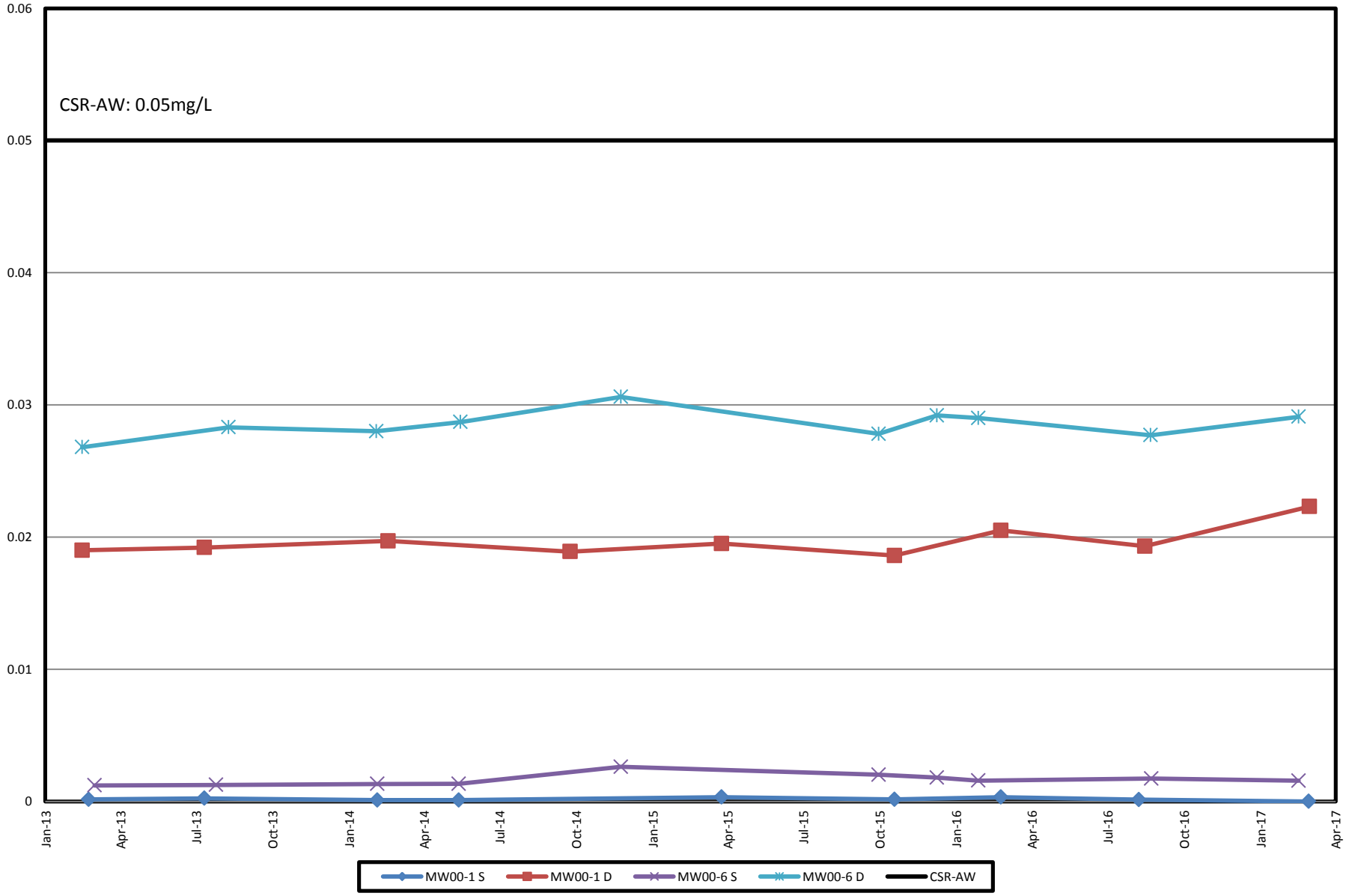
Graph 16
RBP Monitoring Wells - Dissolved Sulphate (mg/L)



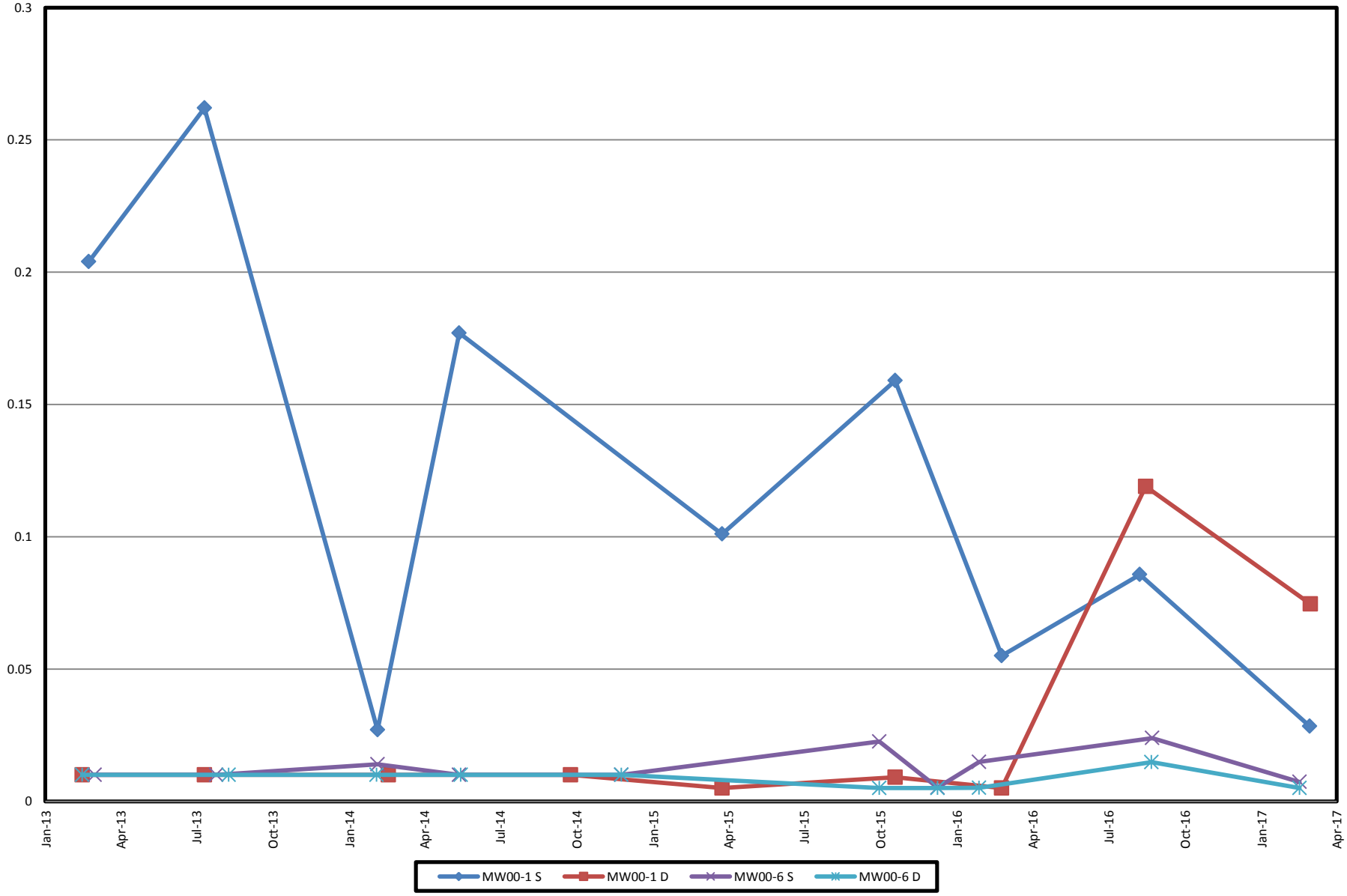
Graph 17
RBP Monitoring Wells - Sulphide as H_2S (mg/L)



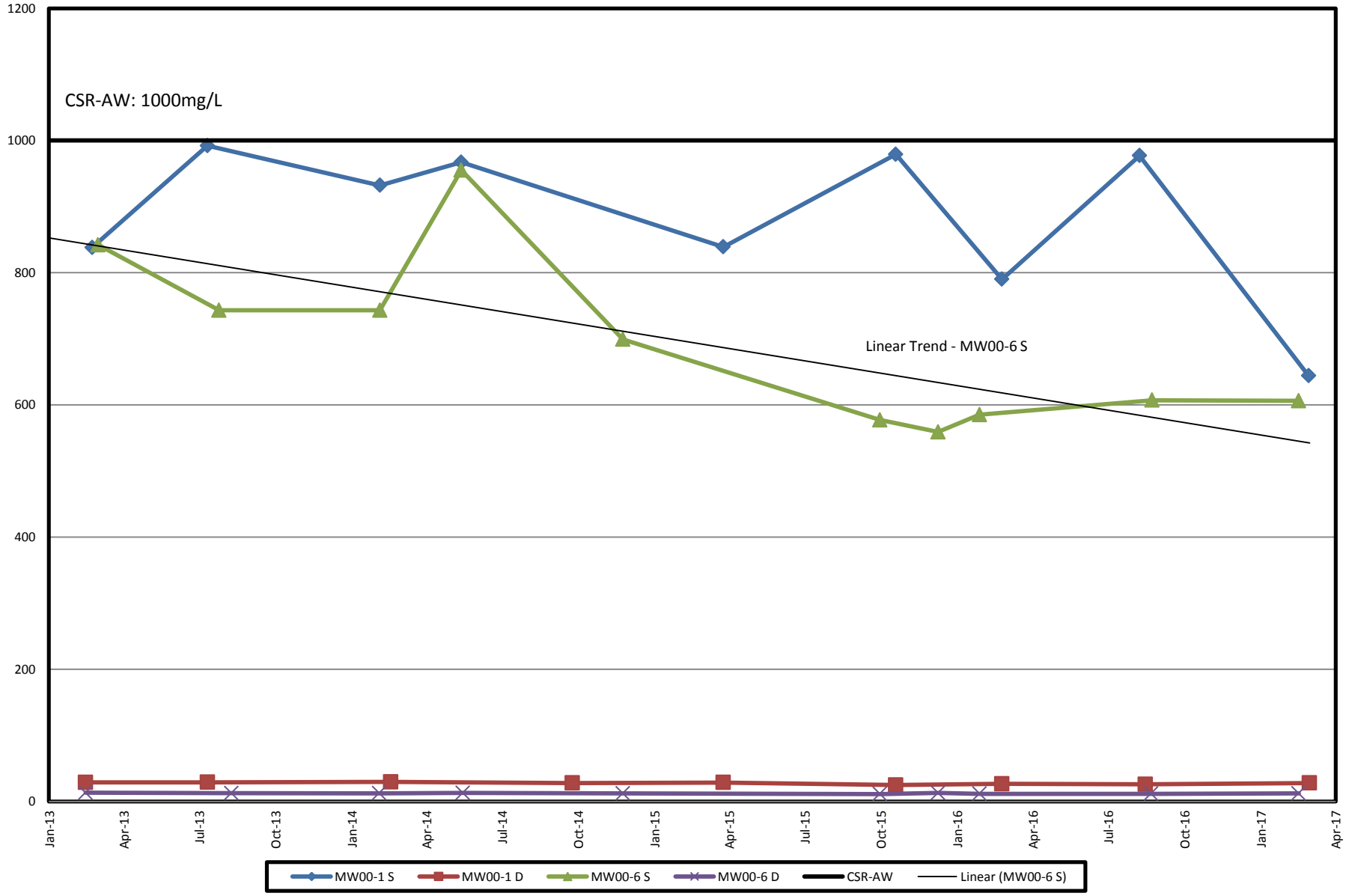
Graph 18
Plant Monitoring Wells - Dissolved Arsenic (mg/L)



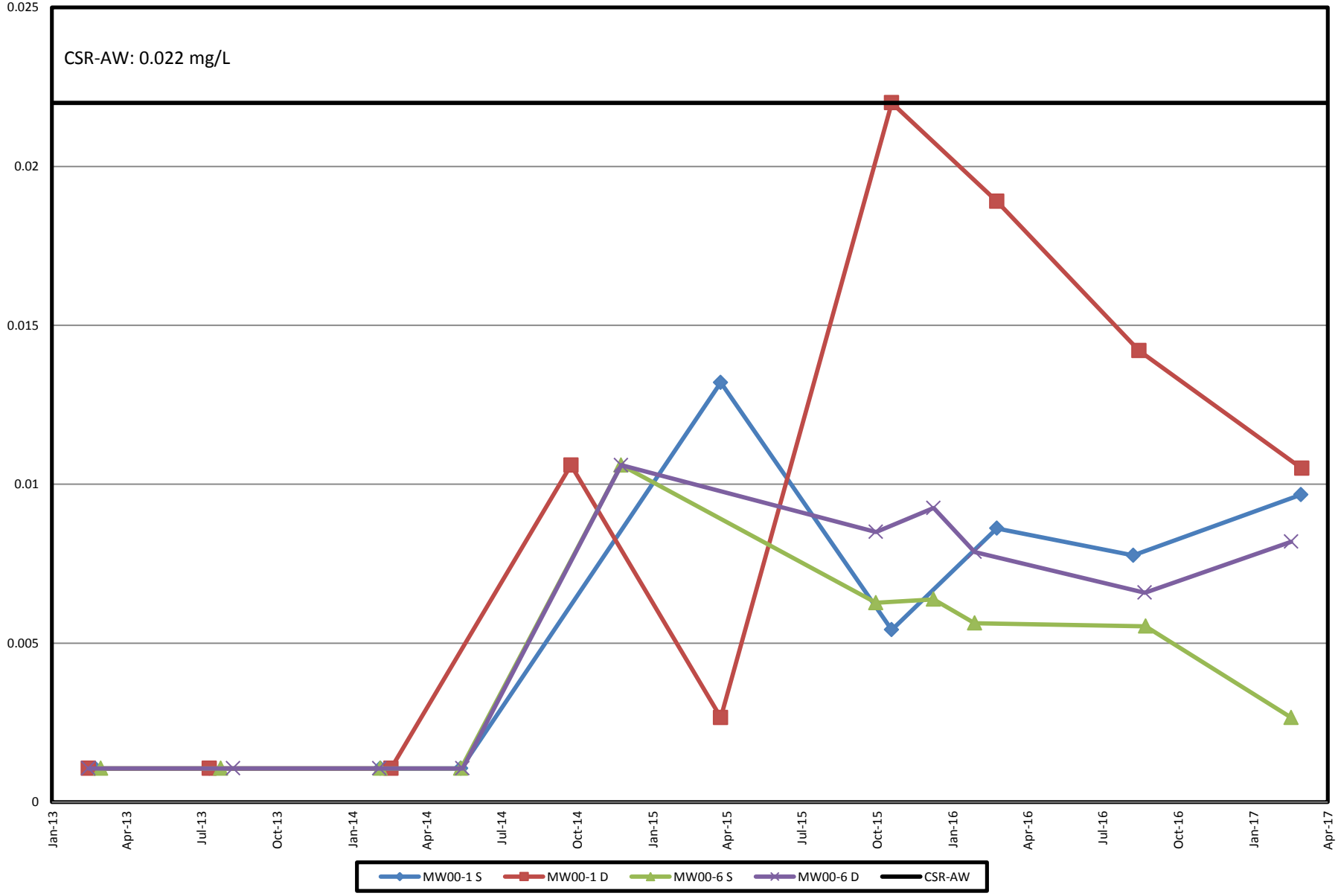
Graph 19
Plant Monitoring Wells - Dissolved Iron (mg/L)



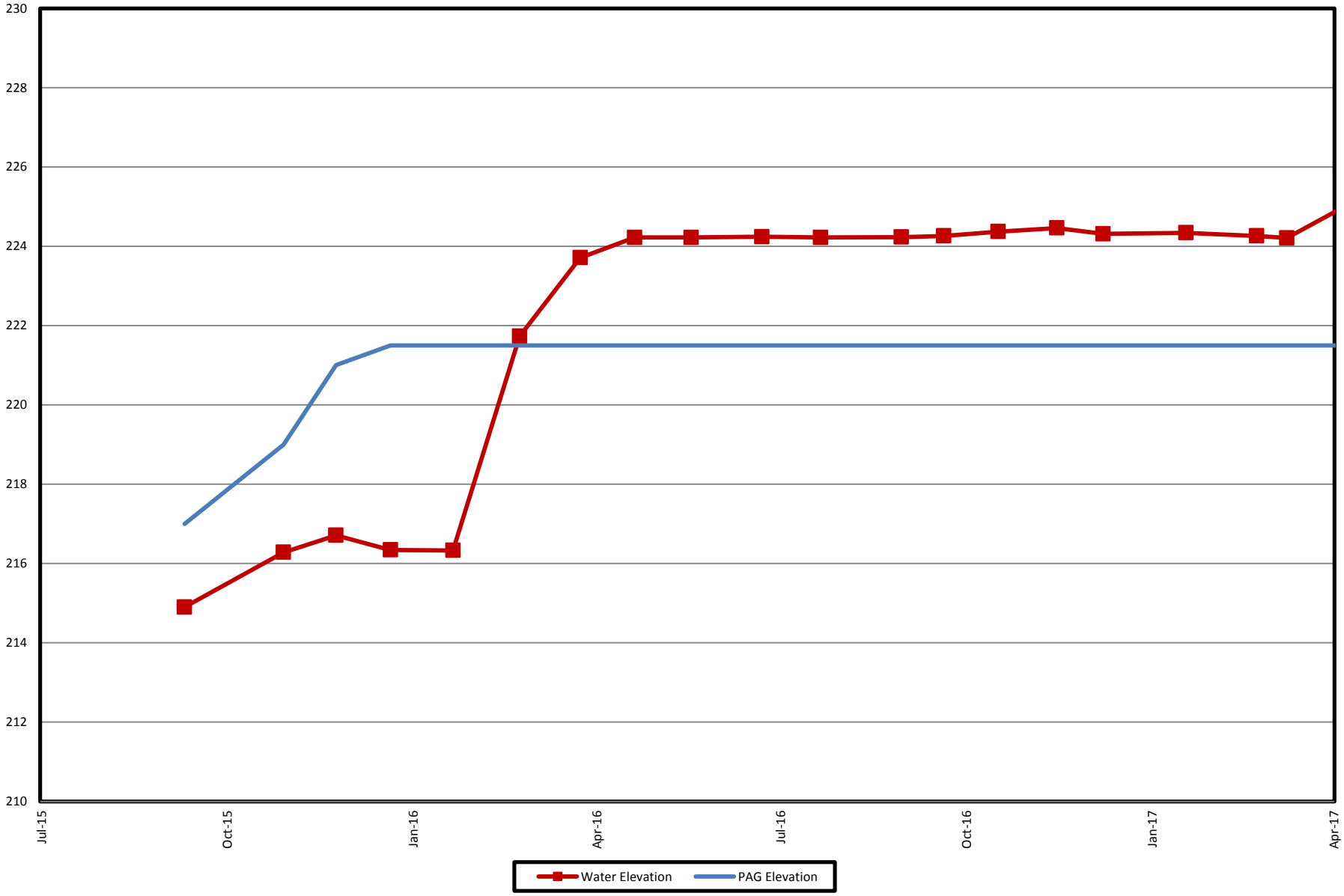
Graph 20
Plant Monitoring Wells - Dissolved Sulphate (mg/L)



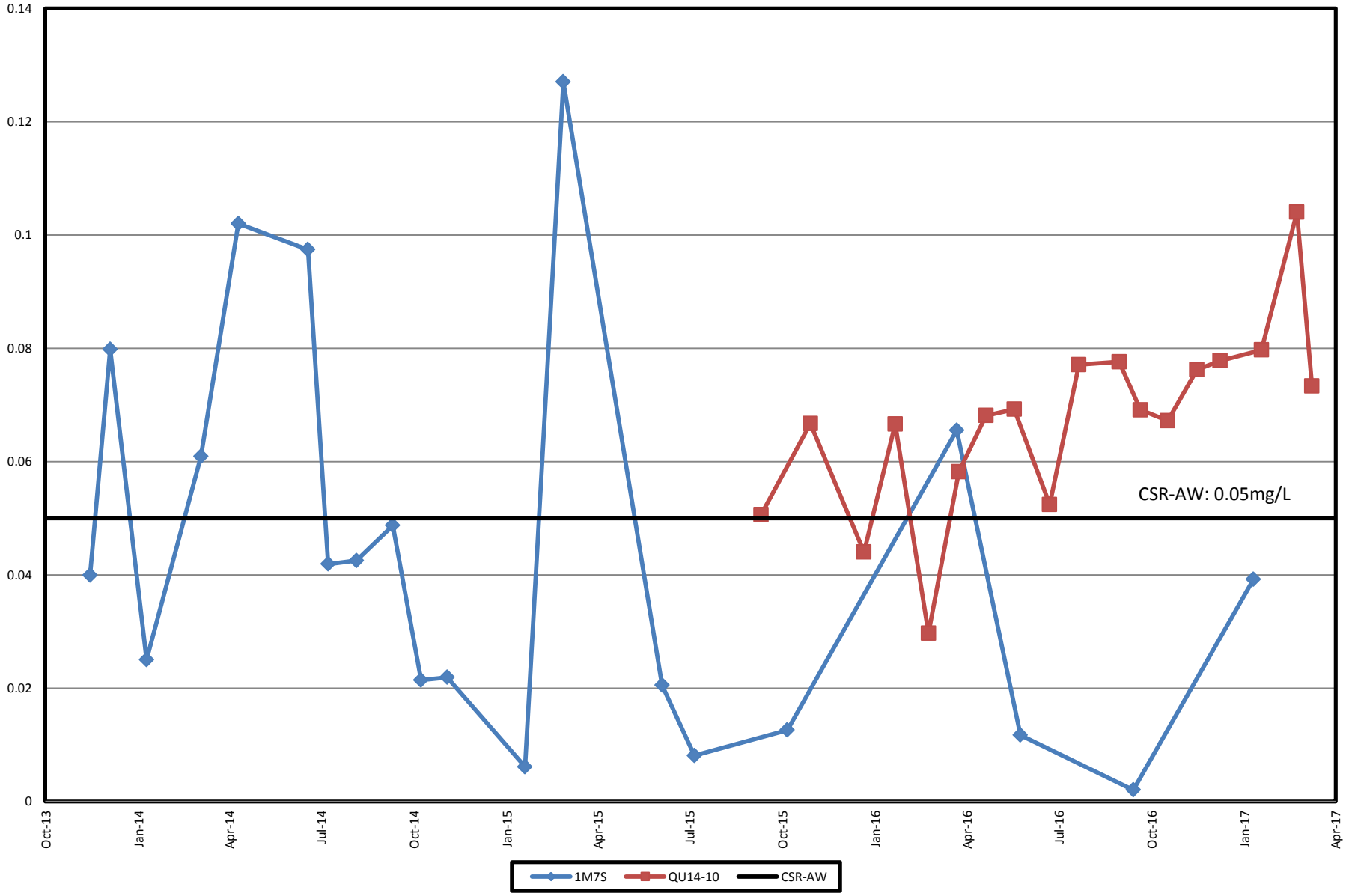
Graph 21
Plant Monitoring Wells - Sulphide as H_2S (mg/L)



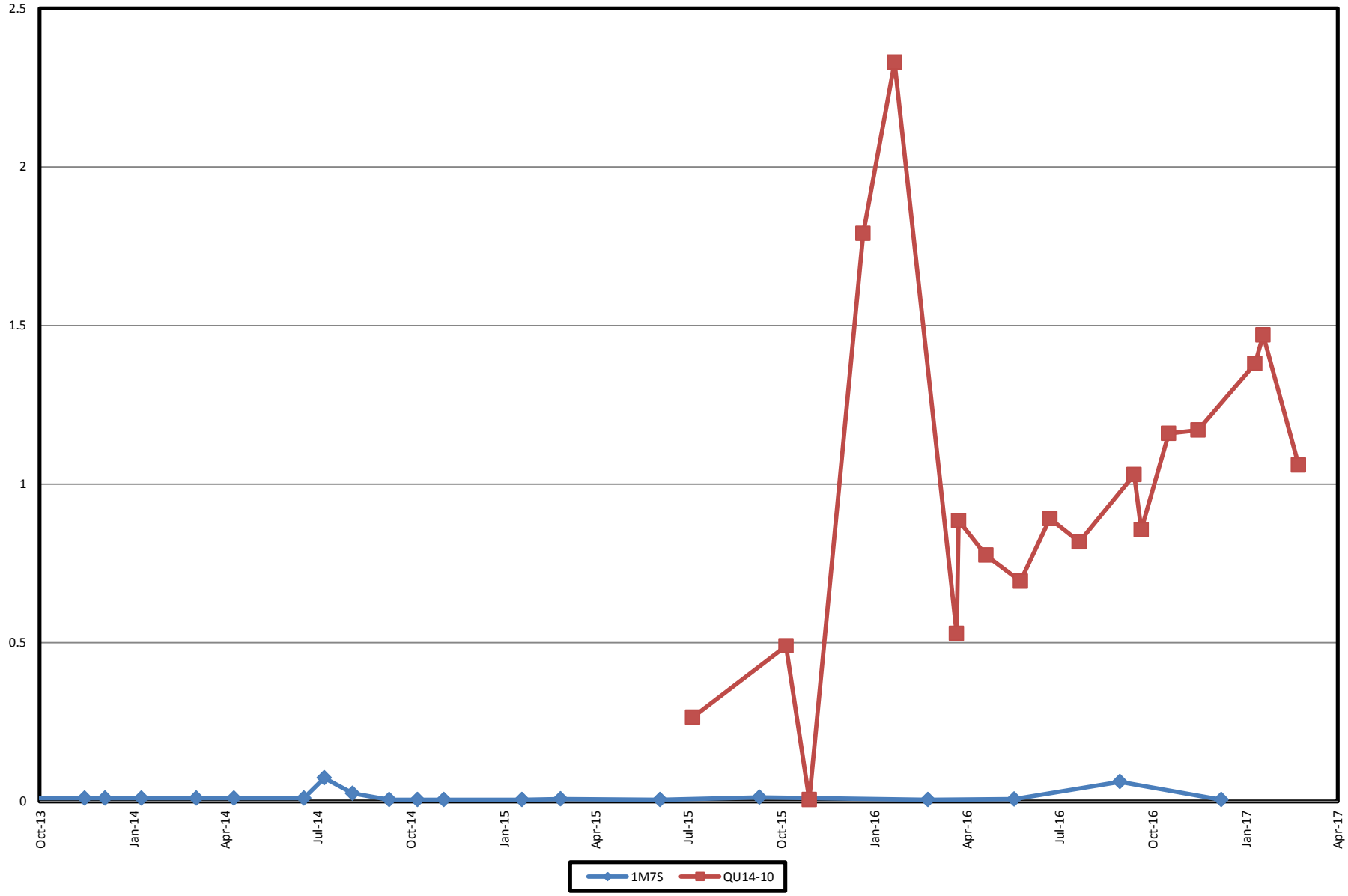
Graph 22
In-Situ 7-South PAG Elevation and Water Elevation @ QU14-10 (Metres Above Sea Level)



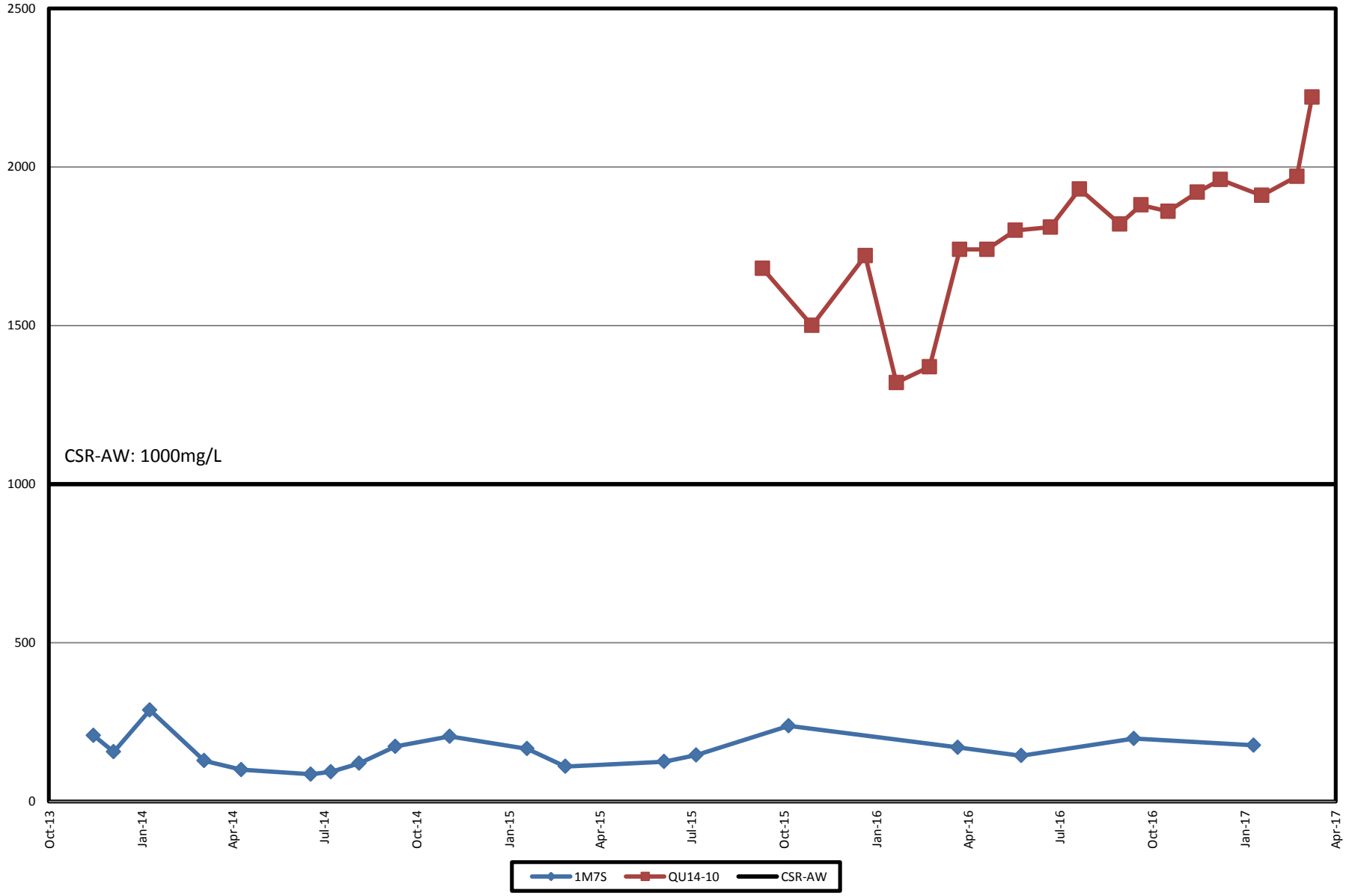
Graph 23
7-South In-Situ Monitoring Wells - Dissolved Arsenic (mg/L)



Graph 24
7-South In-Situ Monitoring Wells - Dissolved Iron (mg/L)

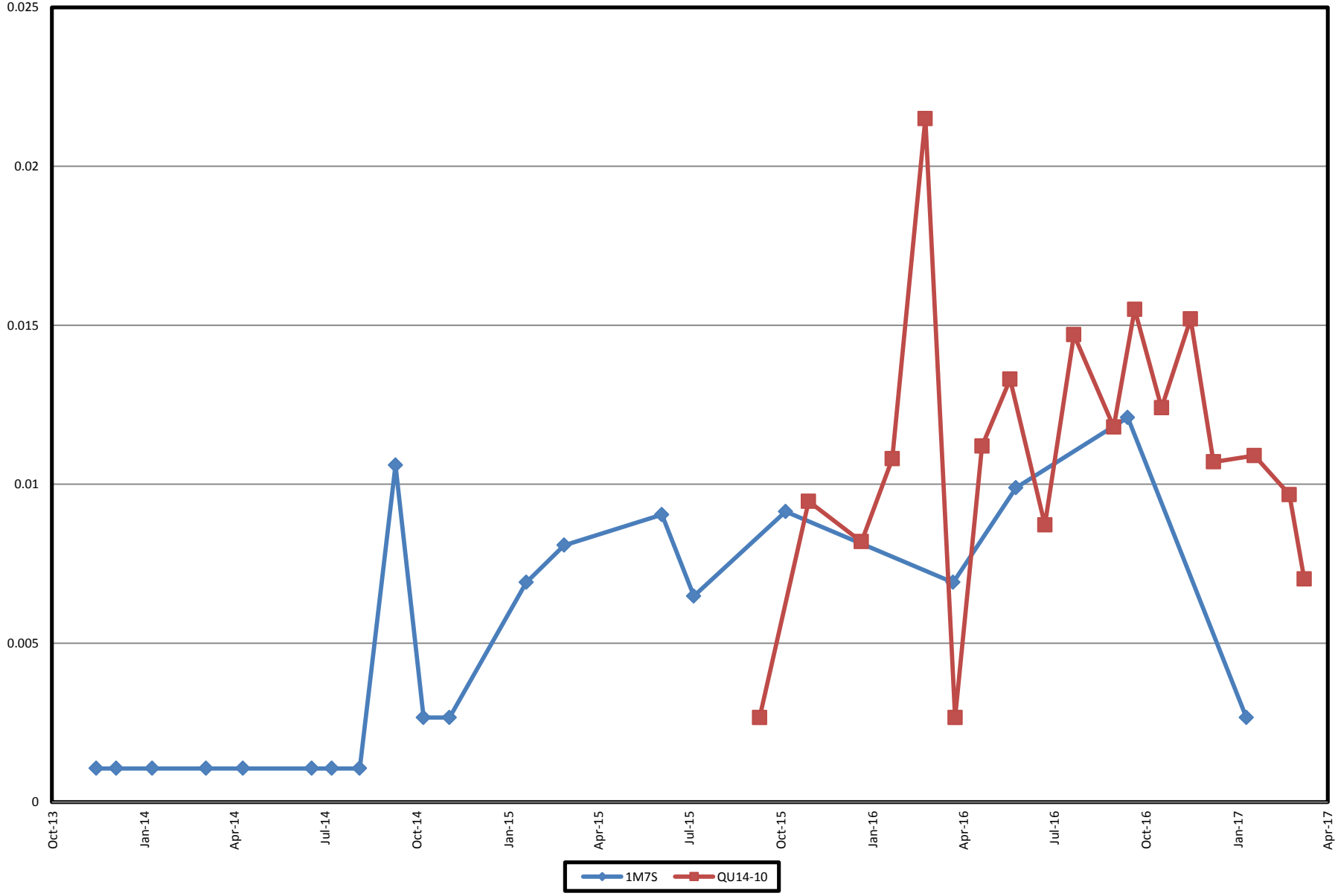


Graph 25
7-South In-Situ Monitoring Wells - Dissolved Sulphate (mg/L)

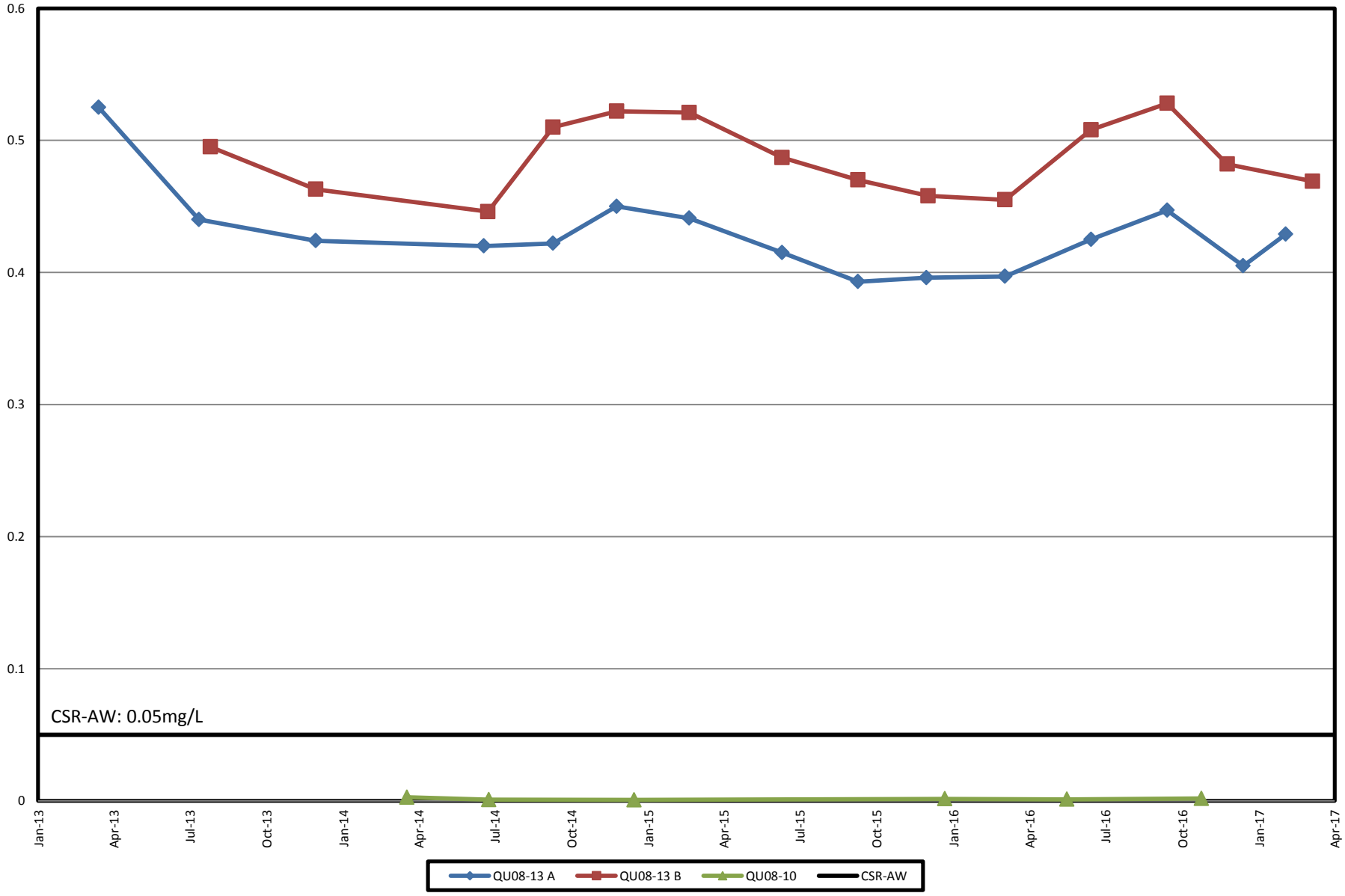


Graph 26

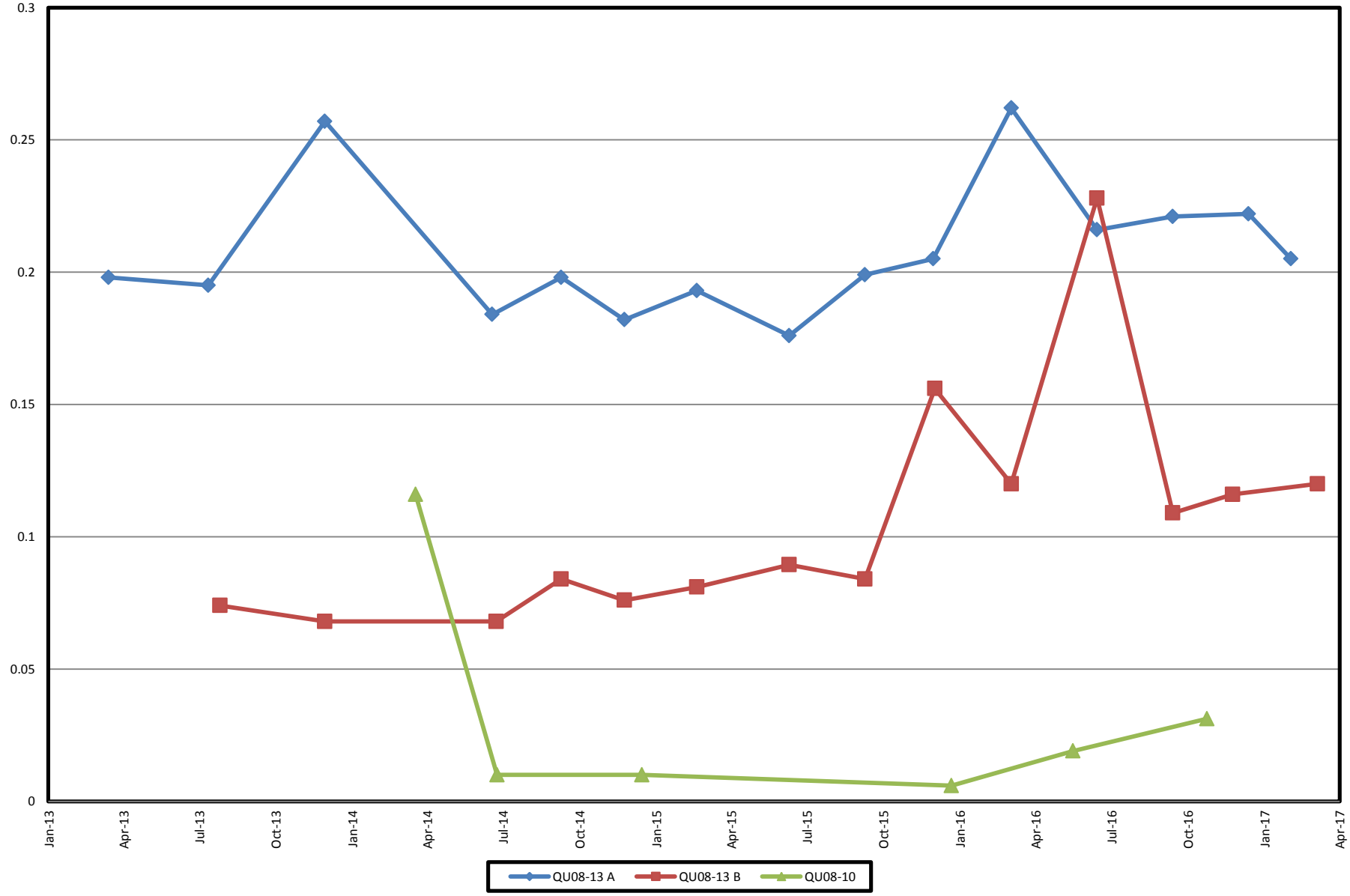
7-South In-Situ Monitoring Wells - Sulphide as H_2S (mg/L)



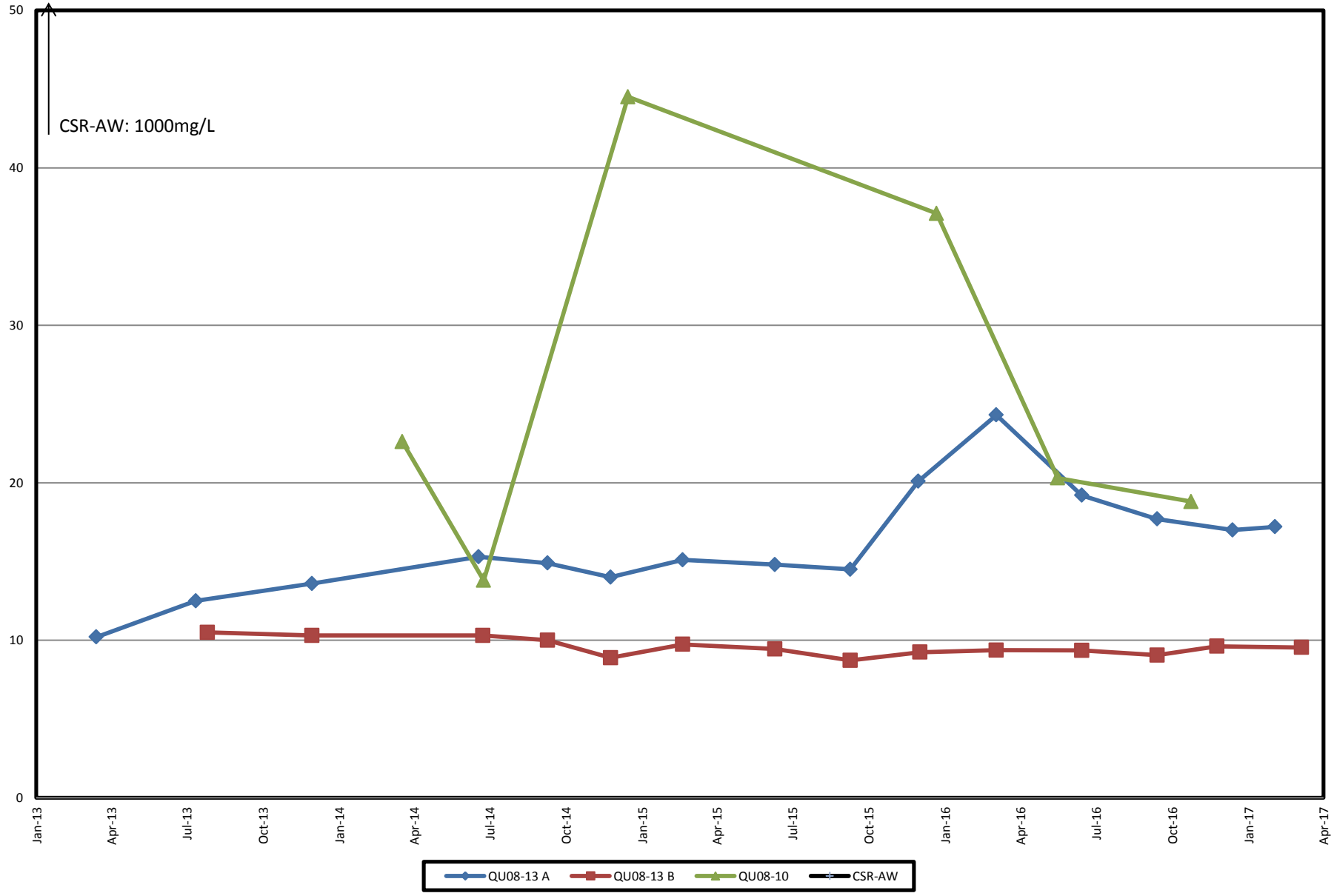
Graph 27
7-South Ex-Situ Monitoring Wells - Dissolved Arsenic (mg/L)



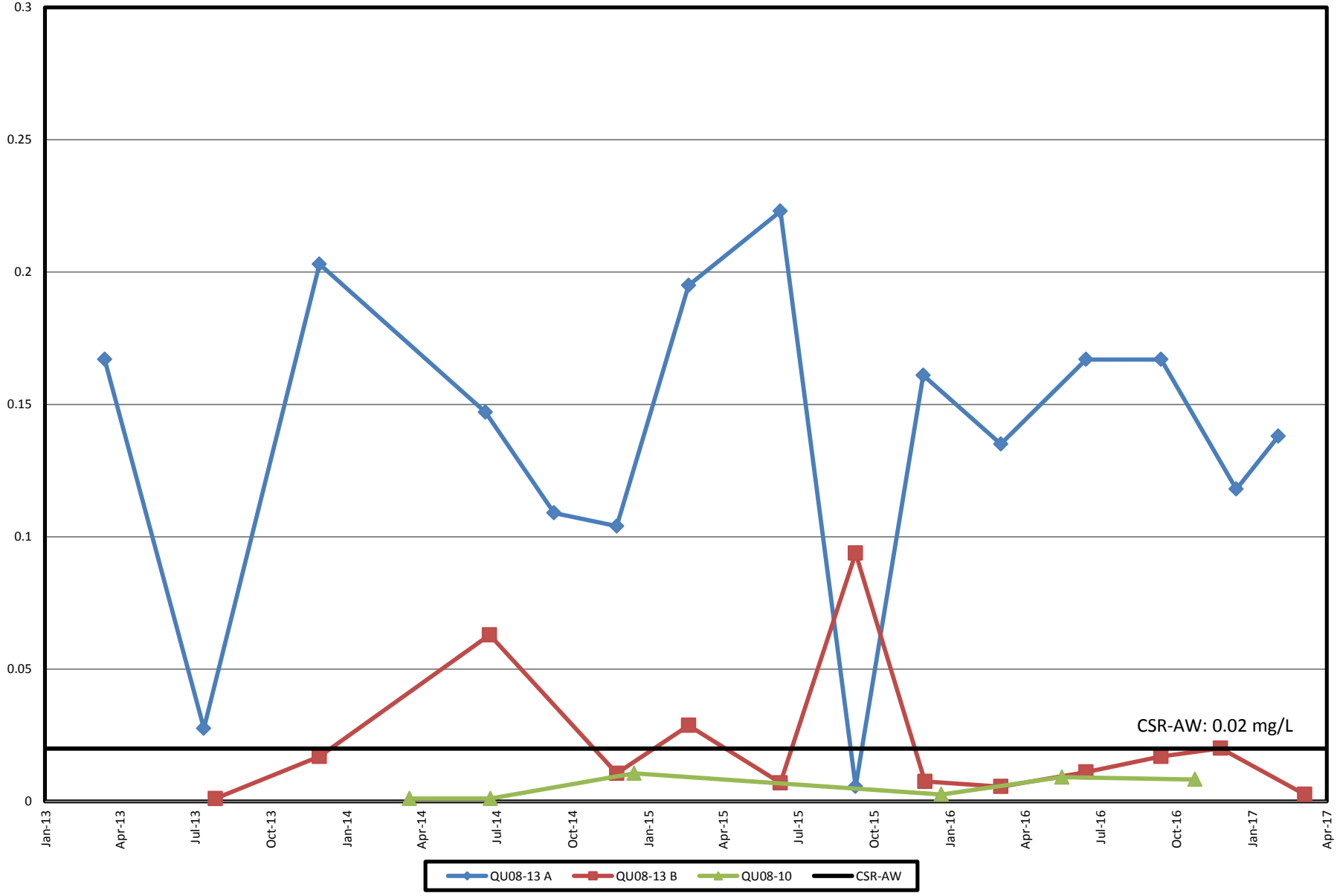
Graph 28
7-South Ex-Situ Monitoring Wells - Dissolved Iron (mg/L)



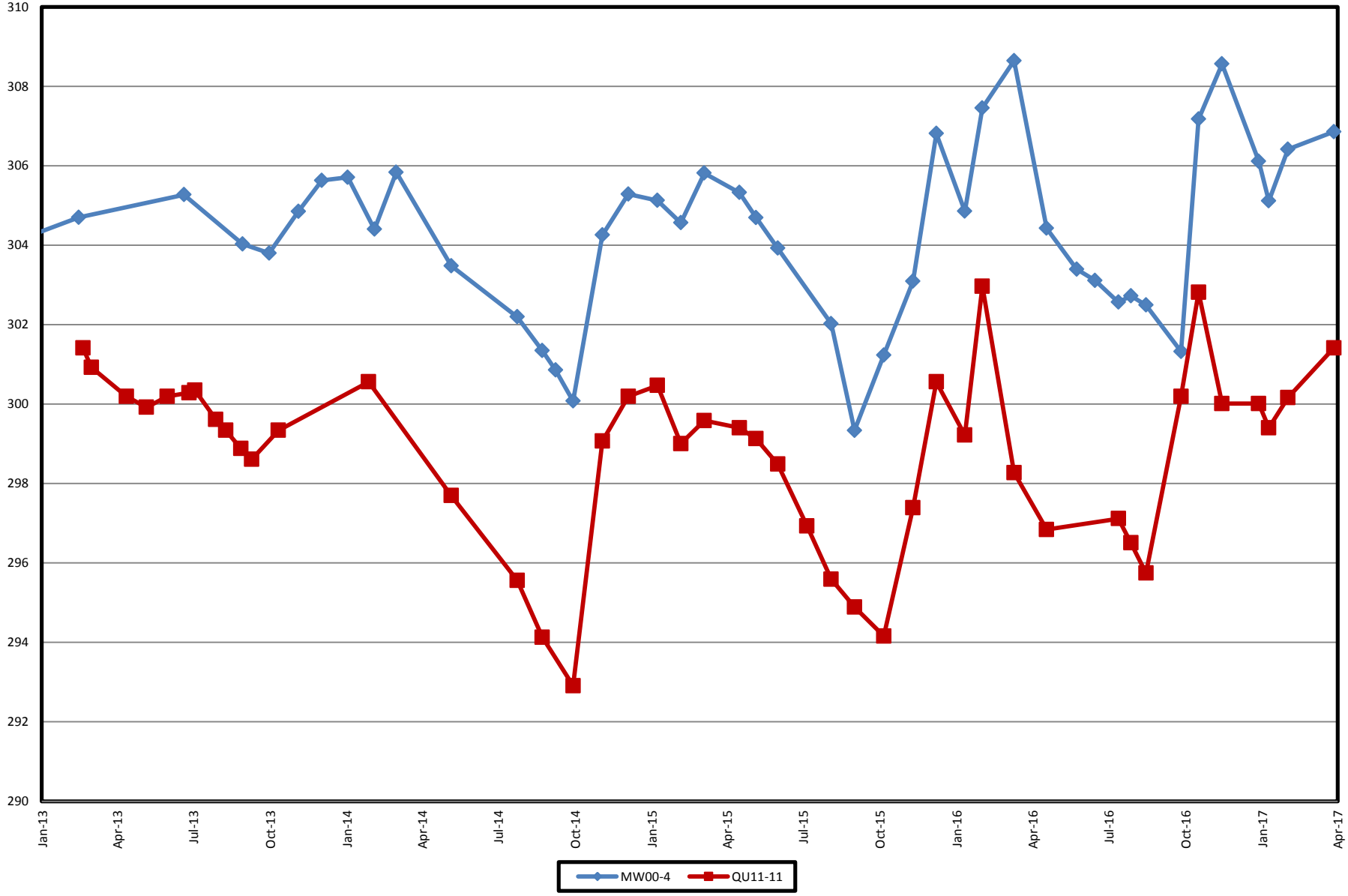
Graph 29
7-South Ex-Situ Monitoring Wells - Dissolved Sulphate (mg/L)



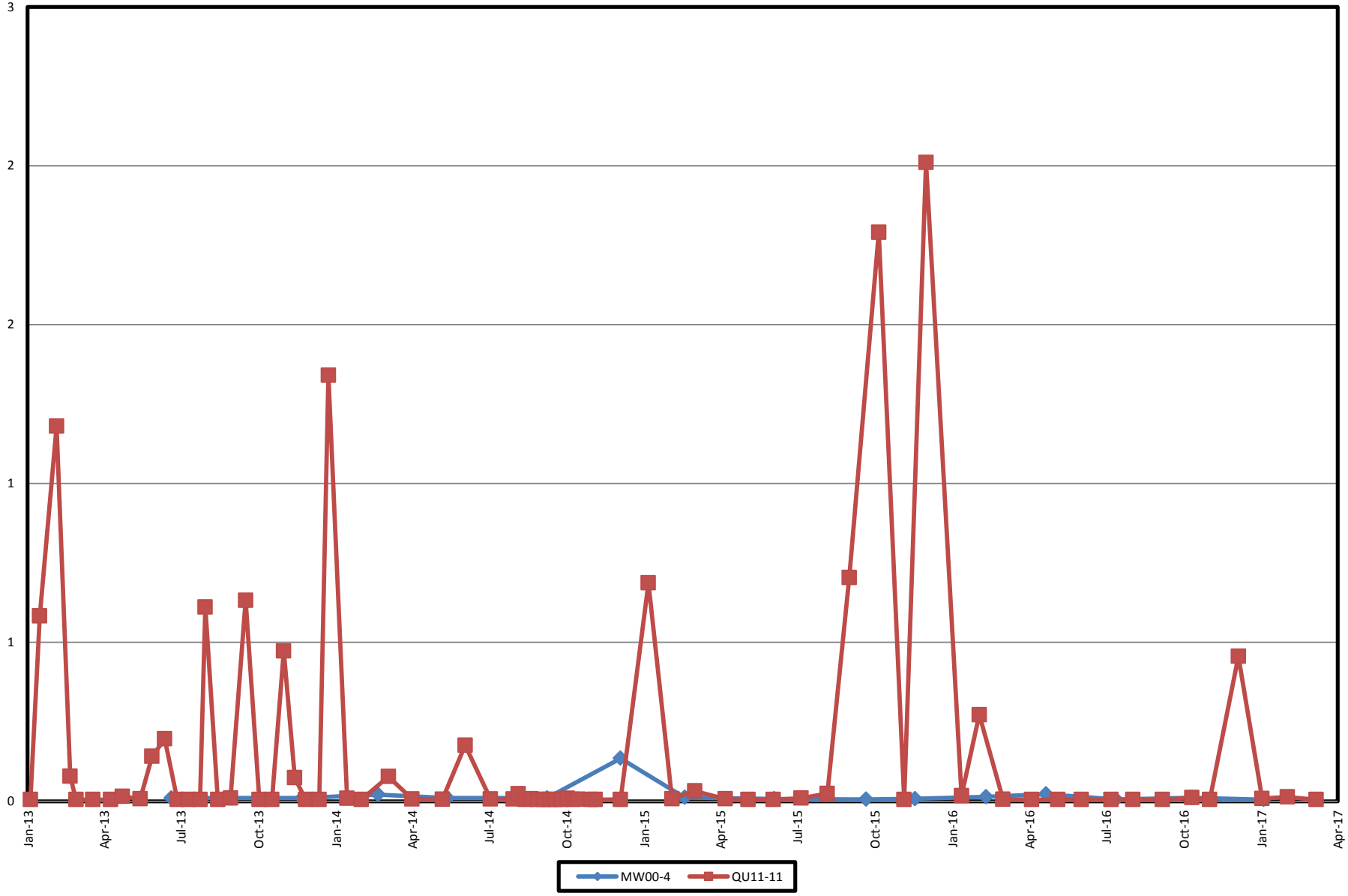
Graph 30
7-South Ex-Situ Monitoring Wells - Sulphide as H_2S (mg/L)



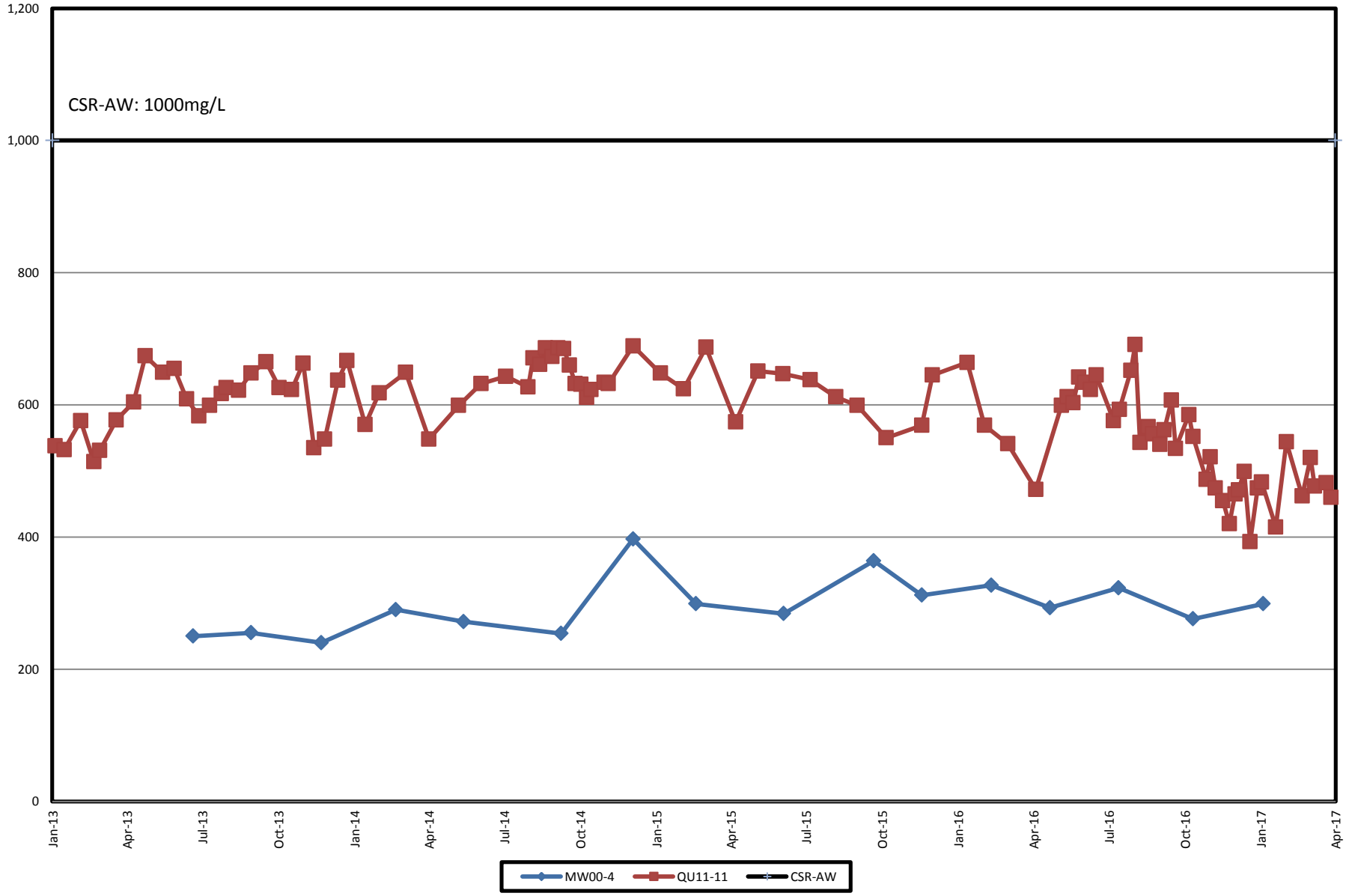
Graph 31
In-Situ 2-South Groundwater and Mine Pool Water Elevations (Metres Above Sea Level)



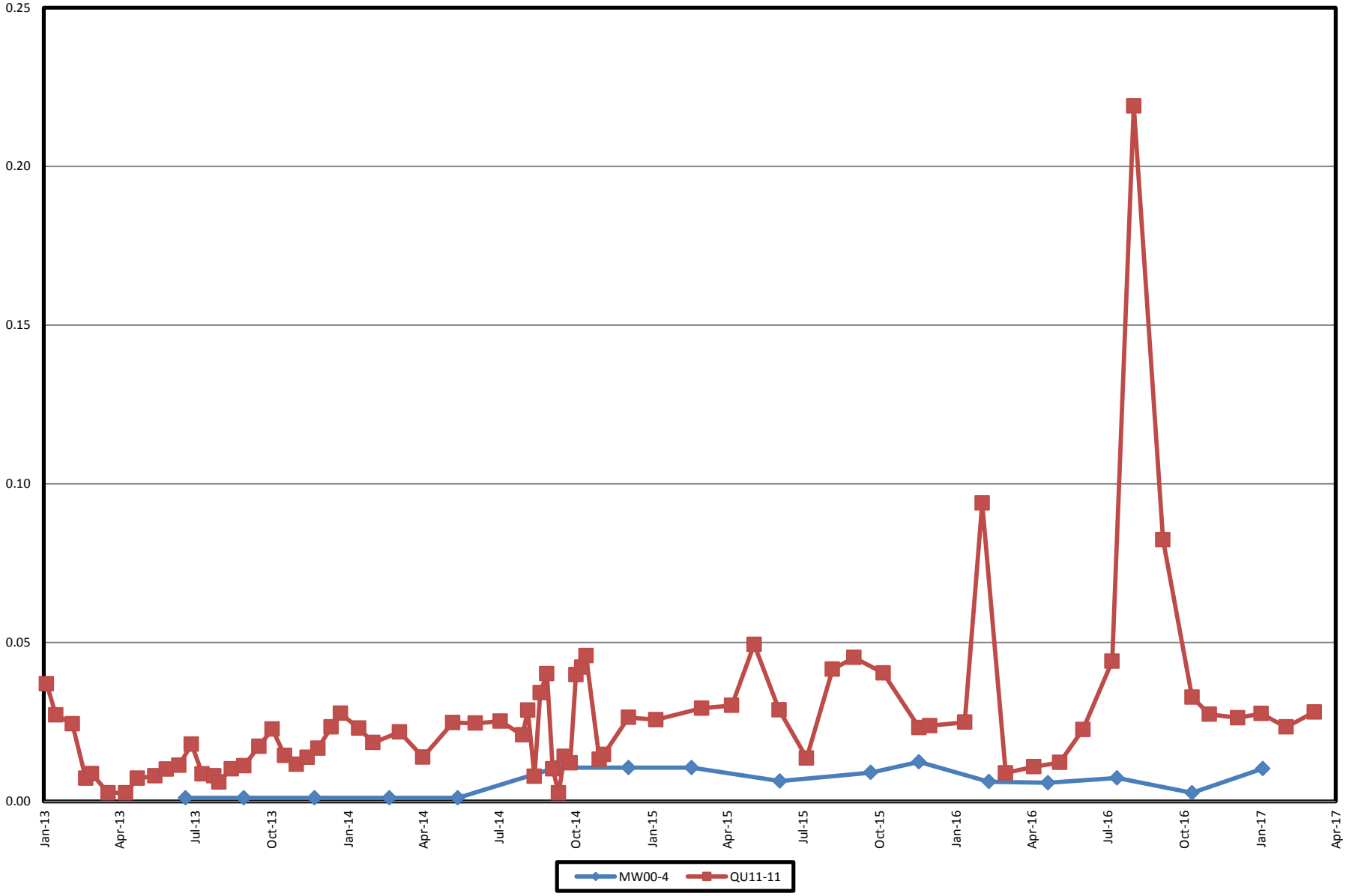
Graph 32
In-Situ 2-South Monitoring Wells - Dissolved Iron (mg/L)



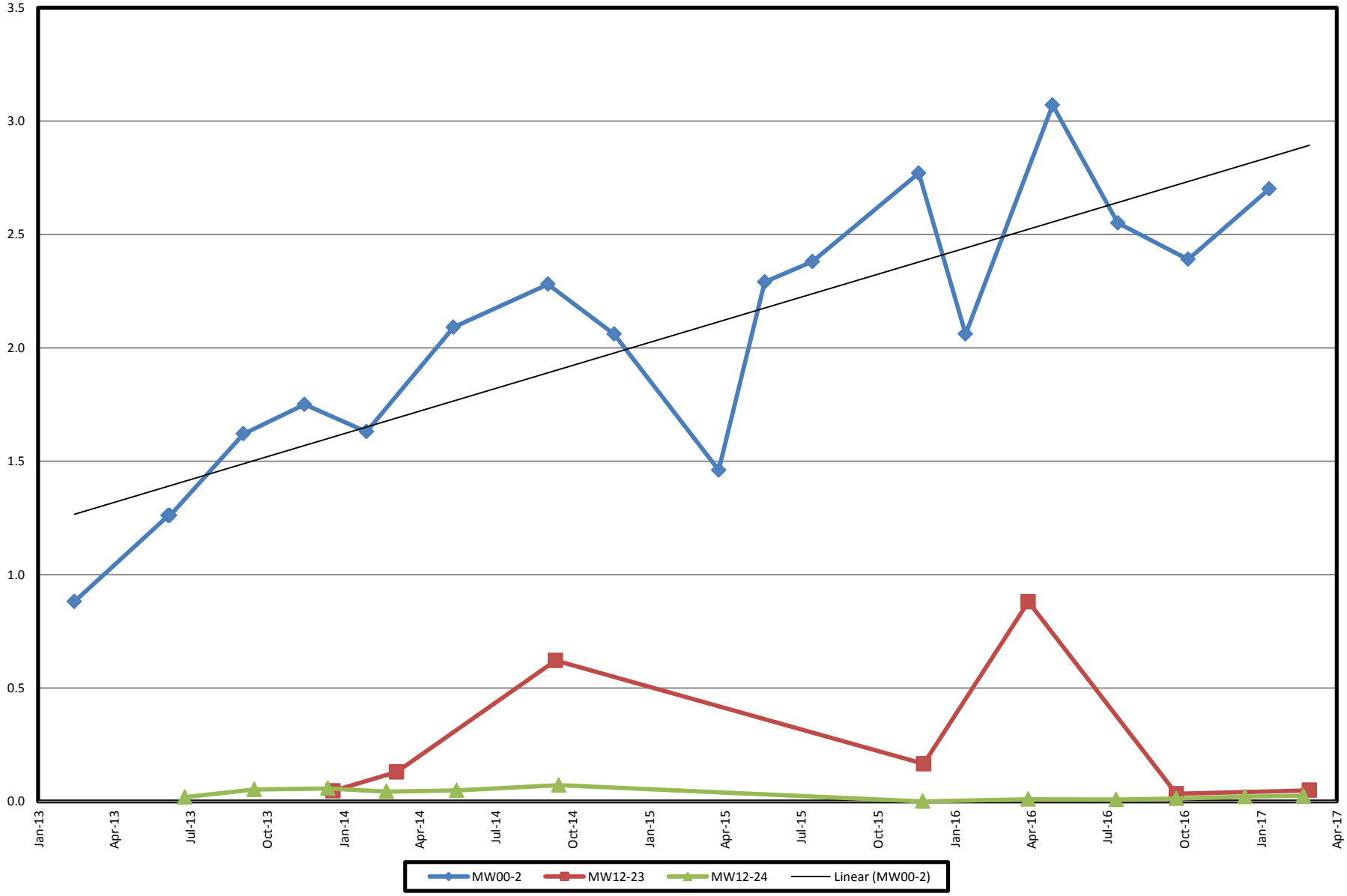
Graph 33
In-Situ 2-South Monitoring Wells - Dissolved Sulphate (mg/L)



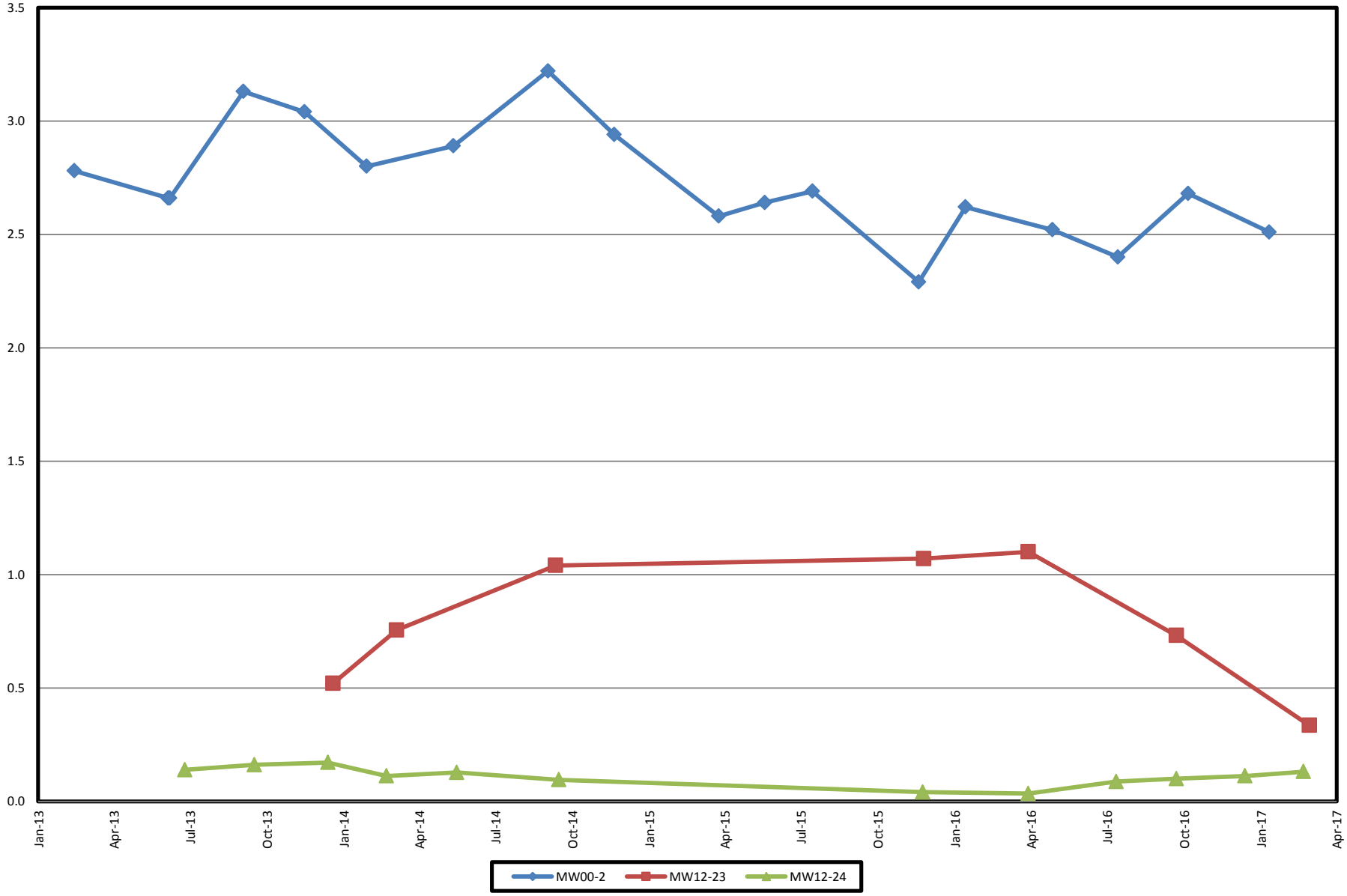
Graph 34
In-Situ 2-South Monitoring Wells - Sulphide as H_2S (mg/L)



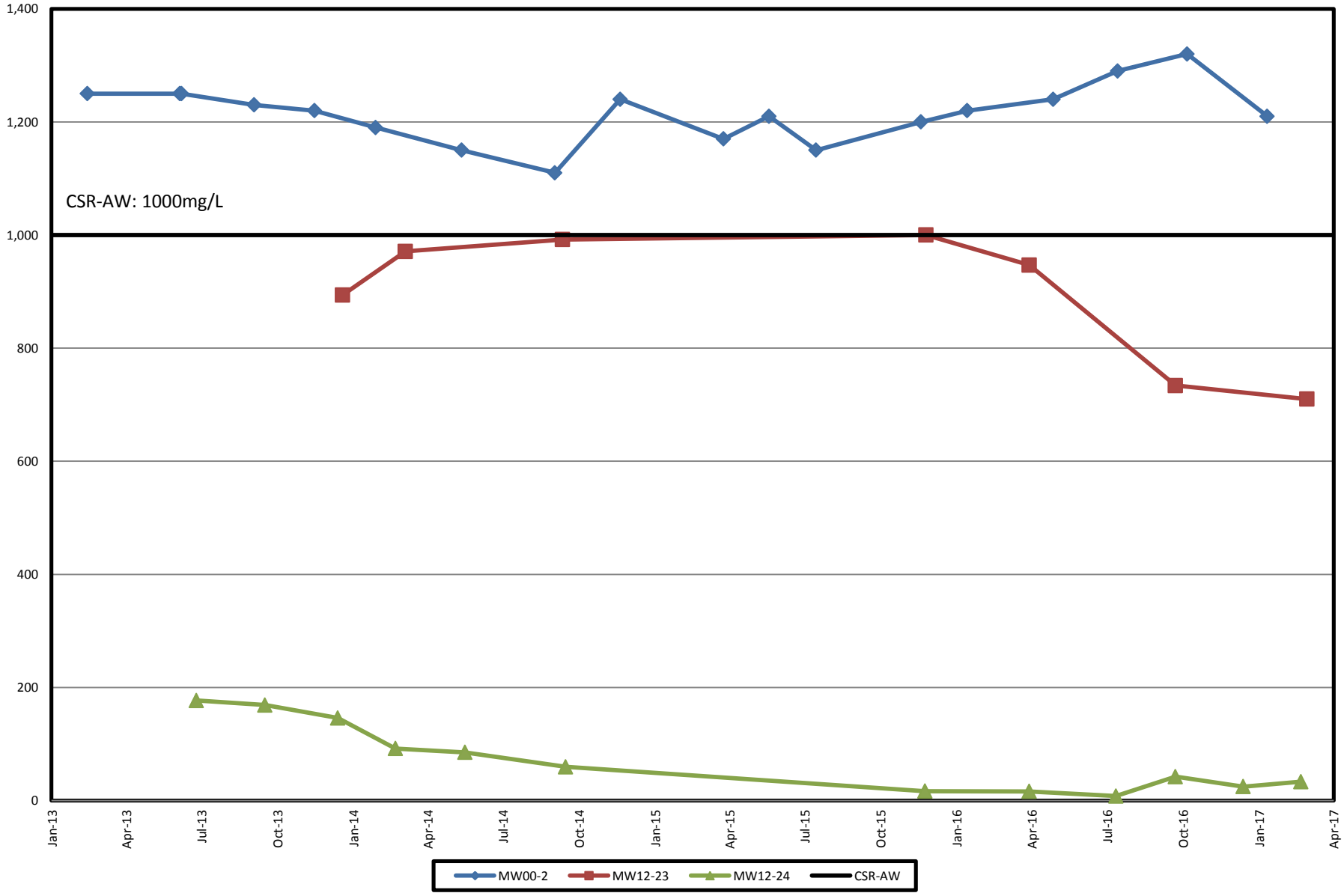
Graph 35
Ex-Situ 2/3-South Monitoring Wells - Dissolved Iron (mg/L)



Graph 36
Ex-Situ 2/3-South Monitoring Wells - Dissolved Manganese (mg/L)

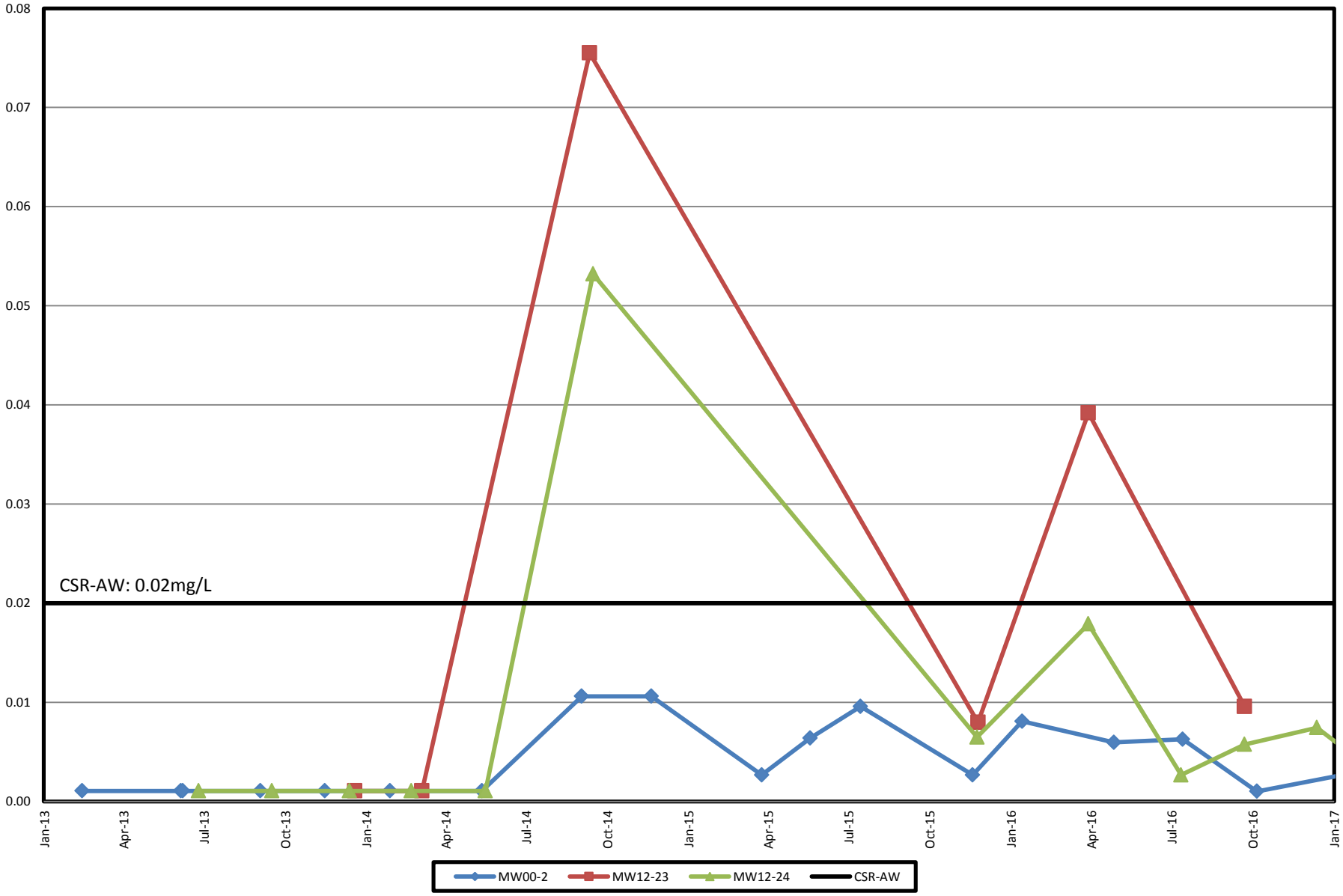


Graph 37
Ex-Situ 2/3-South Monitoring Wells - Dissolved Sulphate (mg/L)

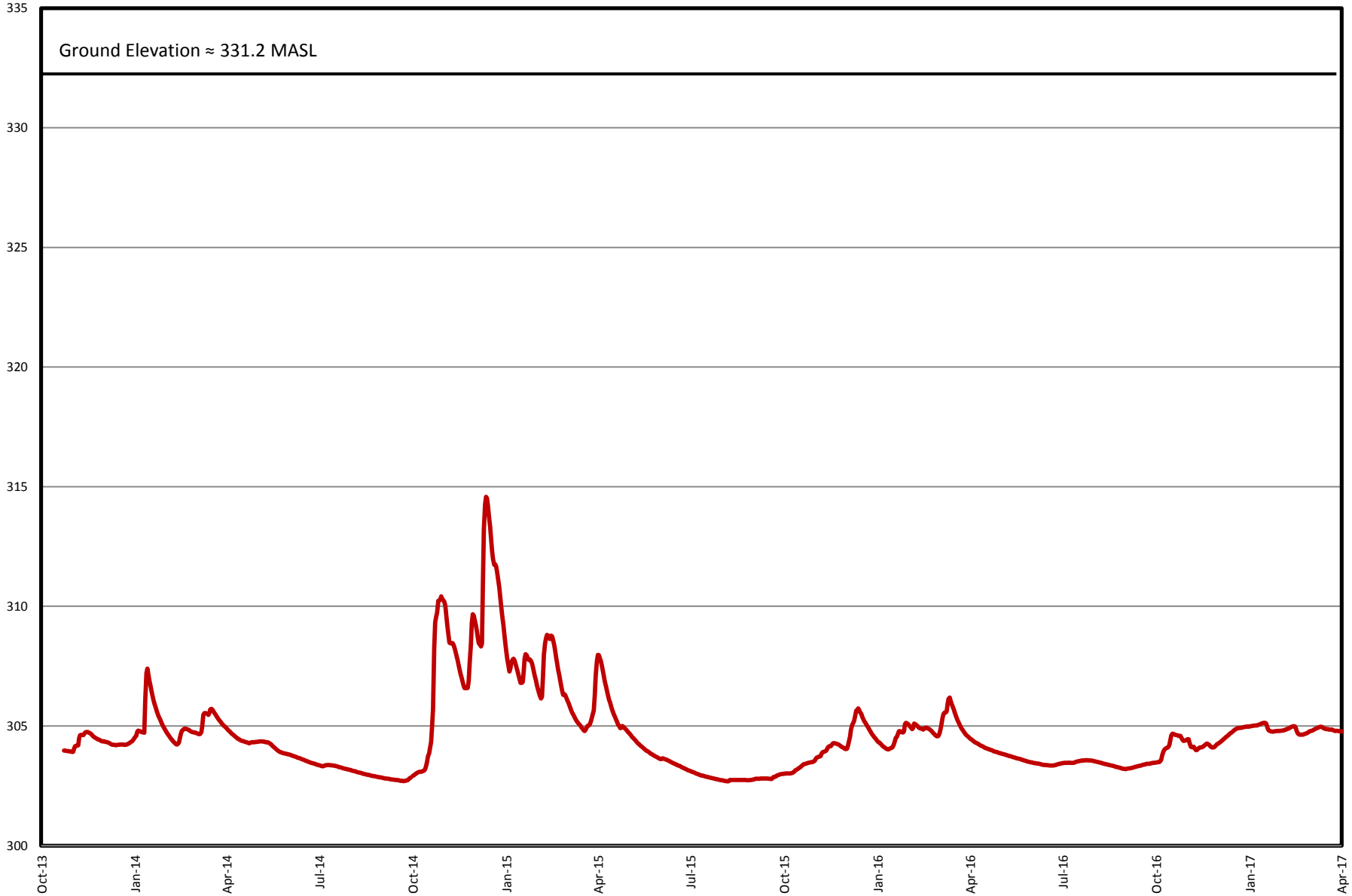


Graph 38

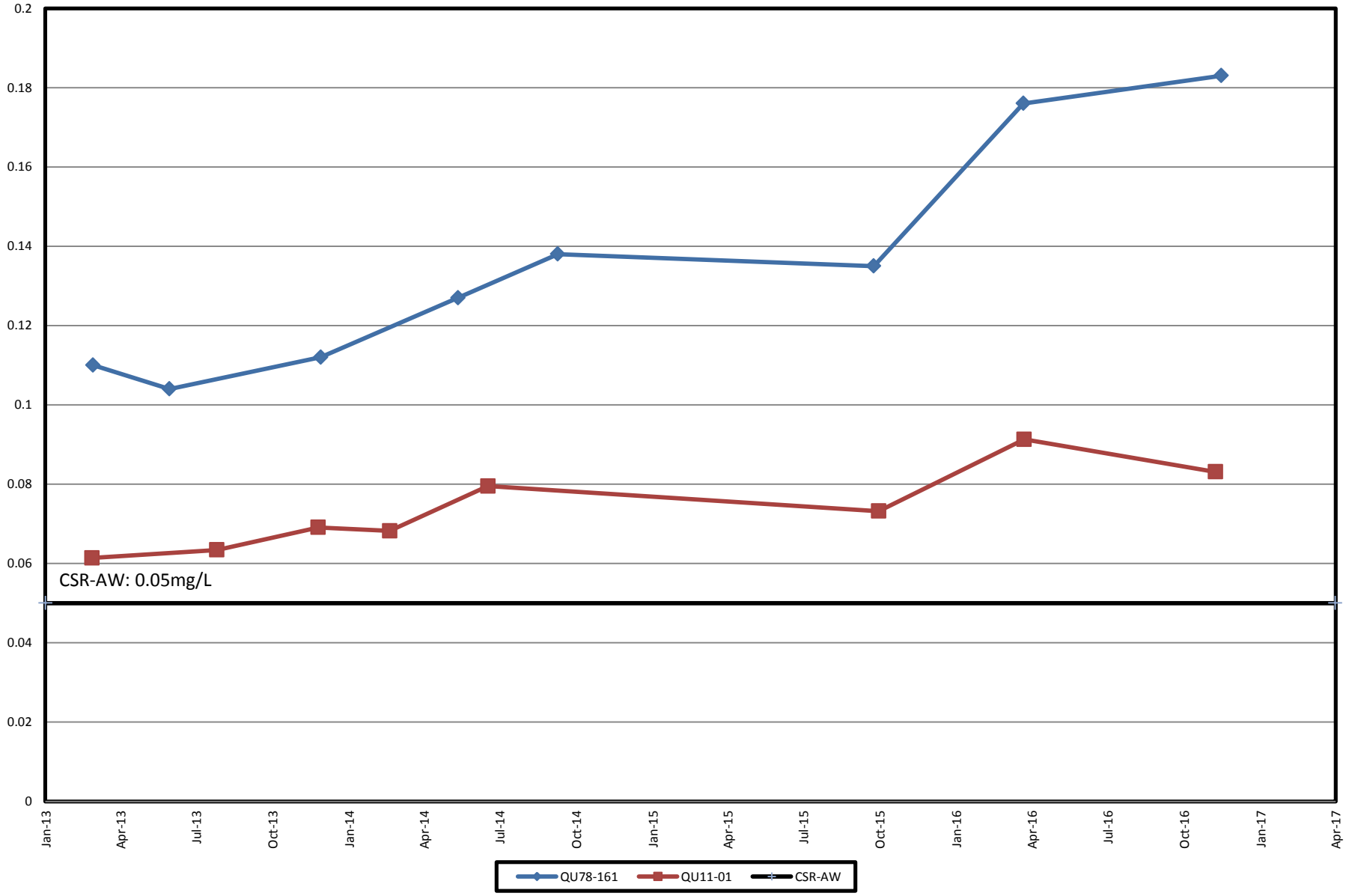
Ex-Situ 2/3-South Monitoring Wells - Sulphide as H_2S (mg/L)



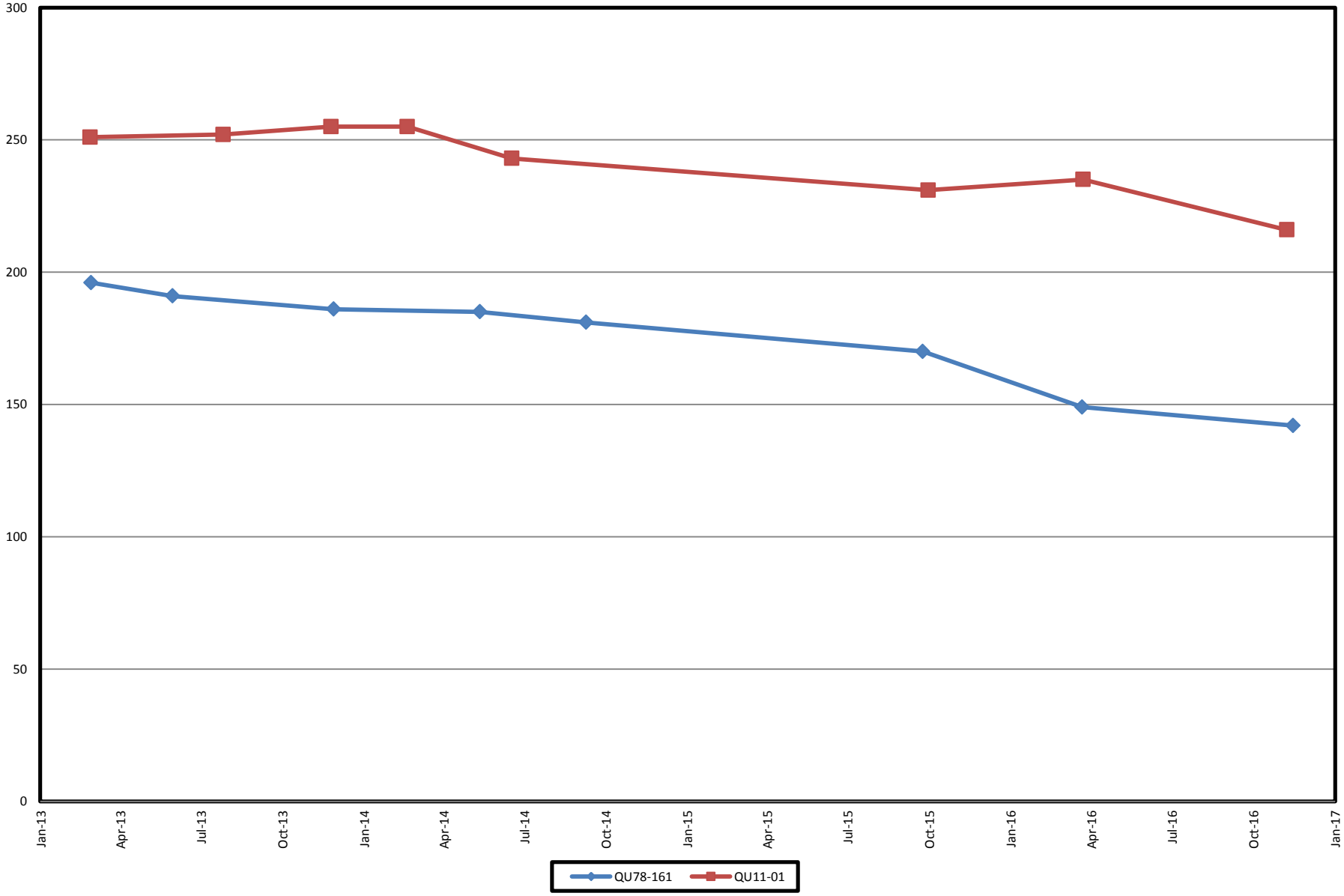
Graph 39
In-Situ 4-South Water Elevation @ QU11-01 (Metres Above Sea Level)



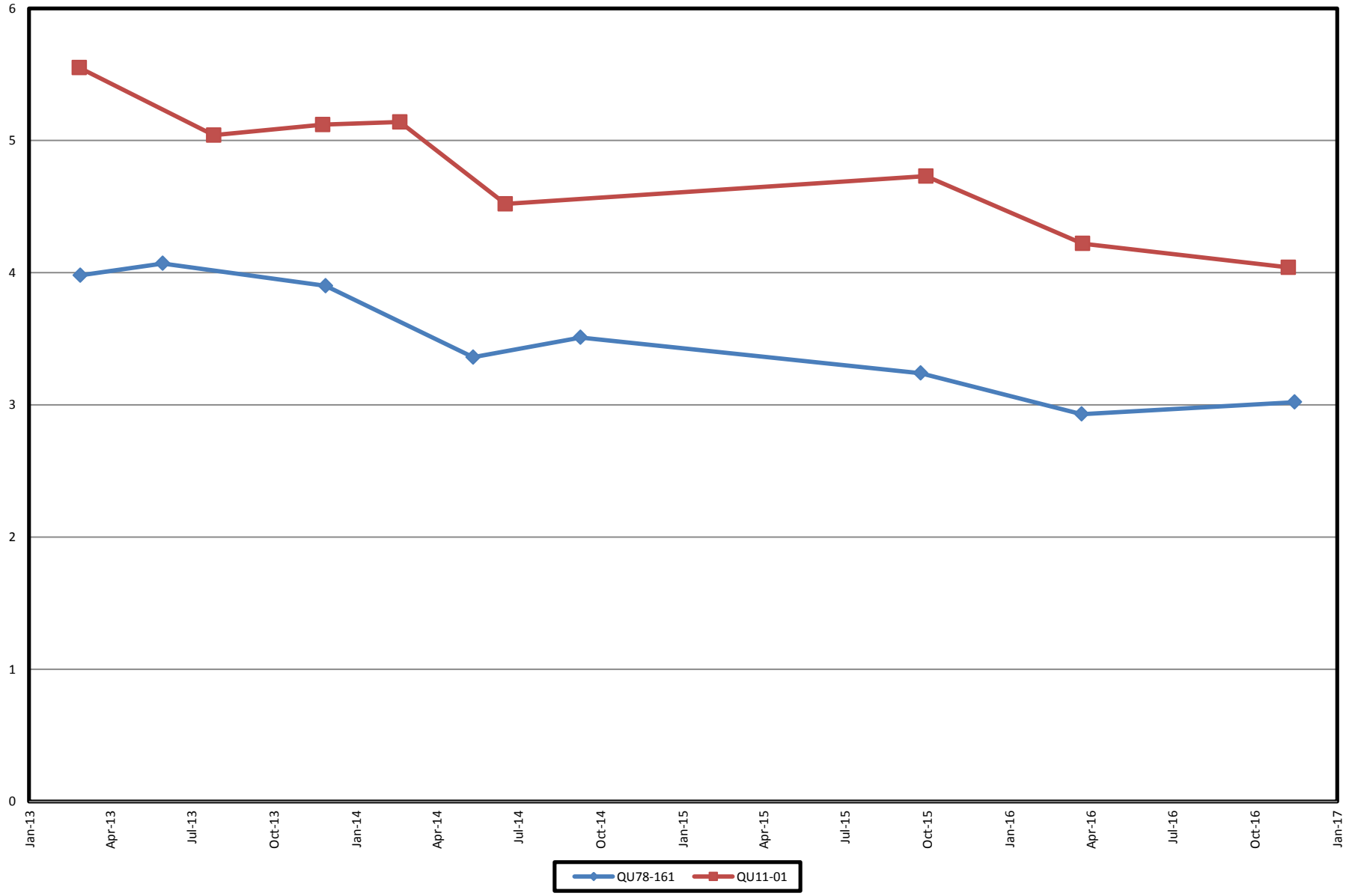
Graph 40
In-Situ 4-South Monitoring Wells - Dissolved Arsenic (mg/L)



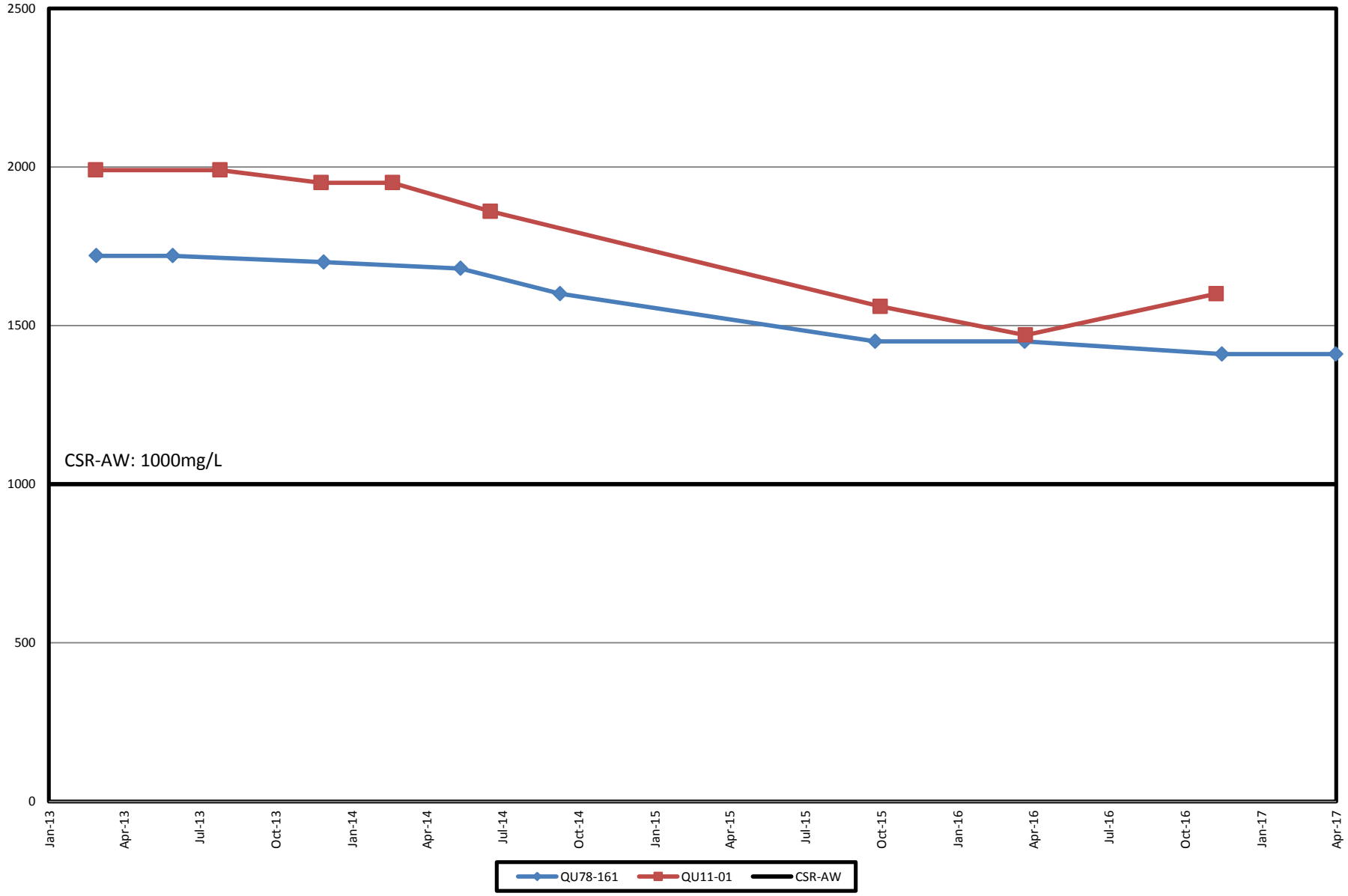
Graph 41
In-Situ 4-South Monitoring Wells - Dissolved Iron (mg/L)



Graph 42
In-Situ 4-South Monitoring Wells - Dissolved Manganese (mg/L)

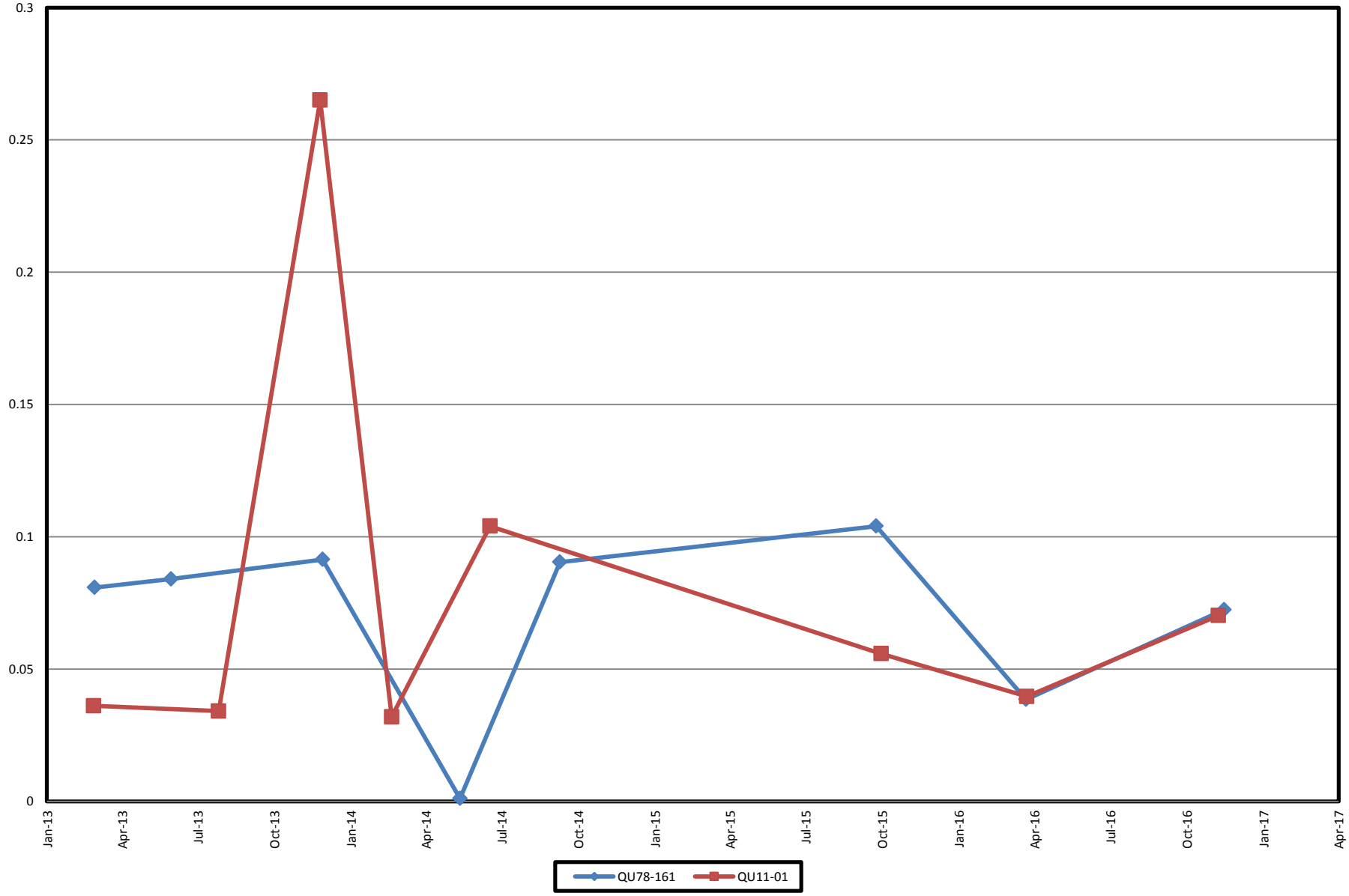


Graph 43
In-Situ 4-South Monitoring Wells - Dissolved Sulphate (mg/L)

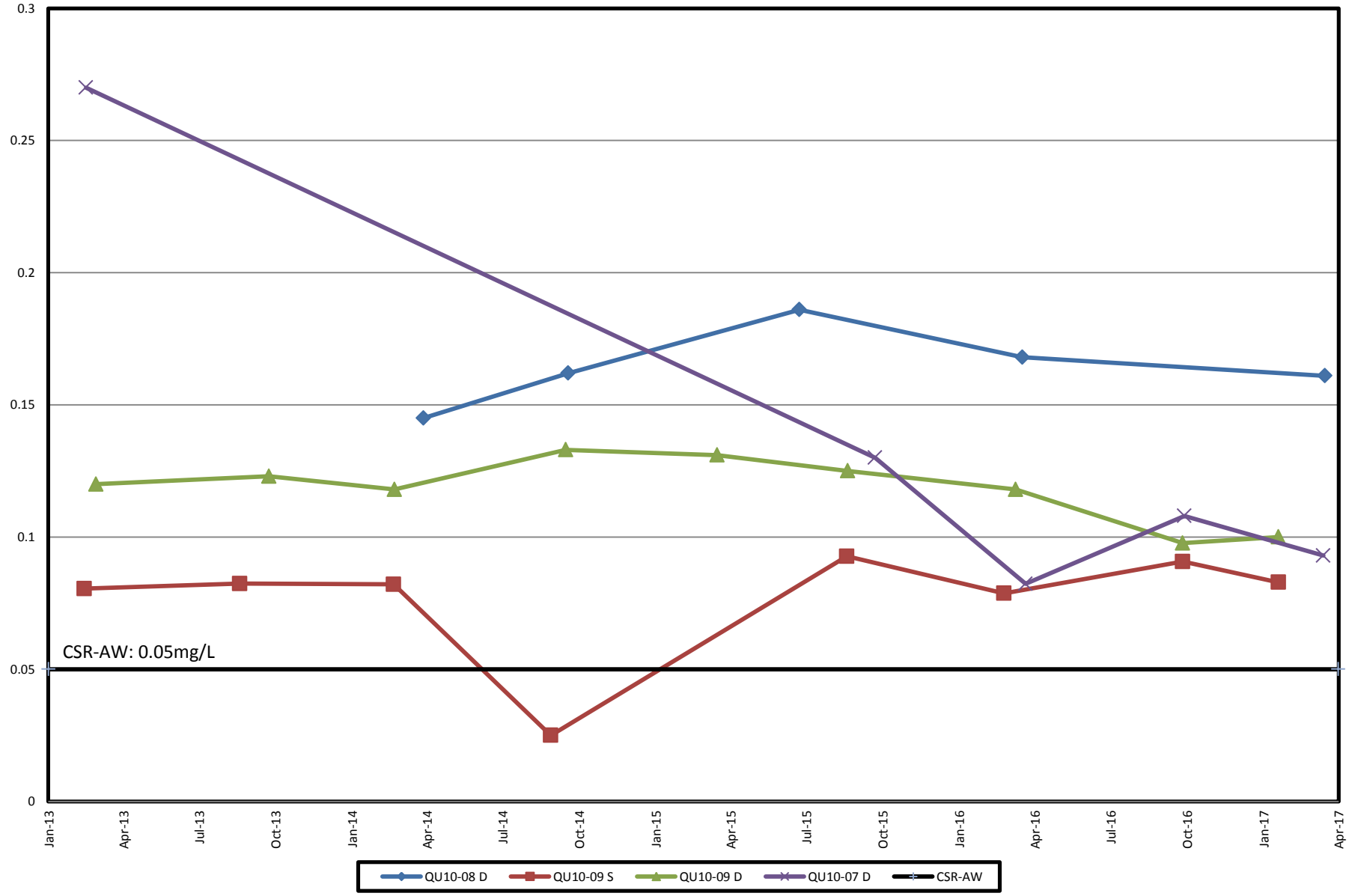


Graph 44

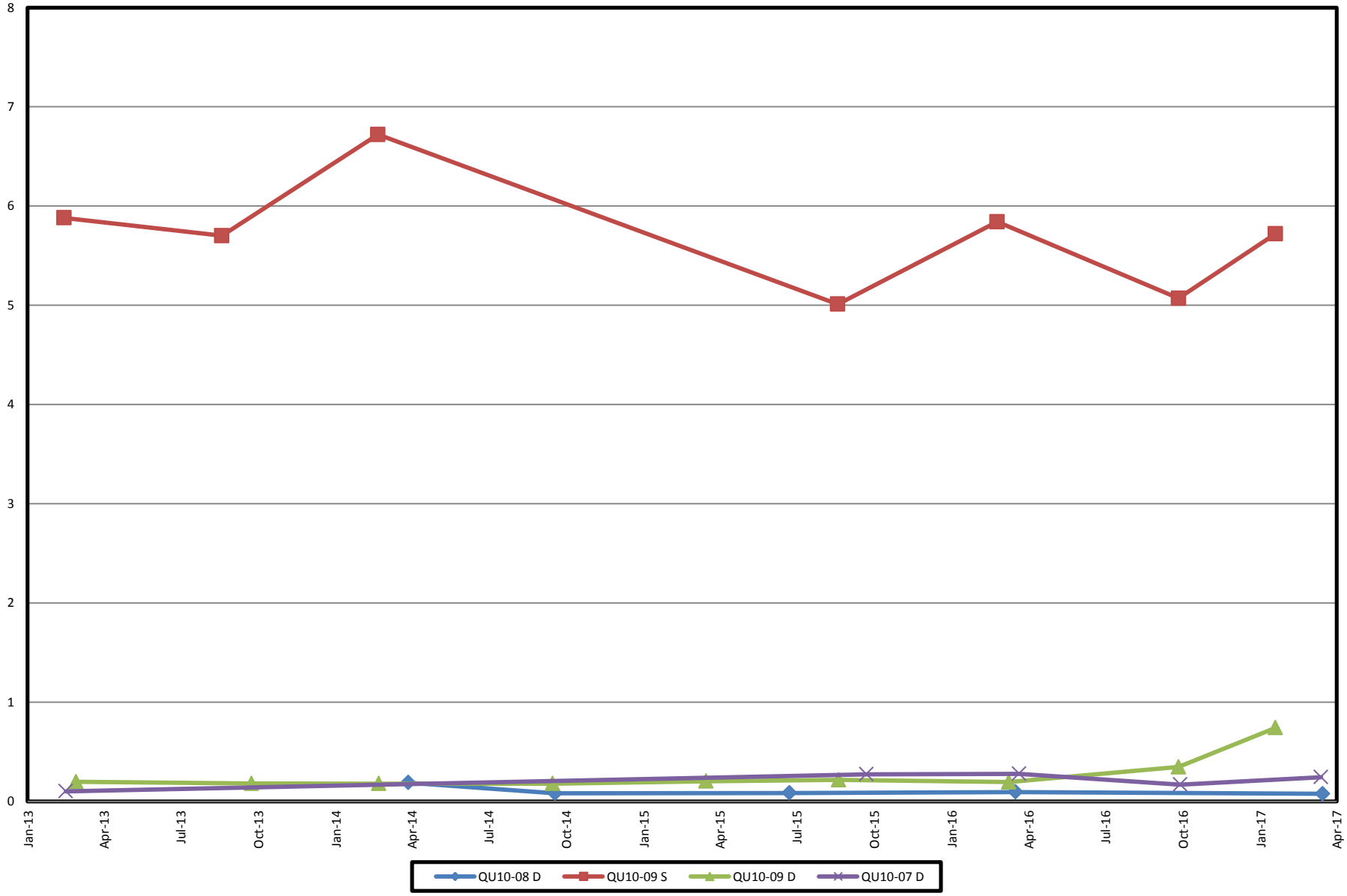
In-Situ 4-South Monitoring Wells - Sulphide as H_2S (mg/L)



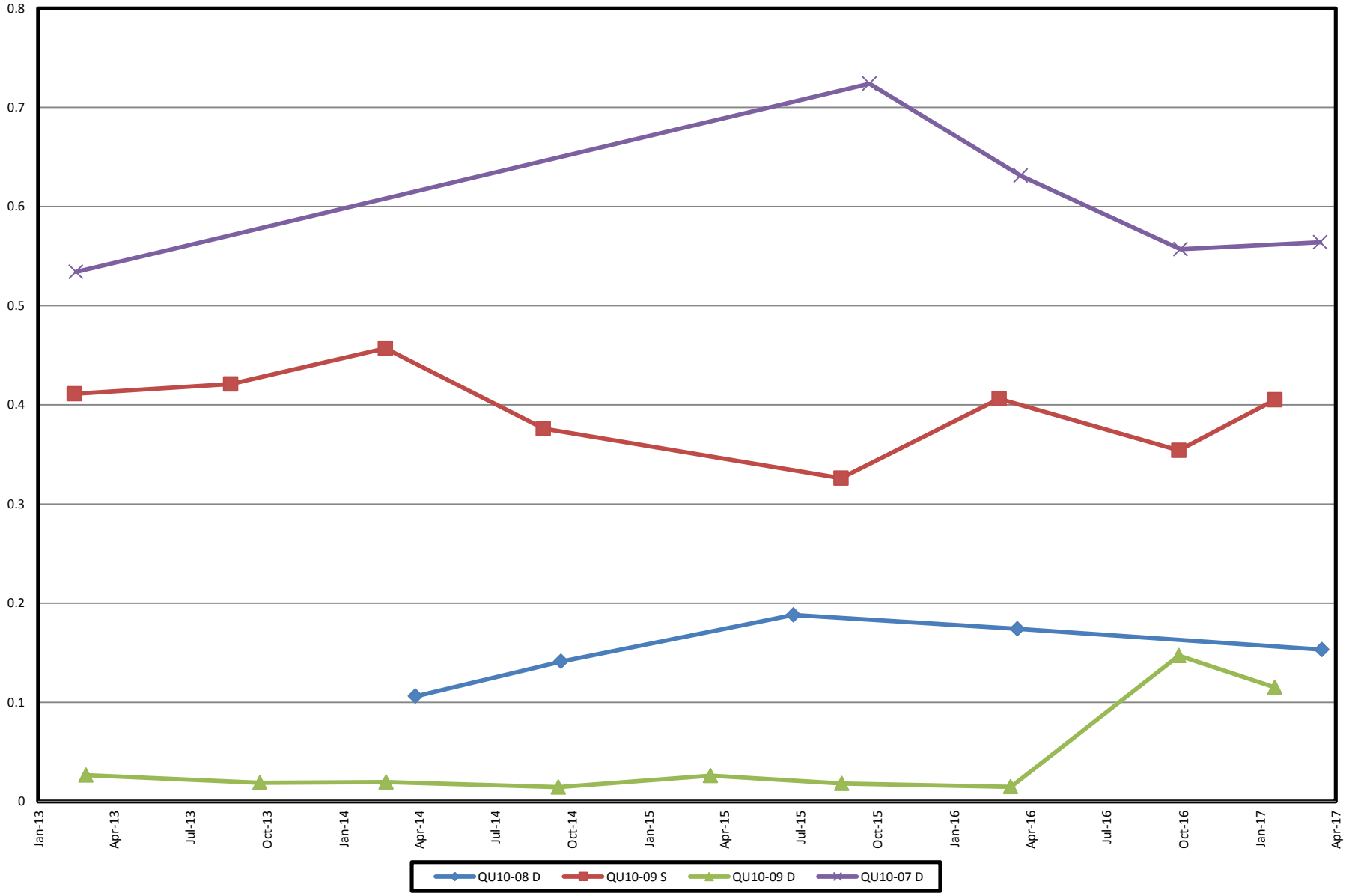
Graph 45
Ex-Situ 4-South Monitoring Wells - Dissolved Arsenic (mg/L)



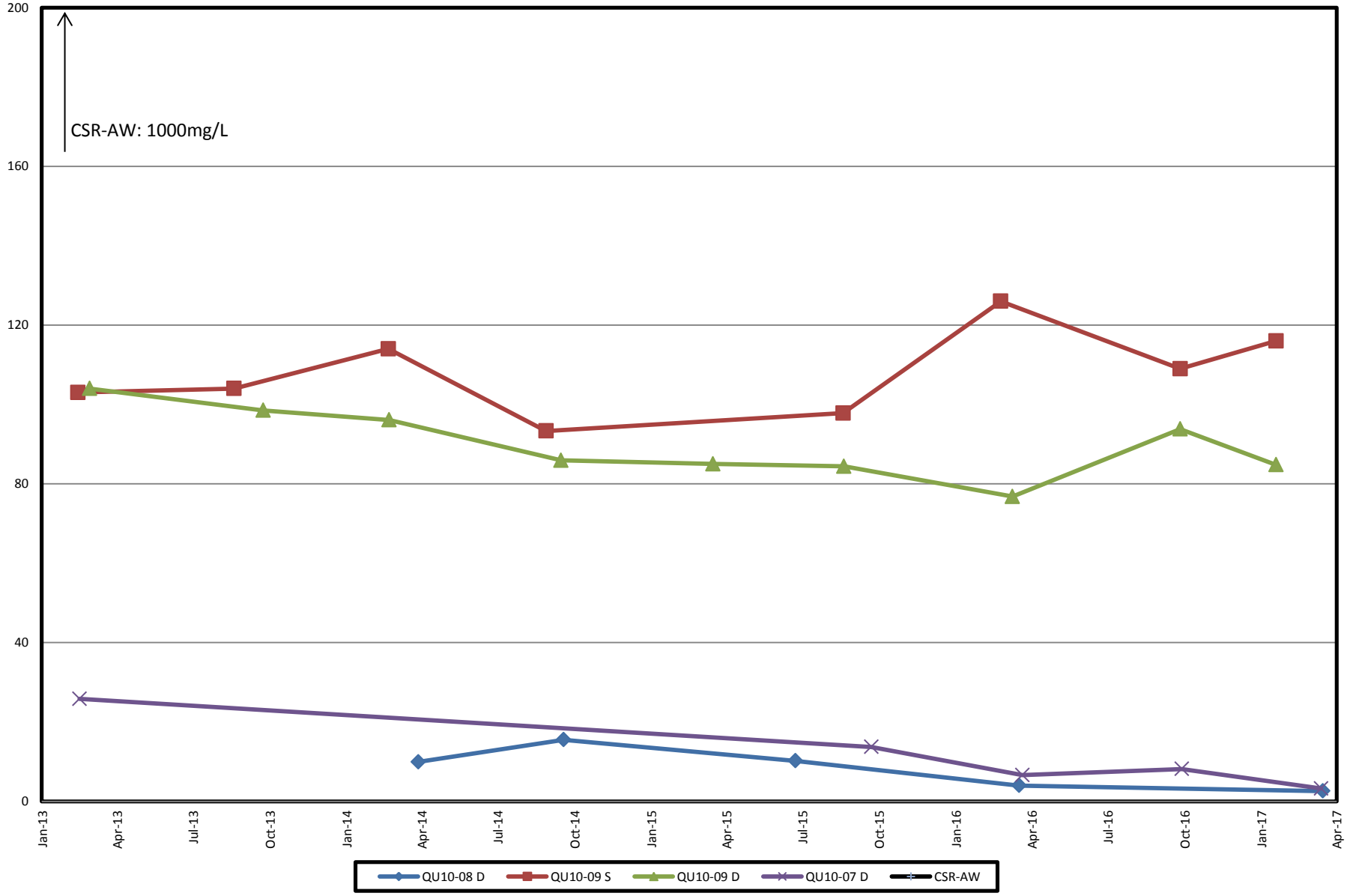
Graph 46
Ex-Situ 4-South Monitoring Wells - Dissolved Iron (mg/L)



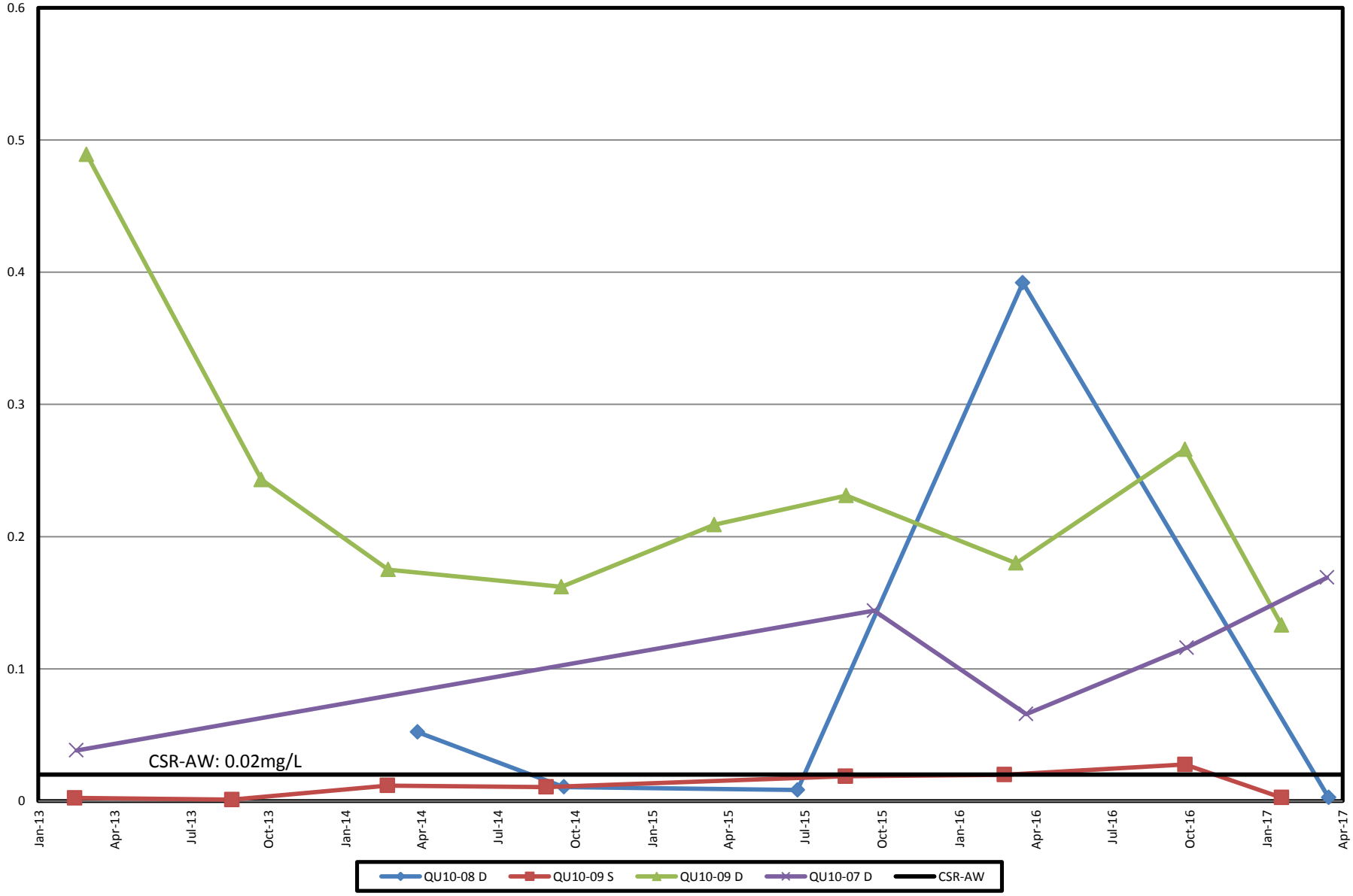
Graph 47
Ex-Situ 4-South Monitoring Wells - Dissolved Manganese (mg/L)



Graph 48
Ex-Situ 4-South Monitoring Wells - Dissolved Sulphate (mg/L)



Graph 49
Ex-Situ 4-South Monitoring Wells - Sulphide as H_2S (mg/L)



APPENDIX X

Annual Status Form

AUTHORIZATION NUMBER: 7008
AUTHORIZATION TYPE: Effluent, Permit
LEGAL AUTHORIZATION HOLDER NAME: Quinsam Coal Corporation

AUTHORIZED PERSON NAME: Kathleen Russell

AUTHORIZED PERSON SIGNATURE: KR.
SIGNATURE DATE: August 8, 2017

I understand that it is an offense to mislead a government official, and I declare that all of the information presented is accurate and true.
I have been given the authority by the authorization holder to sign this form.

CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
Section 1	AUTHORISED DISCHARGES		
Section 1.1	This subsection applies to the discharge of effluent from the NORTH COAL MINING OPERATION AND COAL PREPARATION PLANT. The site reference number for this discharge is E207409		
Section 1.1.1	The maximum and average authorized rates of discharge are 0.32 m^3/s and 0.08 m^3/s respectively. The authorized discharge period is 365 d/a. The maximum flow rate observed was 0.236 m^3/s. The average annual flow rate was calculated as 0.110 m^3/s, exceeding average authorized discharge rate of 0.080 m^3/s.	No	A permit amendment is required to increase the average rate of discharge. Refer to the Annual Report, Section (6.1.1), page 33, Figure 4. This is for permit fee calculations only.
Section 1.1.2	The characteristics of the discharge shall not exceed the specified permit limits (See 1.1.2 of PE7008). TSS exceedances occurred on 13 days out of 365. All other monitored parameters were in compliance.	No	See appendix VII.
Section 1.1.5	The location of the facilities from which the discharge originates is Block 26, Block 120 and Block 148, Comox Land District.	Yes	N/A
Section 1.1.6	The location of the point of discharge is Block 120, Comox Land District.	Yes	N/A
Section 1.2	This subsection applies to the discharge of effluent from the SOUTH COAL MINING OPERATION. The site reference number for this discharge is E218582.	Yes	N/A
Section 1.2.1	The maximum and average authorized rates of discharge are 0.46 m^3/s and 0.10 m^3/s, respectively. The authorized discharge period is 365 d/a. The maximum flow rate observed was 0.221 m^3/s. The average annual flow rate was calculated as 0.0290 m^3/s.	Yes	Refer to the Annual Report, Section (6.2), page 34, Figure 5.
Section 1.2.2	Discharge from the South Mining Operation shall not exceed the specified permit limits. Permit limits are applied to monitoring site BDS under the "*Authorization to bypass the works August 2016* ". Dissolved phosphorus exceeded the permit limit on 1 occasion.	No	The sample may have contained algae, increasing the phosphorus content in the sample. See Appendix VII.
Section 1.2.3	The authorized works are surface runoff collection and diversion ditches, flocculation facilities, settling pond, 3 pit sumps (1S, 2S and 3S Pits), an adit sump (4S Adit), pumping facilities, and related appurtenances approximately located.	Yes	N/A
Section 1.2.5	The location of the facilities from which the discharge originates is Block 98 and Block 149, Comox Land District.	Yes	N/A
Section 1.2.6	The location of the point of discharge is Block 149,Comox Land District.	Yes	N/A
Section 1.3-1.3.6	This subsection applies to the discharge of effluent from the BLOCK 242 COAL MINING OPERATION as shown on attached Site Plan C. The site reference number for this discharge is E225796.	Yes	No discharge occurred from this site during 2016-2017. This site is non-operational and is partially reclaimed.
Section 1.4	This subsection applies to the discharge of effluent from the 7 SOUTH MINING OPERATION. The site reference number for this discharge is E292069.	Yes	N/A
Section 1.4.1	The maximum authorized rate of discharge is 0.005 m^3/s. The authorized discharge period is 365 d/a. Discharge occurred for 12 days over the year, totaling 731.274 m^3.	Yes	Refer to the Annual Report, Section (6.3), page 38, Figure 8.
Section 1.4.2	The characteristics of the discharge from the 7 South Mining Operation shall not exceed the specified permit limits. TSS composites exceeded permit limits on 2 events.	No	Efforts were made to divert water back to the underground workings. Downstream water quality monitoring indicated compliance prior to receiving environment entry. See Appendix VII.
Section 1.4.5	The location of the facilities and point of discharge is Block 120, Comox Land District, except part in plan 12164, 13574, 13641, VIP53617 and VIP64817.	Yes	N/A
Section 2	Specific Requirements		
Section 2.1	North Coal Mining and Coal Preparation Plant Operation (Settling Pond #4)		
Section 2.1.1	Rate of Discharge: The maximum flow of 0.32 m^3/s is the peak routed outflow from the settling pond resulting from the following inputs: a) The assumed response of the gravity fed catchment area defined in Subsection 2.1.3 up to a 1 in 10 year return period rainfall of 24 hour duration; and b) The maximum combined pumping rate from the 2-North portal sump, 2-North underground workings, and the tailings facility, as specified in Subsection 2.1.2. The Director may from time to time redefine the maximum outflow based upon actual on-site measurements.	Yes	N/A
Section 2.1.2	Pumping Rate: The combined rate at which effluent may be pumped from the 2-North portal sump, 2-North underground workings and the tailings facility to the settling pond shall not exceed 0.32 m^3/s unless authorization has been obtained from the Director. Pumping rates shall be decreased as necessary to accommodate flows as defined in Subsection 2.1.1 (a).	ND	Extreme storms exceeding 100 year 72 hour events lead to excessive pumping in order to maintain water elevations in the tailings dam, PAG-CCR Pond and 2-North underground. See Appendix VII, memorandum to MEM dated December 14, 2016 for further information.
Section 2.1.3	Catchment Area: The gravity drained settling pond catchment area shall not exceed 4 hectares unless authorization has been obtained from the Director.	Yes	N/A
Section 2.1.4	Wash Plant Effluent: Wash plant effluent shall not be conveyed to the 2-North pit sump via the wash plant ditch. The Permittee shall keep records of the date, duration and estimated volume of any overflow from the wash plant effluent sump. Subject to review of this data, the Director may request changes to the works.	Yes	N/A The plant has not been in operation this monitoring year.
Section 2.1.5	Settling Pond Solids and Storage Volume: Settled solids which have accumulated in the settling pond shall be removed as required to maintain a minimum water depth below the pond decant of 1.0 m and a minimum water storage volume of 2,300 m^3. The removed solids shall be disposed of in a manner approved by the Director.	Yes	Settled solids have not accumulated to a point that requires them to be removed at this time.
Section 2.1.6	Discharge Routing: The discharge from the settling pond shall be conveyed to Middle Quinsam Lake in a manner acceptable to the Director.	Yes	N/A

Authorized Person Initial:_____ Date:_____

CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
Section 2.1.7	Effluent Characteristics (for Total Suspended Solids): The characteristics of the effluent with respect to total suspended solids shall be equivalent to or less than the levels specified in Subsection 1.1.2 for discharge rates of up to 0.32 m^3/s (or as may be redefined by the Director according to Subsection 2.1.1). Variances may be allowed by the Director for higher discharge rates. The Director may as well, in the future, establish a maximum level for total suspended solids during extreme storm events.	No	13 TSS results were in excess of permit limits due to extreme storm events. See Annual Report, Appendix VII.
Section 2.2	South Coal Mining Operation (Settling Pond #1)		
Section 2.2.1	Rate of Discharge: The maximum flow of 0.46 m^3/s is the peak routed outflow from the settling pond resulting from an assumed response of the maximum equivalent catchment area as defined in Subsection 2.2.2 to a design I in 10 year return period rainfall of 24 hour duration. The Director may from time to time redefine the maximum routed outflow based upon actual on-site measurements.	Yes	N/A
Section 2.2.2	Catchment Area: The maximum equivalent settling pond catchment area shall not exceed 68.4 hectares as defined in theSouth Pit Water Management. Settling Pond 1, Quinsam Coal Project. Ker, Priestman and Associates Limited, March 1990 unless authorization has been obtained from the Director.	Yes	N/A
Section 2.2.3	Settling Pond Solids and Storage Volume: Settled solids which have accumulated in the settling pond shall be removed as required to maintain a minimum water depth below the pond decant of 1.0 m and a minimum water storage volume of 1400 m^3. The removed solids shall be disposed of in a manner approved by the Director.	Yes	Settled solids have not accumulated to a point that requires them to be removed at this time.
Section 2.2.4	Discharge Routing: The discharge from the settling pond shall be conveyed to Long Lake through the adjacent wetlands as specified in Figure I, South Pit Water Management. Settling Pond 1, Quinsam Coal Project, Ker, Priestman and Associates Limited, March 1990.	Yes	N/A
Section 2.2.5	Effluent Characteristics (for Total Suspended Solids): The characteristics of the effluent with respect to total suspended solids shall be equivalent to or less than the levels specified in Subsection 1.2.2 for discharge rates up to 0.46 m^3/s (or as may be redefined by the Director according to Section 2.2.1). Variances may be allowed by the Director for higher discharge rates. The Director may as well, in the future, establish a maximum level for total suspended solids during extreme storm events.	Yes	N/A
Section 2.3 - 2.3.4	Block 242 Coal Mining Operation		This site is non-operational with reclamation underway.
Section 2.4	7-South Mining Operation Settling Pond		
Section 2.4.1	Rate of Discharge : The maximum flow of 0.005 m^3/s is the peak routed outflow from the settling pond resulting from an assumed response of the maximum equivalent catchment area as defined in subsection 2.4.3 to a design I in 10 year return period of 24 hour duration. Additional flow from the 7S adit sump pump must not cause the settling pond to overflow or exceed the maximum flow. The Director may from time to time redefine the maximum routed outflow based upon actual on-site measurements.	Yes	N/A
Section 2.4.2	Pumping Rate: The Permittee shall keep records of the date, duration and estimated volume when water from the 7 South Adit Sump (7S-Sump) is pumped to the settling pond and submit the records to the Regional Waste Manager upon request.	Yes	To date, no water has been routed from the 7S-Sump to 7SSD. Therefore no records exist.
Section 2.4.3	Catchment Area: The maximum settling pond catchment area shall not exceed 3.14 hectares as defined in the Surface Water Management Plan -7 South Development Quinsam Mine, Golder Associates, April 12, 2012 (Appendix B) unless authorization has been obtained from the Director.	Yes	N/A
Section 2.4.4	Settling Pond Solids and Storage Volume: Settled solids which have accumulated in the settling pond shall be removed as required to maintain a minimum water depth below the pond decant of 1.0 m and a minimum water storage volume of 340 m^3. The removed solids shall be disposed of in a manner approved by the Director.	ND	Settled solids have not accumulated to a point that requires them to be removed at this time. A minimum water cover of 1.0m is not sustained at all times as water management practices have changed to have minimal water discharged from the pond. Based on experience, it is difficult to maintain a 1.0m cover and discharge at appropriate levels. There has been far less TSS exceedances with the new practice.
Section 2.4.5	Discharge Routing: The discharge from the settling pond shall be conveyed to the Quinsam River via an ephemeral stream (Stream I) and a wetland (Lower Wetland) adjacent the Quinsam River in a manner acceptable to the Director.	Yes	N/A
Section 2.4.6	Settling Pond Discharge Dilution Ratio: The 7-South settling pond must not discharge unless a minimum flow is measured in Stream 1 (7S monitoring site). The minimum Stream 1 to discharge ratio shall be documented to the satisfaction of the Director in the Environmental Procedures Manual required in Section 3.2.	Yes	Refer to the Annual Report, Section (1.1.3) & Figure 3. Appendix I, Table (126 & 127).
Section 2.4.7	Settling Pond Discharge Effluent Quality Model Validation: The Permittee shall report on the settling pond performance in the annual report. The purpose of the report is to validate the effluent water quality prediction model using actual flow and water quality data. The Director may amend the permit, if required, or request an amendment of the permit for environmental protection based on the report findings.	Yes	Refer to the Annual Report , Section (6.3).
Section 2.4.8	Contingency Measures: In the event of a 7-South settling pond discharge permit limit exceedance, the settling pond discharge valve must be closed immediately and the effluent must temporarily be diverted to the 5S mine or 7S mine underground workings, or to another area acceptable to the Director. Details of the contingency measures shall be documented in the Environmental Procedures Manual required under Section 3.2. Additionally, the Permittee shall follow Section 3.9 requirements.	Yes	The 7-South settling pond water is mostly directed to 7-S Sump via pumping. Refer to the Annual Report Section (6.3). Details of the contingency measures are documented in the Environmental Procedures Manual (EPM).
Section 2.4.9	Toxicity Failure Monitoring and Reporting Procedures	Yes	There have been no toxicity failures in the past. Toxicity samples were collected during the fall flush but were not collected during the spring due to low flow conditions and limited discharge. See Appendix III.
Section 3.2	Environmental Procedures Manual (EPM)	Yes	The EPM was submitted on March 31, 2017 to the MOE compliance review website.
Section 3.3	Acid Generation Control	Yes	N/A
Section 3.4	Water Quality Objectives	Yes	N/A
Section 3.5	Nutrient Control	Yes	N/A
Section 3.6	Chemical Storage Containment Works	Yes	N/A
Section 3.7	Spill Reporting	Yes	See Annual Report (Appendix VII)

Authorized Person Initial:_____ Date:_____

CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
Section 3.8	Additional Works	Yes	There is an authorization to bypass the works for the Long Lake Seep Passive Treatment System granted in August 2016.
Section 3.9 (3.9.1-3.9.2)	Maintenance of Works, Non-Compliances and Emergency Procedures	Yes	Refer to Annual Report, Appendix I (Table 2) and Appendix VII & EPM.
Section 3.10	Bypasses	Yes	There is an authorization to bypass the works for the Long Lake Seep Passive Treatment System granted in August 2016.
Section 4.1.1	Effluent and In-Mine Release		
Section 4.1.1	North Coal Mining and Coal Preparation Plant Operation	Yes	
Section 4.1.1 i)	Decant WD (EMS # E207409) Missed 4/308 TSS samples. Composites were missed due to an equipment jam which occurred during days where the permittee was not on site. Maintenance was performed on this unit. Samples were not collected when the permittee was off-site and a miscommunication between residing staff and environmental personal resulted in missed samples. Please refer to corresponding noncompliance reports Flow meter malfunctioned erasing continuous flow data. The instrument reset itself to factory settings during download. Field observations & spot measurements were recorded from the flow meter during Q3. Missing continuous discharge data for (29/365) days required.	No	New flow meter was purchased & non-compliance reports were submitted. Refer to Appendix VII in the Annual Report.
Section 4.1.1 ii)	Culvert, at Middle Quinsam Lake Road - WC (EMS # E207411)	Yes	N/A
Section 4.1.1 iii)	2-North Portal Sump Effluent - 2N-P-Sump (EMS # E283433).	Yes	N/A
Section 4.1.1 iv)	Additional Sites Monitoring Schedule : 2-North Pit Sump CCR Cover (WP) EMS # E207412, South Dyke Sump (SDS) EMS # E292126	No	Missed a monthly sampling event due to dangerous conditions (ice). TSS was missed for 1/12 sampling events due to sampler error while filling out chain of custody.
Section 4.1.2	South Coal Mining Operation		
Section 4.1.2 (i)	Decant - SPD (EMS # E218582)	No	Missing 2/138 required daily TSS grab samples. 1 due to miscommunication between residing staff and environmental personal while permittee was off-site. 1 sample was collected but spilled in transit to the lab.
Section 4.1.2 (ii)	Culvert, Downstream End of Access Road - SPC (EMS # E217014)	Yes	N/A
Section 4.1.2 (iii)	South Pit Main Sump Water- 3S (EMS # E217015)	Yes	N/A
Section 4.1.2 (iv)	Additional Monitoring Sites Schedule: 2-South Pit In Pit Water Cover (2S) EMS # E292127, 1977 Bulk Pit Sample (3S77) EMS # E292128, Culvert Downstream of the 4 South Access Road (4S-Lo) EMS # E292129	Yes	N/A
Section 4.3	Block 242 Coal Mining Operation	Yes	NA - Area is non-operational and reclamation is ongoing.
Section 4.1.4	7 South Mining Operation		
Section 4.1.4 (i)	Decant - 7SSD (EMS # E292069) Spring freshet rainbow trout bioassay was not collected due to no discharge occurring in spring. Missed 3/21 required daily composite TSS samples due to equipment malfunction and leak from discharge piping. TSS exceedances occurred on two days during extreme storm events.	No	A higher capacity pump was installed to more effectively route surface water to underground workings. TSS composite sampler was replaced with a new unit and discharge piping was repaired.
Section 4.1.4 (ii)	7-South Adit Sump EMS # E292110	Yes	NA - This pond is never pumped to 7S Settling Pond.
Section 4.2	Receiving Environment Monitoring Sites and Monitoring Requirements		
Section 4.2.1 (i)	Initial Dilution Zone Monitoring Sites - Long Lake Entrance- LLE (EMS # E292130)	Yes	N/A
Section 4.2.1 (ii)	Road Crossing bridge on Stream I above the Lower Wetland -7S (EMS # E292109)	Yes	N/A
Section 4.2.2	Seep Monitoring Sites		N/A
Section 4.2.2 (i)	Long Lake Seep- LLS (EMS # E292131)	Yes	N/A
Section 4.2.3	Receiving Water (Stream and Lakes) Monitoring Sites. **7-South Mining Operation (Areas 1 to 4):** Quinsam River downstream of 7 South Mining Operation (7SQR) (EMS # E292113), **7-South Area 5 Mining Operation:** Stream- Iron River upstream of mining operations (IR1) (EMS #E297230), Iron River upstream of 7SA5 (IR6) (EMS # E297231), Iron River downstream of 7SA5 and 242 inputs (IR8) (EMS # E297232), Quinsam River downstream of confluence with Iron River (IRQR) (EMS # E299256).	Yes	Missing (1/12) required monthly samples. Snow and ice made it dangerous for sample collection and access during February.
Section 4.2.4	Sediment and Benthic Monitoring Sites	Yes	Refer to Annual Report Appendix VI.
Section 4.2.4 (i)	7-South Area 5 sediment proposal		Mining in this section has been suspended as the mine is currently is in reclamation.
Section 4.2.5	Stream Monitoring Requirements		
Section 4.2.5 (i)	General Requirements Applicable to All Sites Defined Under Section 4.2.3	Yes & No	All samples were obtained in accordance to the permit. Refer to exceedance tables and subsequent text for detailed information.
Section 4.2.6	Lake Monitoring Requirements		
Section 4.2.6 (i)	General Requirements Applicable to All Sites Defined Under Section 4.2.3	Yes & No	All samples were obtained in accordance to the permit. Refer to exceedance tables and subsequent text for detailed information.
Section 4.2.7	Sediment Benthic Monitoring Requirements		
Section 4.2.7 (i)	General Requirements Applicable to All Sites Defined Under Section 4.2.4	Yes	Refer to Annual Report Appendix VI
Section 4.3	Additional Monitoring Requirements		
Section 4.3.1	Composite sampling	Yes & No	Equipment is established and routinely inspected. Refer to Non-compliance list for information on missed samples. Appendix I, Table 2.
Section 4.3.2	Continuous Flow Recording	Yes & No	There was equipment failure at WD and & 7SSD for a short period. At WD a new device was purchased and installed. At 7SSD the frozen cracked pipe was replaced.
Section 4.3.3	Iron River Flow Monitoring	Yes	N/A
Section 4.3.4	pH and Conductivity Monitoring	Yes & No	Some samples have been missed due to unsafe working conditions, as stated above.
Section 4.3.5	Monitoring of Seeps	Yes	N/A
Section 4.3.6	Groundwater Observation Wells	Yes	Groundwater results and discussion is integrated into the Annual Report. Please see Appendix IX.
Section 4.3.7	Monitoring of Drainage Ditches and Water Channels	Yes	Operations are checked daily by the environmental technician and shift bosses.
Section 4.3.8	Precipitation Monitoring	Yes	N/A
Section 4.3.9	Block 242 Monitoring	Yes	N/A
Section 4.4	Monitoring Procedures	Yes	
Section 4.4.1	Sampling and Analytical Procedures	Yes	N/A
Section 4.5	Reporting	Yes	N/A
Section 4.5.1	7 South Area 5 Reporting		Mining in this section has been suspended as the mine has been in care and maintenance.

Authorized Person Initial:_____ Date:_____

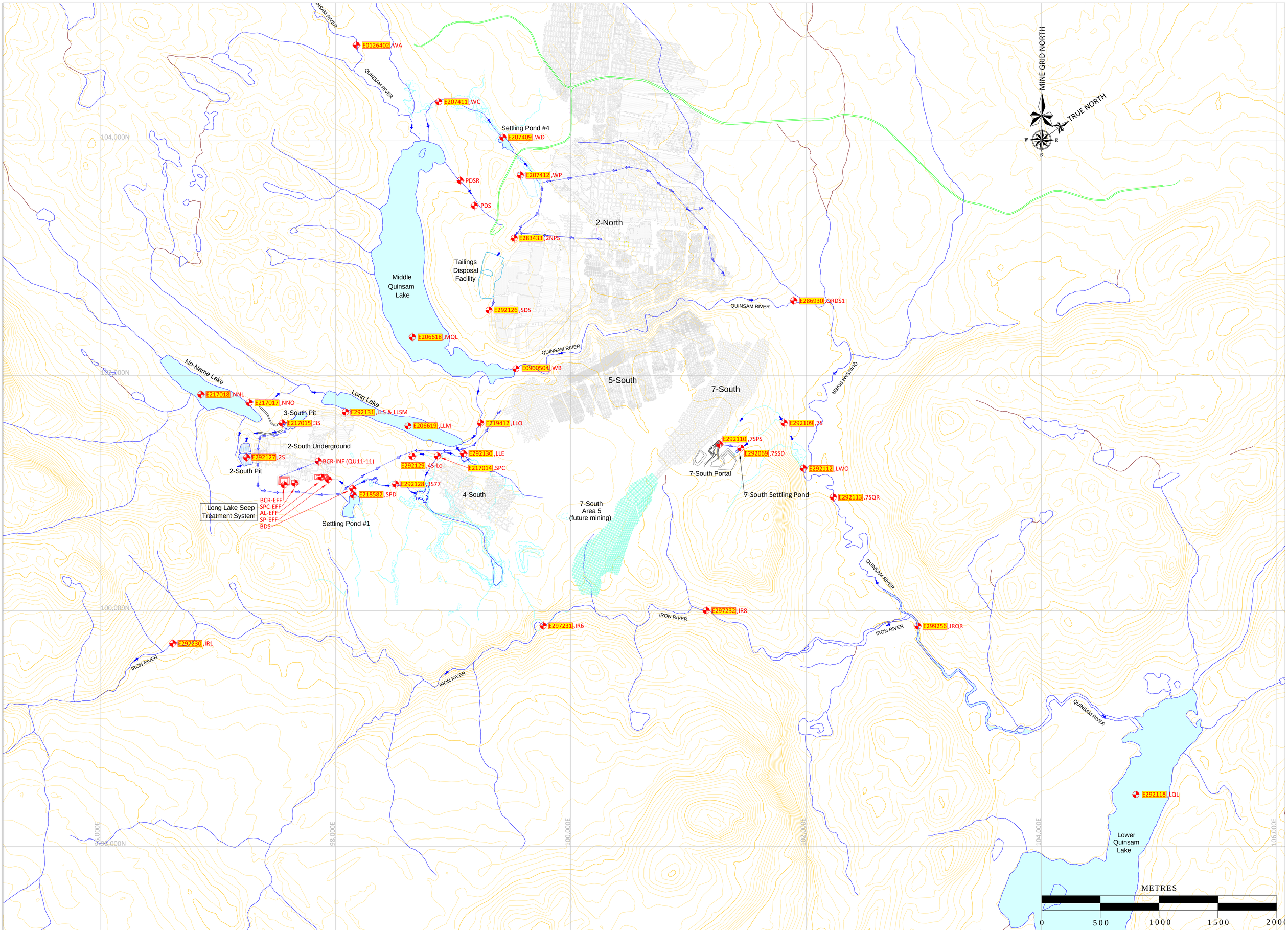
APPENDIX XI

Appendix XI

Site Plan - Surface Water Sampling Locations

List of Figures:

Figure 1	Sediment & Benthic Sampling Locations
Figure 2	Gooseneck Lake (Arsenic, Iron, Manganese & Total PAH)
Figure 3	No Name Lake - Arsenic
Figure 4	No Name Lake - Iron
Figure 5	No Name Lake - Manganese
Figure 6	No Name Lake -Total PAH
Figure 7	Long Lake - Arsenic
Figure 8	Long Lake - Iron
Figure 9	Long Lake - Manganese
Figure 10	Long Lake -Total PAH
Figure 11	Middle Quinsam Lake - Arsenic
Figure 12	Middle Quinsam Lake - Iron
Figure 13	Middle Quinsam Lake - Manganese
Figure 14	Middle Quinsam Lake - Total PAH
Figure 15	Lower Quinsam Lake - Arsenic
Figure 16	Lower Quinsam Lake - Iron
Figure 17	Lower Quinsam Lake - Manganese
Figure 18	Lower Quinsam Lake - Total PAH



EMS ID #, Station Code

Surface Water Flow

Pumped Water Flow

QUINSAM COAL

2017 Annual Water Quality Report
Site Plan - Surface Water

Scale: 1:10,000	Site Plan - Surface Water

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Gooseneck Lake

1132502
GNL = Gooseneck Lake

MINE GRID NORTH
TRUE NORTH

0126402 WA = Quinsam River at Argonaut Road
(CABIN Protocol)

Settling Pond #4

E292116 Middle Quinsam Lake Near Seep

E206901 Middle Quinsam Lake Inlet

2-North

Tailings Disposal Facility

Middle Quinsam Lake

E286930 QRDS1 = Quinsam River Upstream of 7-South
(CABIN Protocol)

E224246 No-Name Lake Inlet

E292115 Middle Quinsam Lake Deep

0900504 Middle Quinsam Lake Outlet

E217018 No-Name Lake Deep

E292114 No-Name Lake Near Seep

E292121 Long Lake Inlet

E217017 No-Name Lake Outlet

E292123 Long Lake Near Seep

E292122 Long Lake Deep

E219412 Long Lake Outlet

5-South

7-South

No-Name Lake

3-South Pit

Long Lake

2-South Pit

2-South Underground

Long Lake Seep Treatment System

4-South

Settling Pond #1

7-South Area 5 (future mining)

7-South Portal

7-South Settling Pond

E292124 Lower Wetland Inlet

E292125 Lower Wetland Middle

E292112 Lower Wetland Outlet

E292113 7SQR = Quinsam River Downstream of 7-South
(CABIN Protocol)

E292117 Lower Quinsam Lake Inlet

E29118 Lower Quinsam Lake Deep 1

Lower Quinsam Lake

E292119 Lower Quinsam Lake Deep 2

E292120 Lower Quinsam Lake Outlet

QUINSAM RIVER

IRON RIVER

METRES
0 1000 2000

EMS # Site Name

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
Sampling Site Locations

Scale: 1:20,000	FIGURE: 1

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Gooseneck Lake

Goose Neck Lake - Middle

G-1

G-2

Goose Neck Lake Middle 1 - (mg/kg)				
		Min.	Max.	Average
Quinsam 2016	As	17.6	25	21.4
Golder 2010 (G-1)				11.1
Quinsam 2016	Fe	29,500	41,400	36,540
Golder 2010 (G-1)				29,900
Quinsam 2016	Mn	781	1,200	987
Golder 2010 (G-1)				686
Quinsam 2016	PAH's	0.23	0.31	0.27
Golder 2010 (G-1)				

Goose Neck Lake Middle 1 - (mg/kg)				
		Min.	Max.	Average
Quinsam 2016	As			
Golder 2010 (G-2)				72.5
Quinsam 2016	Fe			
Golder 2010 (G-2)				74,500
Quinsam 2016	Mn			
Golder 2010 (G-2)				1,870
Quinsam 2016	PAH's			
Golder 2010 (G-2)				

Quinsam 2016

Golder 2010

mg/kg	Arsenic	Iron	Manganese	Total PAH's
ISQG	5.9	21,200	460	4
PEL	17	43,766	1,100	35

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
Goose Neck Lake - Sediment Chemistry

Scale: 1:5000 | **FIGURE: 2**

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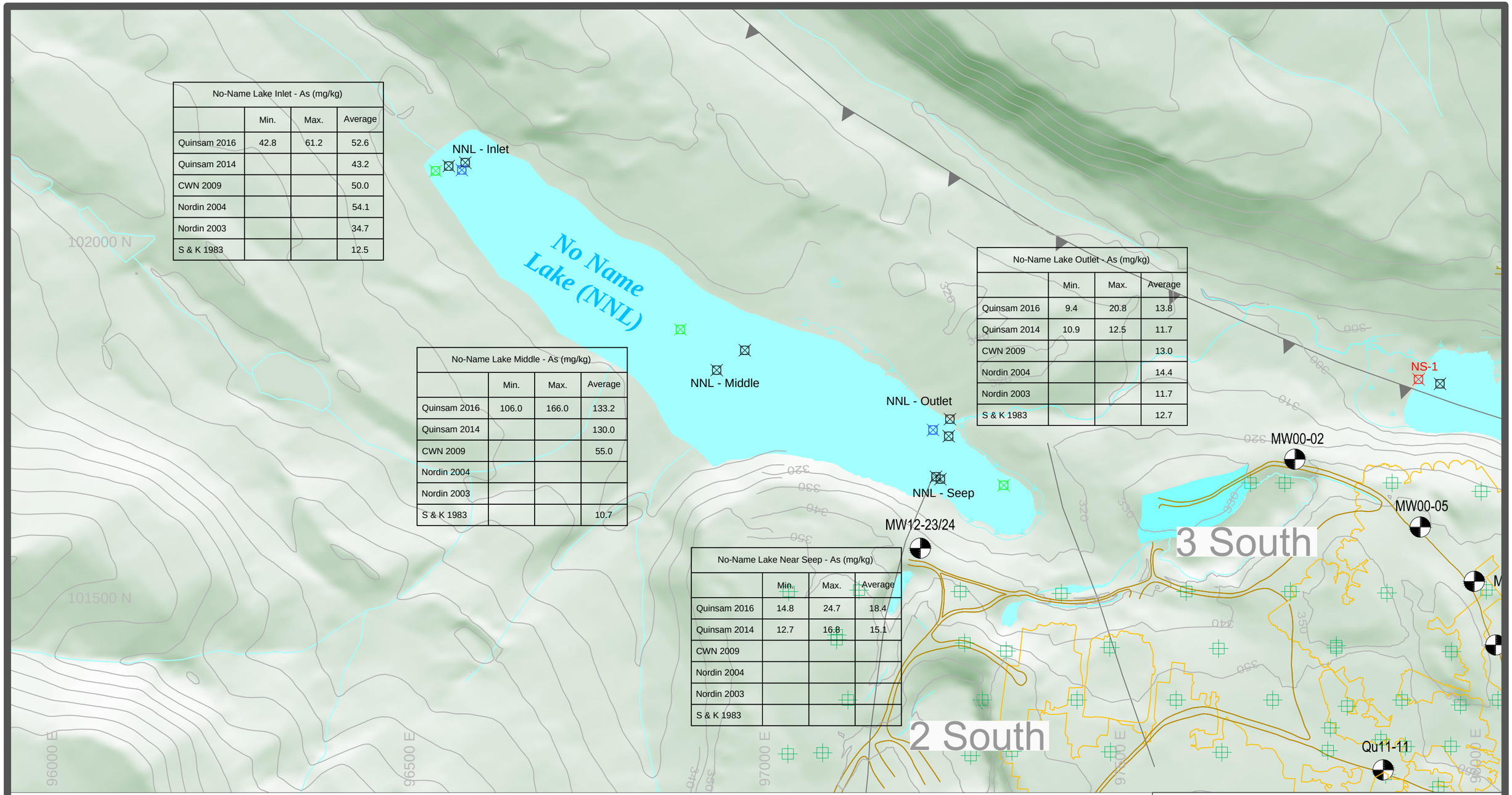
No-Name Lake Inlet - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	42.8	61.2	52.6
Quinsam 2014			43.2
CWN 2009			50.0
Nordin 2004			54.1
Nordin 2003			34.7
S & K 1983			12.5

No-Name Lake Middle - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	106.0	166.0	133.2
Quinsam 2014			130.0
CWN 2009			55.0
Nordin 2004			
Nordin 2003			
S & K 1983			10.7

No-Name Lake Near Seep - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	14.8	24.7	18.4
Quinsam 2014	12.7	16.8	15.1
CWN 2009			
Nordin 2004			
Nordin 2003			
S & K 1983			

No-Name Lake Outlet - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	9.4	20.8	13.8
Quinsam 2014	10.9	12.5	11.7
CWN 2009			13.0
Nordin 2004			14.4
Nordin 2003			11.7
S & K 1983			12.7



- Quinsam 2014 and 2016
- Canadian Water Network 2009
- Nordin 2003 and 2004

Arsenic:
ISQG = 5.9 mg/kg
PEL = 17.0 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
No Name Lake - Sediment Arsenic

Scale: 1:5000	FIGURE: 3

C:\Environment - Reclamation\2016 Sediment and Benthic Program\2016 Sediment Study_

No-Name Lake Inlet - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	54,300	80,500	67,420
Quinsam 2014			48,900
CWN 2009			39,000
Nordin 2004			29,100
Nordin 2003			50,800
S & K 1983			29,620

No-Name Lake Middle - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	125,000	218,000	173,000
Qinsam 2014			168,000
CWN 2009			80,000
Nordin 2004			
Nordin 2003			
S & K 1983			41,270

No-Name Lake Outlet - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	14,600	32,900	22,040
Quinsam 2014			19,600
CWN 2009			12,000
Nordin 2004			32,600
Nordin 2003			18,300
S & K 1983			36,210

No-Name Lake Near Seep - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	41,200	52,600	45,120
Quinsam 2014	41,200	50,200	45,870
CWN 2009			
Nordin 2004			
Nordin 2003			
S & K 1983			

- Quinsam 2014 and 2016
- Canadian Water Network 2009
- Nordin 2003 and 2004

Iron:
ISQG = 21,200 mg/kg
PEL = 43,766 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
No Name Lake - Sediment Iron (Fe)

Scale: 1:5000	FIGURE: 4

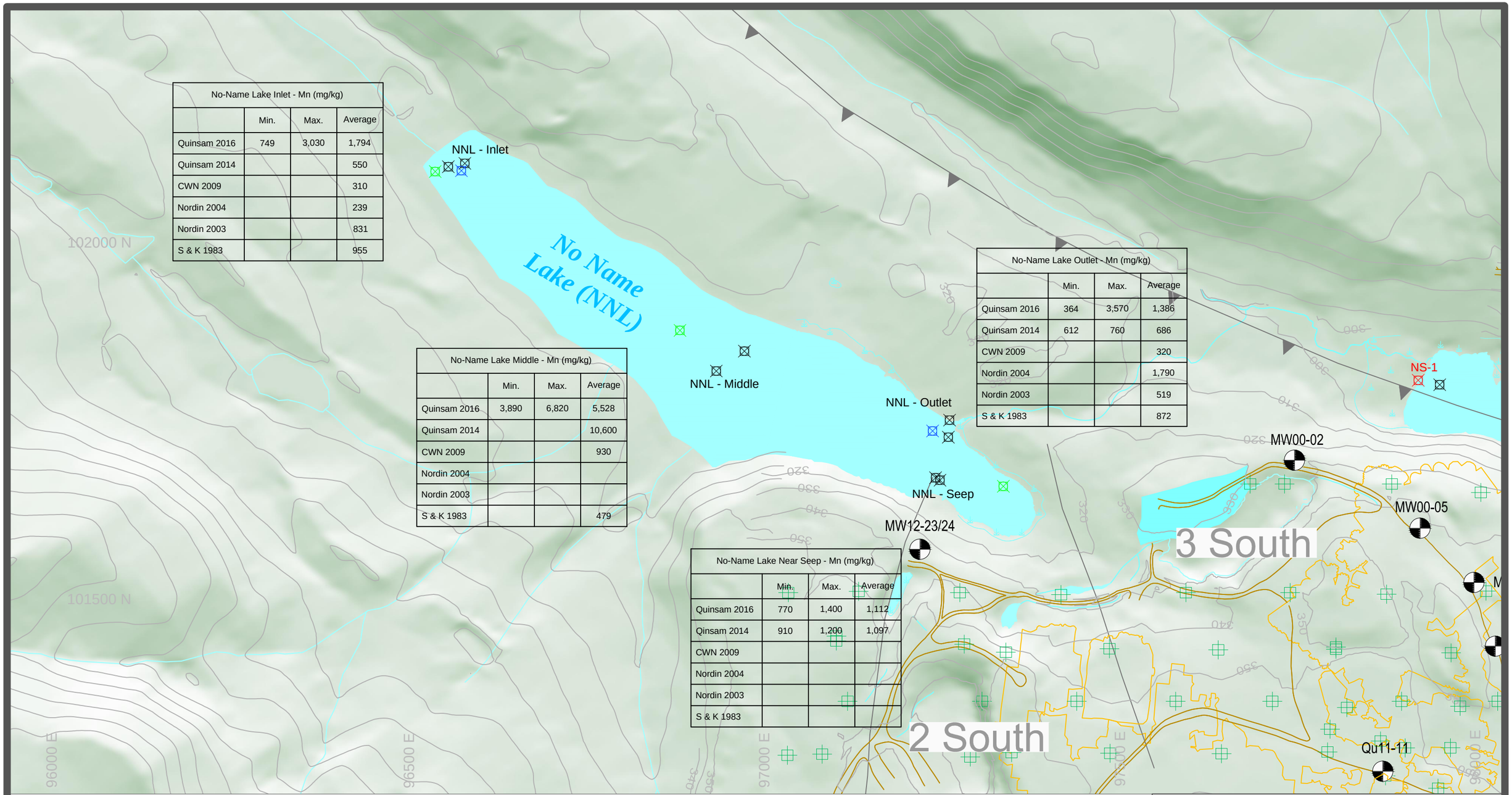
C:\Environment - Reclamation\2016 Sediment and Benthic Program\2016 Sediment Study_o

No-Name Lake Inlet - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	749	3,030	1,794
Quinsam 2014			550
CWN 2009			310
Nordin 2004			239
Nordin 2003			831
S & K 1983			955

No-Name Lake Middle - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	3,890	6,820	5,528
Quinsam 2014			10,600
CWN 2009			930
Nordin 2004			
Nordin 2003			
S & K 1983			479

No-Name Lake Near Seep - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	770	1,400	1,112
Qinsam 2014	910	1,200	1,097
CWN 2009			
Nordin 2004			
Nordin 2003			
S & K 1983			

No-Name Lake Outlet - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	364	3,570	1,386
Quinsam 2014	612	760	686
CWN 2009			320
Nordin 2004			1,790
Nordin 2003			519
S & K 1983			872



- Quinsam 2014 and 2016
- Canadian Water Network 2009
- Nordin 2003 and 2004

Manganese:
ISQG = 460 mg/kg
PEL = 1,100 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
No Name Lake - Sediment Manganese (Mn)

Scale: 1:5000	FIGURE: 5

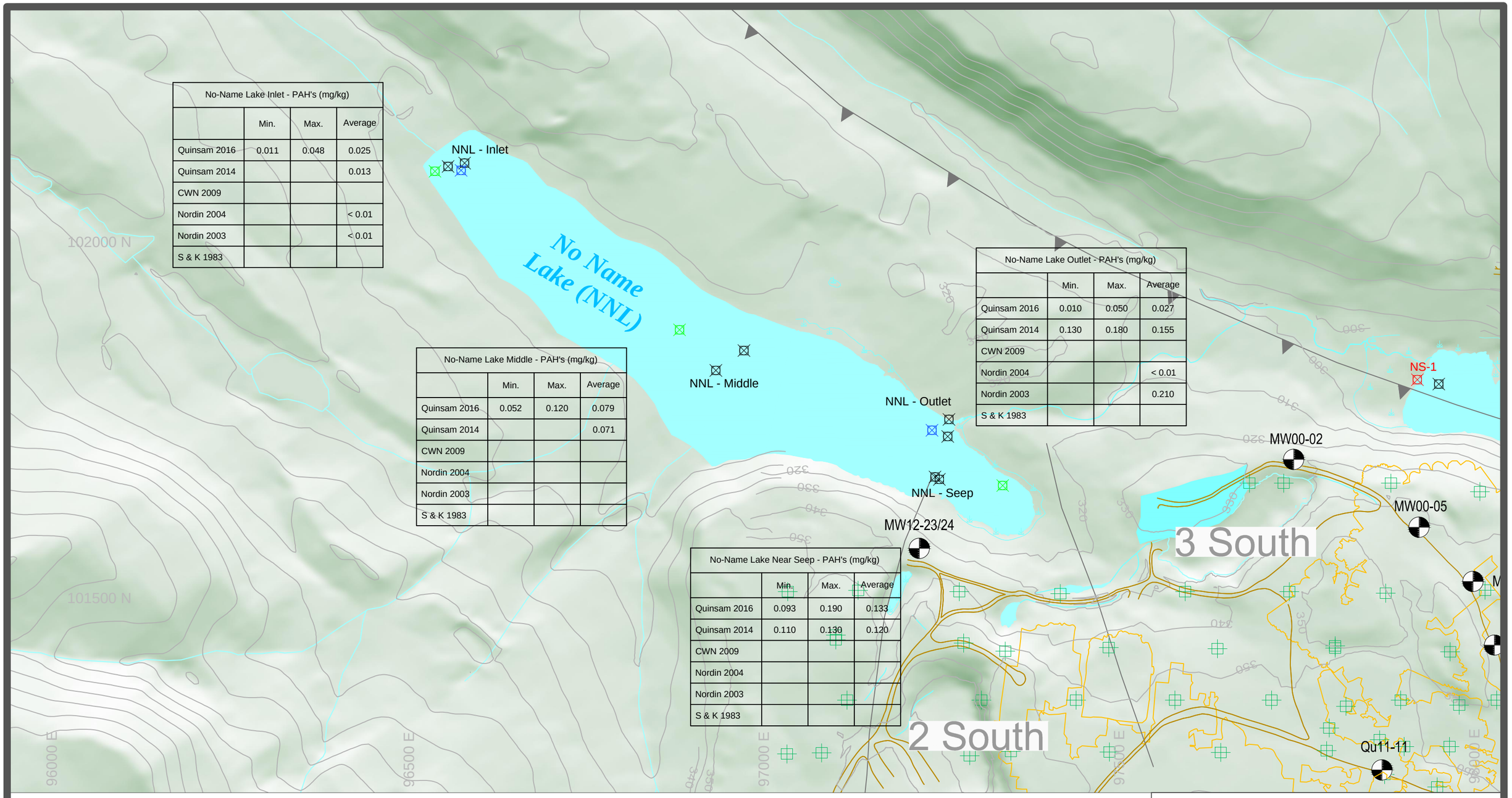
C:\Environment - Reclamation\2016 Sediment and Benthic Program\2016 Sediment Study_p

No-Name Lake Inlet - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	0.011	0.048	0.025
Quinsam 2014			0.013
CWN 2009			
Nordin 2004			< 0.01
Nordin 2003			< 0.01
S & K 1983			

No-Name Lake Middle - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	0.052	0.120	0.079
Quinsam 2014			0.071
CWN 2009			
Nordin 2004			
Nordin 2003			
S & K 1983			

No-Name Lake Outlet - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	0.010	0.050	0.027
Quinsam 2014	0.130	0.180	0.155
CWN 2009			
Nordin 2004			< 0.01
Nordin 2003			0.210
S & K 1983			

No-Name Lake Near Seep - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	0.093	0.190	0.133
Quinsam 2014	0.110	0.130	0.120
CWN 2009			
Nordin 2004			
Nordin 2003			
S & K 1983			



- Quinsam 2014 and 2016
- Canadian Water Network 2009
- Nordin 2003 and 2004

Total PAH's:
ISQG = 4 mg/kg
PEL = 35 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
No Name Lake - Sediment Total PAH's

Scale: 1:5000	FIGURE: 6

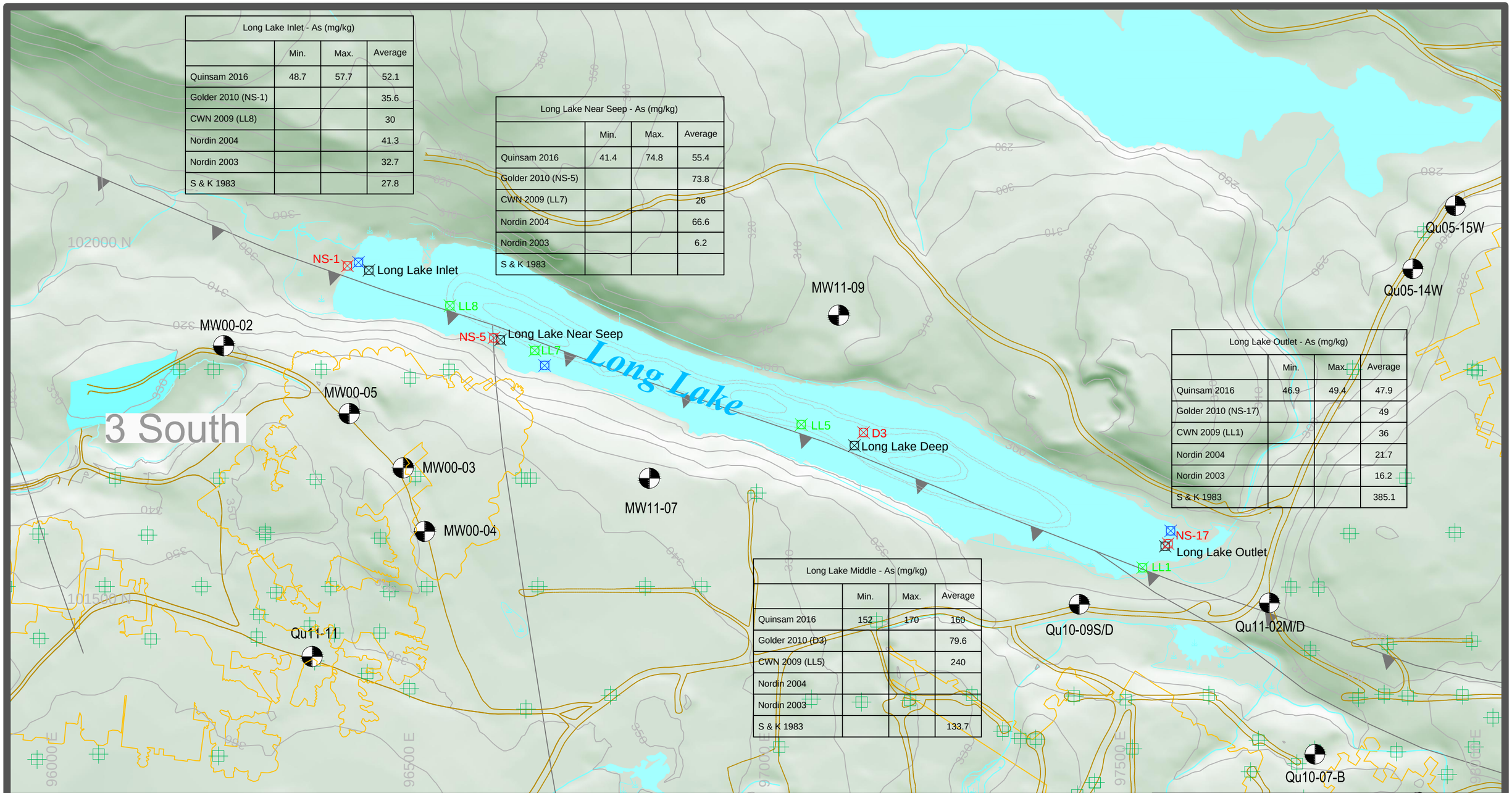
C:\Environment - Reclamation\2016 Sediment and Benthic Program\2016 Sediment Study_...

Long Lake Inlet - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	48.7	57.7	52.1
Golder 2010 (NS-1)			35.6
CWN 2009 (LL8)			30
Nordin 2004			41.3
Nordin 2003			32.7
S & K 1983			27.8

Long Lake Near Seep - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	41.4	74.8	55.4
Golder 2010 (NS-5)			73.8
CWN 2009 (LL7)			26
Nordin 2004			66.6
Nordin 2003			6.2
S & K 1983			

Long Lake Outlet - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	46.9	49.4	47.9
Golder 2010 (NS-17)			49
CWN 2009 (LL1)			36
Nordin 2004			21.7
Nordin 2003			16.2
S & K 1983			385.1

Long Lake Middle - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	152	170	160
Golder 2010 (D3)			79.6
CWN 2009 (LL5)			240
Nordin 2004			
Nordin 2003			
S & K 1983			133.7



- Quinsam 2016
- Golder 2010
- Canadian Water Network 2009
- Nordin 2003 and 2004

Arsenic:
ISQG = 5.9 mg/kg
PEL = 17.0 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
Long Lake - Sediment Arsenic

Scale: 1:5000	FIGURE: 7

C:\Environment - Reclamation\2016 Sediment and Benthic Program\2016 Sediment Study_

Long Lake Inlet - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	40,200	51,900	45,167
Golder 2010 (NS-1)			37,000
CWN 2009 (LL8)			30,000
Nordin 2004			39,000
Nordin 2003			29,300
S & K 1983			35,130

Long Lake Near Seep - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	51,000	62,000	55,550
Golder 2010 (NS-5)			60,400
CWN 2009 (LL7)			39,000
Nordin 2004			75,700
Nordin 2003			15,900
S & K 1983			

Long Lake Outlet - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	51,300	55,900	53,133
Golder 2010 (NS-17)			48,600
CWN 2009 (LL1)			31,000
Nordin 2004			32,500
Nordin 2003			22,500
S & K 1983			146,700

Long Lake Middle - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	104,000	119,000	112,000
Golder 2010 (D3)			75,700
CWN 2009 (LL5)			140,000
Nordin 2004			
Nordin 2003			
S & K 1983			100,130

102000 N

101500 N

96000 E

96500 E

97000 E

97500 E

NS-1

Long Lake Inlet

LL8

NS-5

Long Lake Near Seep

LL7

Long Lake

LL5

D3

Long Lake Deep

NS-17

Long Lake Outlet

LL1

MW00-02

MW00-05

MW00-03

MW00-04

MW11-09

MW11-07

Qu05-15W

Qu05-14W

Qu11-11

Qu10-09S/D

Qu11-02M/D

Qu10-07-B

3 South

- Quinsam 2016
- Golder 2010
- Canadian Water Network 2009
- Nordin 2003 and 2004

Iron:
ISQG = 21,200 mg/kg
PEL = 43,766 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
Long Lake - Sediment Iron

Scale: 1:5000 | **FIGURE: 8**

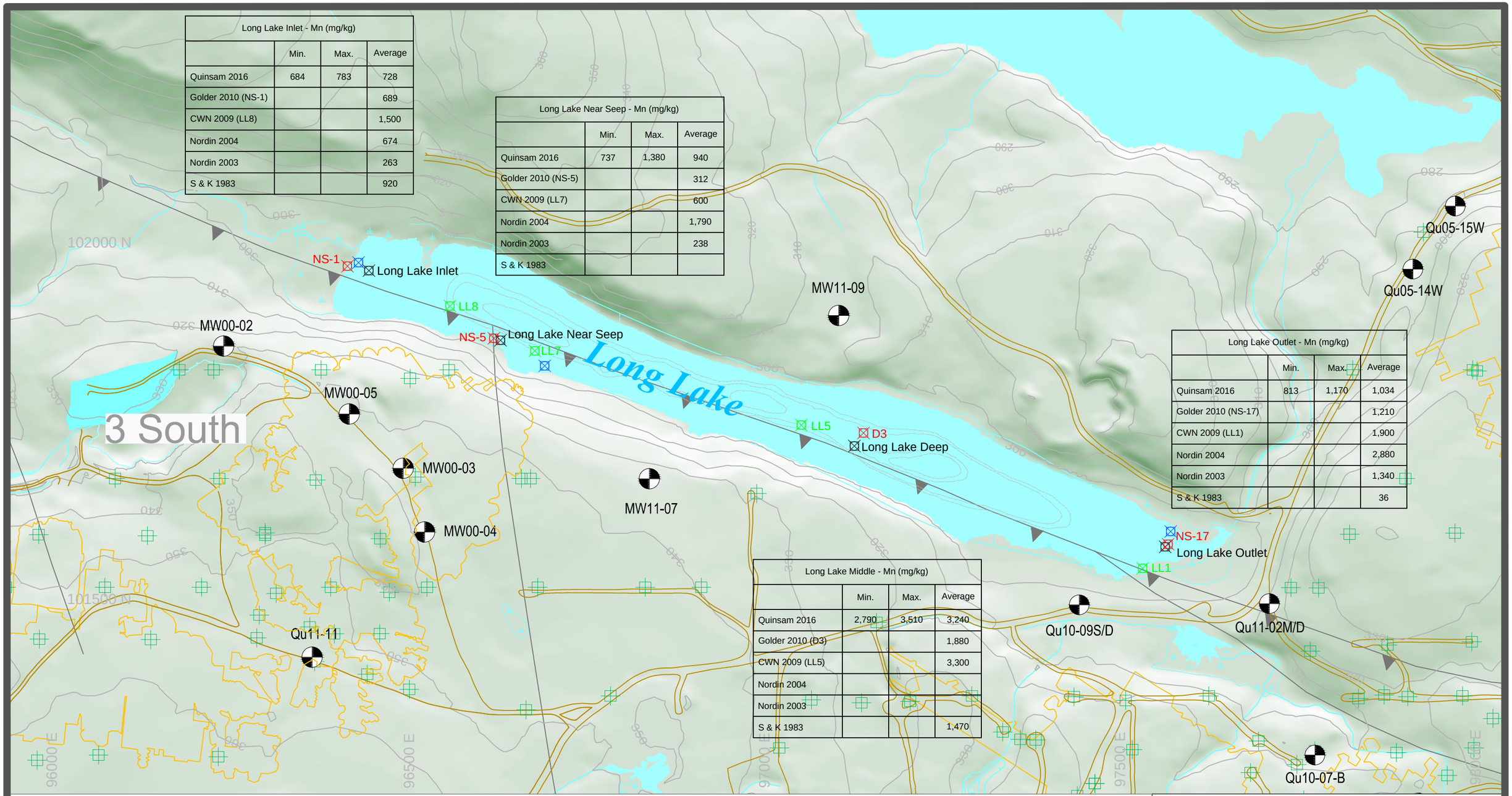
C:\Environment - Reclamation\2016 Sediment and Benthic Program\2016 Sediment Study_...

Long Lake Inlet - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	684	783	728
Golder 2010 (NS-1)			689
CWN 2009 (LL8)			1,500
Nordin 2004			674
Nordin 2003			263
S & K 1983			920

Long Lake Near Seep - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	737	1,380	940
Golder 2010 (NS-5)			312
CWN 2009 (LL7)			600
Nordin 2004			1,790
Nordin 2003			238
S & K 1983			

Long Lake Outlet - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	813	1,170	1,034
Golder 2010 (NS-17)			1,210
CWN 2009 (LL1)			1,900
Nordin 2004			2,880
Nordin 2003			1,340
S & K 1983			36

Long Lake Middle - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	2,790	3,510	3,240
Golder 2010 (D3)			1,880
CWN 2009 (LL5)			3,300
Nordin 2004			
Nordin 2003			
S & K 1983			1,470



- Quinsam 2016
- Golder 2010
- Canadian Water Network 2009
- Nordin 2003 and 2004

Manganese:
ISQG = 460 mg/kg
PEL = 1,100 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
Long Lake - Sediment Manganese

Scale: 1:5000	FIGURE: 9

C:\Environment - Reclamation\2016 Sediment and Benthic Program\2016 Sediment Study_

Long Lake Inlet - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	0.17	0.24	0.22
Golder 2010 (NS-1)			0.19
CWN 2009 (LL8)			
Nordin 2004			0.28
Nordin 2003			0.22
S & K 1983			

Long Lake Near Seep - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	0.78	1	0.9
Golder 2010 (NS-5)			2.75
CWN 2009 (LL7)			
Nordin 2004			1.1
Nordin 2003			0.09
S & K 1983			

Long Lake Outlet - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	1.3	3.6	2.18
Golder 2010 (NS-17)			2.1
CWN 2009 (LL1)			
Nordin 2004			1.2
Nordin 2003			0.99
S & K 1983			

Long Lake Middle - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	2.5	1.8	2.67
Golder 2010 (D3)			1.03
CWN 2009 (LL5)			
Nordin 2004			
Nordin 2003			
S & K 1983			

102000 N

101500 N

96000 E

96500 E

97000 E

97500 E

NS-1

Long Lake Inlet

LL8

NS-5

Long Lake Near Seep

LL7

Long Lake

LL5

D3

Long Lake Deep

NS-17

Long Lake Outlet

LL1

MW00-02

MW00-05

MW00-03

MW00-04

MW11-07

MW11-09

Qu11-11

Qu10-09S/D

Qu11-02M/D

Qu10-07-B

Qu05-15W

Qu05-14W

3 South

- Quinsam 2016
- Golder 2010
- Canadian Water Network 2009
- Nordin 2003 and 2004

Total PAH's
ISQG = 4 mg/kg
PEL = 35 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
Long Lake - Sediment Total PAH's

Scale: 1:5000	FIGURE: 10

C:\Environment - Reclamation\2016 Sediment and Benthic Program\2016 Sediment Study_

Middle Quinsam Lake Inlet - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	7.83	8.29	8.07
CWN 2009 (ML10)			6.8
Nordin 2004			10.2
Nordin 2003			9.5
S & K 1983			10.5

Middle Quinsam Lake Near Seep - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	6.88	12.1	9.38
CWN 2009			
Nordin 2004			
Nordin 2003			
S & K 1983			

Middle Quinsam Lake Middle - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	11.8	13.7	12.8
CWN 2009 (ML8)			6.5
Nordin 2004			
Nordin 2003			
Rieberger 1992			21
S & K 1983			8.6

Middle Quinsam Lake Outlet - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	8.02	17.7	11.7
CWN 2009 (ML1)			9.9
Nordin 2004			8.8
Nordin 2003			9.9
S & K 1983			16.3

MQL Inlet
MQL Near Seep
MW00-1S/D
MW00-6S/D
ML10
Middle Quinsam Lake
ML8
MQL Deep
ML1
MQL Outlet
Qu81-P1-1
Qu81-P1-3
MW12-19
MW12-20
Qu05-15W
Qu78-143
Qu06-1W
Qu05-14W
Long Lake Inlet
LL8
NS-5
Long Lake Near Seep
LL7
Long Lake
LL5
D3
MW11-09
MW00-05
MW00-03
MW00-04
MW11-07
102000 N
101500 N
96000 E
96500 E
97000 E
97500 E
98000 E
5 South

- Quinsam 2016
- Golder 2010
- Canadian Water Network 2009
- Nordin 2003 and 2004

Arsenic:
ISQG = 5.9 mg/kg
PEL = 17.0 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
Middle Quinsam Lake - Sediment Arsenic

Scale: 1:7500	FIGURE: 11

C:\Environment - Reclamation\2016 Sediment and Benthic Program\2016 Sediment Study_

Middle Quinsam Lake Inlet - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	30,100	31,700	30,767
CWN 2009 (ML10)			24,000
Nordin 2004			36,000
Nordin 2003			33,500
S & K 1983			31,370

Middle Quinsam Lake Near Seep - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	32,700	48,200	43,840
CWN 2009			
Nordin 2004			
Nordin 2003			
S & K 1983			

Middle Quinsam Lake Middle - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	32,800	40,700	36,400
CWN 2009 (ML8)			19,000
Nordin 2004			
Nordin 2003			
Rieberger 1992			34,600
S & K 1983			28,500

Middle Quinsam Lake Outlet - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	20,000	29,700	28,100
CWN 2009 (ML1)			21,000
Nordin 2004			30,200
Nordin 2003			27,600
S & K 1983			28,000

MQL Inlet
MQL Near Seep
ML10
ML8
MQL Deep
ML1
MQL Outlet
Middle Quinsam Lake
Long Lake
Long Lake Inlet
Long Lake Near Seep
LL8
LL7
LL5
NS-5
D3
MW00-1S/D
MW00-6S/D
MW00-05
MW00-03
MW00-04
MW11-07
MW11-09
Qu81-P1-1
Qu81-P1-3
MW12-19
MW12-20
Qu05-15W
Qu05-14W
Qu78-143
Qu06-1W
5 South
102000 N
101500 N
96000 E
96500 E
97000 E
97500 E
98000 E

- Quinsam 2016
- Golder 2010
- Canadian Water Network 2009
- Nordin 2003 and 2004

Iron:
ISQG = 21,200 mg/kg
PEL = 43,766 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
Middle Quinsam Lake - Sediment Iron

Scale: 1:7500	FIGURE: 12

C:\Environment - Reclamation\2016 Sediment and Benthic Program\2016 Sediment Study_

Middle Quinsam Lake Inlet - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	631	730	696
CWN 2009 (ML10)			510
Nordin 2004			669
Nordin 2003			602
S & K 1983			589

Middle Quinsam Lake Near Seep - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	357	399	379
CWN 2009			
Nordin 2004			
Nordin 2003			
S & K 1983			

Middle Quinsam Lake Middle - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	330	386	354
CWN 2009 (ML8)			300
Nordin 2004			
Nordin 2003			
Rieberger 1992			409
S & K 1983			559

Middle Quinsam Lake Outlet - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	472	953	780
CWN 2009 (ML1)			1,700
Nordin 2004			1,500
Nordin 2003			1,130
S & K 1983			594

MQL Inlet
MQL Near Seep
MW00-1S/D
MW00-6S/D
ML10
Middle Quinsam Lake
ML8
MQL Deep
ML1
MQL Outlet
Qu81-P1-1
Qu81-P1-3
MW12-19
MW12-20
Qu05-15W
Qu78-143
Qu06-1W
Qu05-14W
Long Lake Inlet
LL8
NS-5
Long Lake Near Seep
LL7
Long Lake
LL5
D3
MW11-09
MW00-05
MW00-03
MW00-04
MW11-07
5 South
102000 N
101500 N
96000 E
96500 E
97000 E
97500 E
98000 E

- Quinsam 2016
- Golder 2010
- Canadian Water Network 2009
- Nordin 2003 and 2004

Manganese:
ISQG = 460 mg/kg
PEL = 1,100 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
Middle Quinsam Lake - Sediment Manganese

Scale: 1:7500	FIGURE: 13

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Middle Quinsam Lake Inlet - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	0.1	0.13	0.11
CWN 2009 (ML10)			
Nordin 2004			0.01
Nordin 2003			0.01
S & K 1983			

Middle Quinsam Lake Near Seep - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	0.02	0.02	0.02
CWN 2009 (LL7)			
Nordin 2004			
Nordin 2003			
S & K 1983			

Middle Quinsam Lake Middle - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	0.02	0.16	0.1
CWN 2009 (ML8)			
Nordin 2004			
Nordin 2003			
Rieberger 1992			
S & K 1983			

Middle Quinsam Lake Outlet - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	0.02	0.02	0.02
CWN 2009 (ML1)			
Nordin 2004			0.01
Nordin 2003			0.22
S & K 1983			

MQL Inlet
MQL Near Seep
MW00-1S/D
MW00-6S/D
ML10
Middle Quinsam Lake
ML8
MQL Deep
ML1
MQL Outlet
Qu81-P1-1
Qu81-P1-3
MW12-19
MW12-20
Qu05-15W
Qu78-143
Qu06-1W
Qu05-14W
Long Lake Inlet
LL8
NS-5
Long Lake Near Seep
LL7
Long Lake
MW11-09
LL5
D3
MW00-05
MW00-03
MW00-04
MW11-07
102000 N
101500 N
96000 E
96500 E
97000 E
97500 E
98000 E
5 South

- Quinsam 2016
- Golder 2010
- Canadian Water Network 2009
- Nordin 2003 and 2004

Total PAH's:
ISQG = 4 mg/kg
PEL = 35 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
Middle Quinsam Lake - Sediment Total PAH's

Scale: 1:7500	FIGURE: 14

C:\Environment - Reclamation\2016 Sediment and Benthic Program\2016 Sediment Study_fi

QUINSAM RIVER

LQL-I

LQL Inlet

Lower Quinsam Lake Inlet - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	31.5	42.1	35.7
Golder 2011 - LQL-I			26.2

Lower Quinsam Lake Deep 1 - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	40.6	43.9	42.2
Golder 2011 - LQL-M1			48.9

LQL Deep 1

LQL-M1

Lower Quinsam Lake

LQL-M2

LQL Deep 2

Lower Quinsam Lake Deep 2 - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	75.3	107.0	92.0
Golder 2011 - LQL-M2			115.0

LQL-O

LQL Outlet

Lower Quinsam Lake Outlet - As (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	39.4	90.0	68.0
Golder 2011 - LQL-O			73.5

Quinsam 2016

Golder 2011

Arsenic:
ISQG = 5.9 mg/kg
PEL = 17.0 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
Lower Quinsam Lake - Sediment Arsenic

Scale: 1:7500 | **FIGURE: 15**

C:\Environment - Reclamation\2016 Sediment and Benthic Program\2016 Sediment Stu

QUINSAM RIVER

LQL-I

LQL Inlet

Lower Quinsam Lake Inlet - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	47,700	59,300	52,160
Golder 2011 - LQL-I			34,600

Lower Quinsam Lake Deep 1 - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	49,700	54,800	52,700
Golder 2011 - LQL-M1			61,200

LQL Deep 1

LQL-M1

Lower Quinsam Lake

LQL-M2

LQL Deep 2

Lower Quinsam Lake Deep 2 - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	55,800	74,100	68,020
Golder 2011 - LQL-M2			82,800

LQL-O

LQL Outlet

Lower Quinsam Lake Outlet - Fe (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	48,900	71,500	64,360
Golder 2011 - LQL-O			75,100

Quinsam 2016

Golder 2011

Iron:
ISQG = 21,200 mg/kg
PEL = 43,966 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
Lower Quinsam Lake - Sediment Iron

Scale: 1:7500 | **FIGURE: 16**

C:\Environment - Reclamation\2016 Sediment and Benthic Program\2016 Sediment Stu

QUINSAM RIVER

LQL-I

LQL Inlet

Lower Quinsam Lake Inlet - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	472	661	529
Golder 2011 - LQL-I			472

Lower Quinsam Lake Deep 1 - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	595	666	639
Golder 2011 - LQL-M1			710

LQL Deep 1

LQL-M1

Lower Quinsam Lake

LQL-M2

LQL Deep 2

Lower Quinsam Lake Deep 2 - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	995	1,750	1,383
Golder 2011 - LQL-M2			1,810

LQL-O

LQL Outlet

Lower Quinsam Lake Outlet - Mn (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	1,730	2,390	2,082
Golder 2011 - LQL-O			2,210

Quinsam 2016

Golder 2011

Manganese:
ISQG = 460 mg/kg
PEL = 1,100 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
Lower Quinsam Lake - Sediment Manganese

Scale: 1:7500 | **FIGURE: 17**

C:\Environment - Reclamation\2016 Sediment and Benthic Program\2016 Sediment Stu

QUINSAM RIVER

LQL-I

LQL Inlet

Lower Quinsam Lake Inlet - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	0.29	0.4	0.35
Golder 2011 - LQL-I			0.33

Lower Quinsam Lake Deep 1 - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	0.36	0.6	0.42
Golder 2011 - LQL-M1			0.71

LQL Deep 1

LQL-M1

Lower Quinsam Lake

LQL-M2

LQL Deep 2

Lower Quinsam Lake Deep 2 - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	0.48	0.51	0.5
Golder 2011 - LQL-M2			0.96

LQL-O

LQL Outlet

Lower Quinsam Lake Outlet - PAH's (mg/kg)			
	Min.	Max.	Average
Quinsam 2016	0.22	0.24	0.23
Golder 2011 - LQL-O			0.54

Quinsam 2016

Golder 2011

Total PAH's:
ISQG = 4 mg/kg
PEL = 35 mg/kg

QUINSAM COAL

2016 Sediment and Biological Monitoring Program
Lower Quinsam Lake - Sediment Total PAH's

Scale: 1:7500 | **FIGURE: 18**

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APPENDIX XII

Long Lake Seep Passive Treatment System & Loading Assessment

Annual Summary 2016/2017

Prepared for:

Ministry of Environment

&

Ministry of Energy and Mines

Prepared by:

QUINSAM COAL

July 2017

Contents

1.0 Summary 4
2.0 Methodology and Limitations 5
3.0 Results 7
3.1 Long Lake Seep Passive Treatment System 7
3.2 BDS Permit Compliance 24
3.3 Loading into Long Lake 26
3.3.1 Sulphate 28
3.3.2 Iron 31
3.3.3 Arsenic 34
4.0 Current and Future Strategies 37

List of Figures

Figure 1: Inflow Pumping Rates 8
Figure 2: pH 9
Figure 3: Oxidation-Reduction Potential 10
Figure 4: Conductivity 11
Figure 5: Dissolved Oxygen 12
Figure 6: Biochemical Oxygen Demand 13
Figure 7: Temperature 14
Figure 8: Dissolved Sulphate 15
Figure 9: Relative Sulphate Removal 16
Figure 10: Relative Sulphate Removal by Month 17
Figure 11: Sulphide 18
Figure 12: BCR Sulphate-Sulphide-Temperature 19
Figure 13: Total and Dissolved Arsenic 20
Figure 14: Total and Dissolved Iron 21
Figure 15: Dissolved Iron and Relative Reduction 22
Figure 16: Total Manganese Concentrations Discharge 23
Figure 17: BDS Chemical Parameters (red) vs. Permit Limits (green) 24
Figure 18: 2-South Mine-pool Elevation vs. Long Lake Seep Flow 25
Figure 19: Quarterly Discharge and Loading into Long Lake 26
Figure 20: Monthly Precipitation and Loading Discharge 28
Figure 21: Average Monthly Dissolved Sulphate Loading by Point Source 29
Figure 22: Monthly Percent Load by Point Source - Dissolved Sulphate 30
Figure 23: Average Monthly Dissolved Sulphate Concentrations by Point Source 30
Figure 24: 5 in 30 Average Dissolved Sulphate - Long Lake 31
Figure 25: Average Monthly Dissolved Iron Loading by Point Source 32
Figure 26: Monthly Percent Load by Point Source - Dissolved Iron 33
Figure 27: Average Monthly Dissolved Iron Concentrations by Point Source 33
Figure 28: Average Monthly Dissolved Arsenic Loading by Point Source 34
Figure 29: Monthly Percent Load by Point Source - Dissolved Arsenic 35
Figure 30: Average Monthly Dissolved Arsenic Concentrations by Point Source 35
Figure 31: 5 in 30 Total Arsenic - Long Lake 36
Figure 32: Carbon Amendment System 38

1.0 Summary

In accordance with Mine Permit condition 3(b) (approving the Long Lake Seep Passive Treatment System) and the Ministry of Environment "Authorization to Bypass the Works", is a report summarizing the operation of the treatment system, monitoring at the downstream site BDS, and aggregate loading into Long Lake from mine-related discharges for the 2016-2017 monitoring year, covering April 1, 2016 through March 31, 2017.

The Long Lake Seep Passive Treatment System (LLST) consists of a series of treatment cells designed to receive mine-water pumped from the 2-South underground workings to reduce Parameters of Interest (POI) concentrations including dissolved sulphate and iron. This system was initiated as part of a remediation plan to limit localized mine-water seepage on the south-side of Long Lake as a result of subsidence caused by mining within close proximity and establishing an evident hydrologic connection. There are numerous seepage sites along this bank and are collectively identified as the "Long Lake Seeps" with two distinct collection sites in which samples are obtained and flows are quantified. Dewatering of the 2-South workings reduces head pressure on the south side of Long Lake and ultimately reduces seepage. The effectiveness and integrity of this system is evaluated by Quinsam Coal staff with physical inspections, monitoring flow rates and scheduled sampling of chemical and physical parameters. Analytical results provide the most effective means of evaluation and take place once per month at 6 sites associated with the treatment system. In addition to monthly monitoring for the entire treatment system, SP-Eff and BDS are monitored on a weekly basis during periods of discharge at SPD for Total Suspended Solids (TSS) and dissolved sulphate. With the addition of molasses into the BCR initiated in May 2016, additional sulphate samples are collected weekly at the inflow and BCR-Eff providing supplementary performance information.

The loading assessment employs a series of calculations to determine the aggregate loading for POI including: dissolved arsenic, dissolved iron, and dissolved sulphate. This data is generated from routine water quality monitoring and flow monitoring at point source discharge locations including: the LLST, the Long Lake Seeps and Settling Pond #1 (SPD). To ensure accurate quantification, flow rates are recorded and water samples are collected at regular intervals to characterize water quality.

This report is designed to inform governing bodies on the effectiveness of the LLST and to support Quinsam Coal's long term mitigation strategy on managing the Long Lake Seeps.

2.0 Methodology and Limitations

Inspections of the LLST are completed multiple times per week to ensure the system is operating as designed. Any unusual observations are noted and maintenance is conducted as needed. Once per month, physical and chemical parameters are measured and analyzed throughout 6 locations including:

- Water pumped into the system from the 2-South mine-pool (inflow or INF)
- In the biochemical reactor (BCR) where sulphate is biochemically reduced to sulphide
- The sulphide polish cell (SPC) in which sulphide is sequestered by sacrificial iron
- The aerobic lagoon (AL) where dissolved oxygen is diffused into the water removing excess nutrients and precipitating metals
- The system settling pond (SP) in which suspended materials settle out
- A location 100m downstream of the confluence from settling pond #1 (SPD) and SP effluent mixing known as Biocell downstream (BDS)

A multiparameter sonde is used by on-site personnel to obtain pH, conductivity, dissolved oxygen (DO) and oxidation reduction potential (ORP) to compliment water chemistry results analyzed by the contracted laboratory Maxxam Analytics. As complete results are obtained only once per month, it is possible that system performance is not represented completely as small biochemical and operational changes may be missed between sampling events. However, a complete dataset using monthly sampling events throughout operations since 2012 have indicated predictable trends that describe system operations and overall effectiveness.

The LLST design is open to the atmosphere where it is conceivable that precipitation may dilute water within the system affecting monitoring results. Adversely, low precipitation during the summer and increased temperatures may evaporate water from the system prior to discharge resulting in higher observed POI concentrations and ultimately, calculated reduction efficiency. Flow rate is only captured at the pumping station into the first portion of the system and losses or gains encountered through the system aren't necessarily realized.

Loading assessment results are generated using monthly averages for both flow measurements and POI concentrations. Water quality sampling is performed on weekly and monthly intervals with dissolved metals sampled monthly and sulphate sampled weekly. To ensure consistency, average monthly sulphate values are calculated using weekly results to synchronize with metal sampling.

Together, flow rate (L/s) and POI concentrations (mg/L) are used to calculate overall load in kilograms (kg) for the desired parameter and time period at each point source. The equation used to quantify load is expressed as:

Load (kg) = Q x T x C / 1000

'Q' represents the average monthly flow in L/s
'T' represents the total time (in seconds) for the month
'C' represents the average monthly concentration in mg/L for the parameter of interest

The concentrations used for calculation may not fully represent monthly discharges as dynamic changes can occur within the system between sampling events. Concentrations are input using the 'instantaneous' results obtained from grab samples and it is impractical to increase sampling frequency. Additionally, short-term hydrologic changes within the system may not necessarily be observed due to flow rates input as monthly averages (derived from continuous or weekly readings).

The aforementioned limitations need to be considered when evaluating loading from a quantitative (and qualitative) standpoint. Quinsam Coal is committed to ensuring that the most reliable and accurate data is collected and continuously evaluates and improves monitoring procedures to best supplement this assessment. Examples include: strict quality control and consistent sampling techniques; flow calibration at SPD; frequent inspections at discharge locations; and removing accumulated sediment at weir devices to ensure laminar flow across monitoring structures.

3.0 Results

3.1 Long Lake Seep Passive Treatment System

Charts 1 through 14 illustrate and provide detailed comments on the treatment system performance including physical parameters, flow rates and chemical parameters since commencement of the system in late 2012. A summary of observations in 2016/17 include:

- System flow rate remained at 4.0L/s with a total of 126,144m^3 treated through the system
- pH throughout the system remained suitable in each respective cell ranging from 6.7 – 8.1
- ORP values observed at BCR displayed seasonal variations with higher values during cooler, less productive periods and lower during warmer months. As a whole, ORP values have appeared increase in the BCR over the past two years
- Conductivity values were variable and highly dependent on inflow levels and precipitation
- The aerator and mixers were successful in diffusing dissolved oxygen to the system
- Sulphate reductions through the system calculated using monthly average sulphate concentrations at the influent and SPeff were 228.9 mg/L with a reduction efficiency of 43.7%
- Using flow rates through the treatment system and average monthly reduction in dissolved sulphate, it was calculated that approximately 29,900 kg of sulphate was removed from potentially entering Long Lake via the seeps

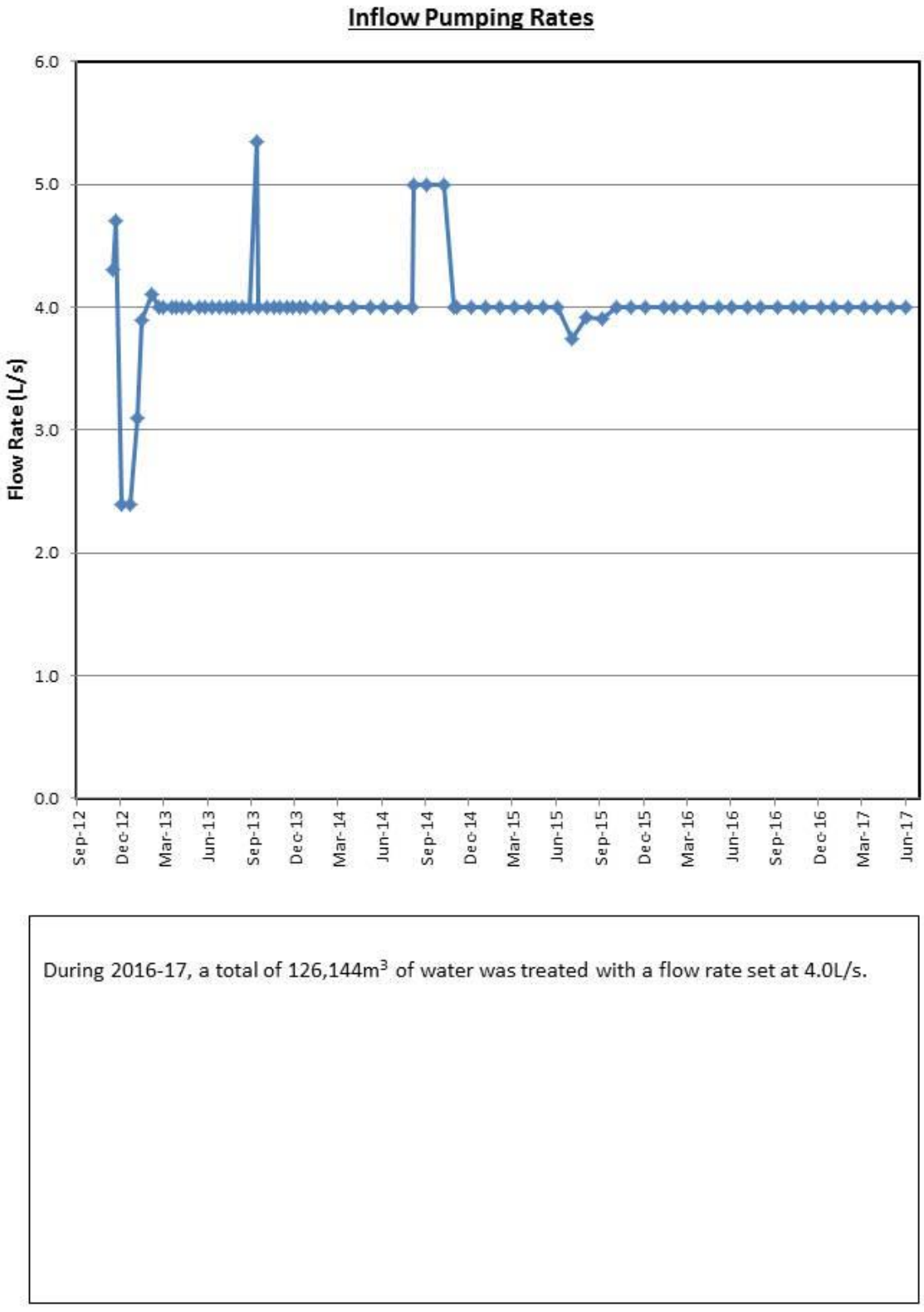


Figure 1: Inflow Pumping Rates

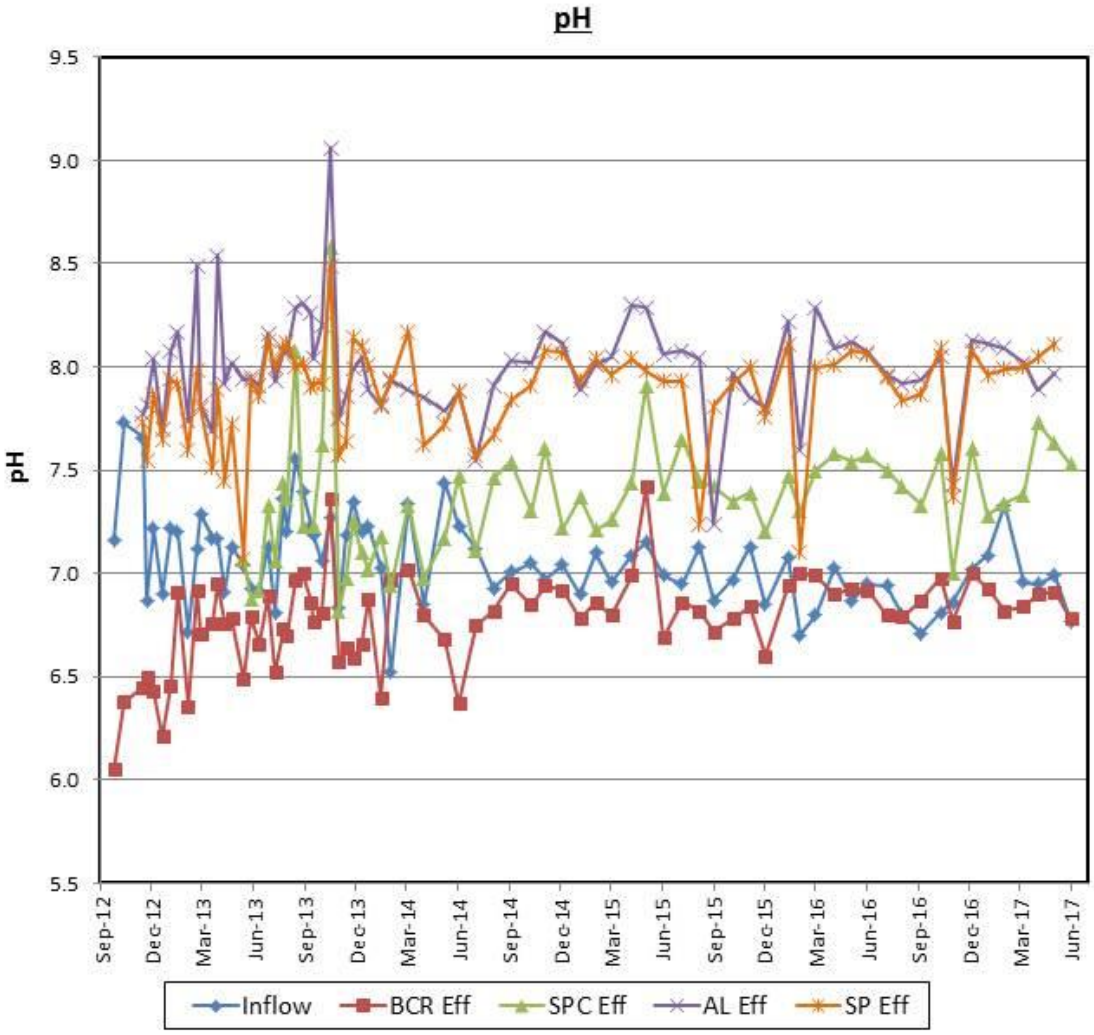
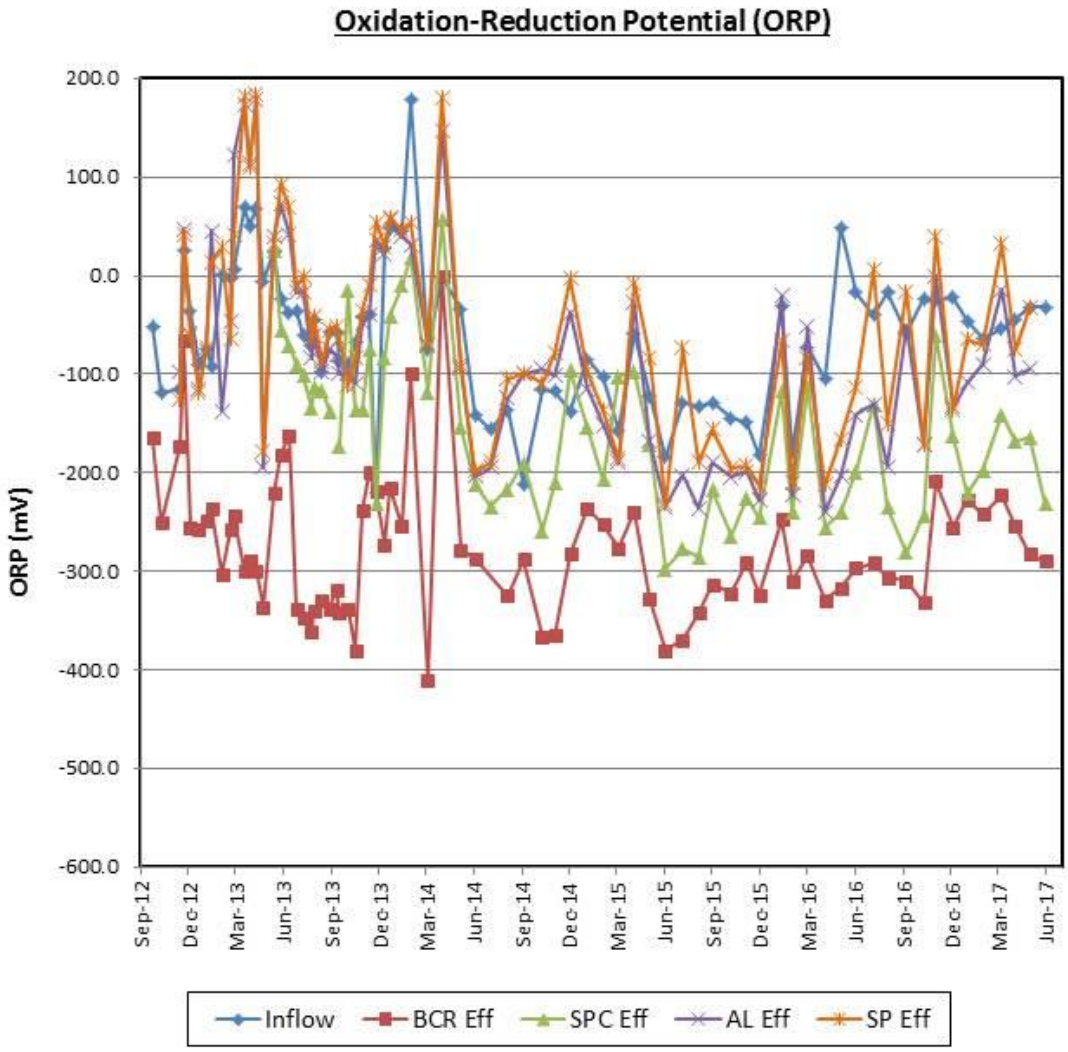


Figure 2 displays pH values obtained in each sector of the treatment system. pH generally decreases through the BCR and increases as water progresses through the remainder of the cells. The pH value(s) and flow path progression are typical of other passive treatment systems with neutral mine water input. The distinction in pH values in each cell is apparent as the water flows through the system.

pH has remained stable and relative changes are reflected upon inflow water with little month over month variation at each respective portion of the system. pH generally remained stable with two noticeable dips during periods of high precipitation.

Figure 2: pH

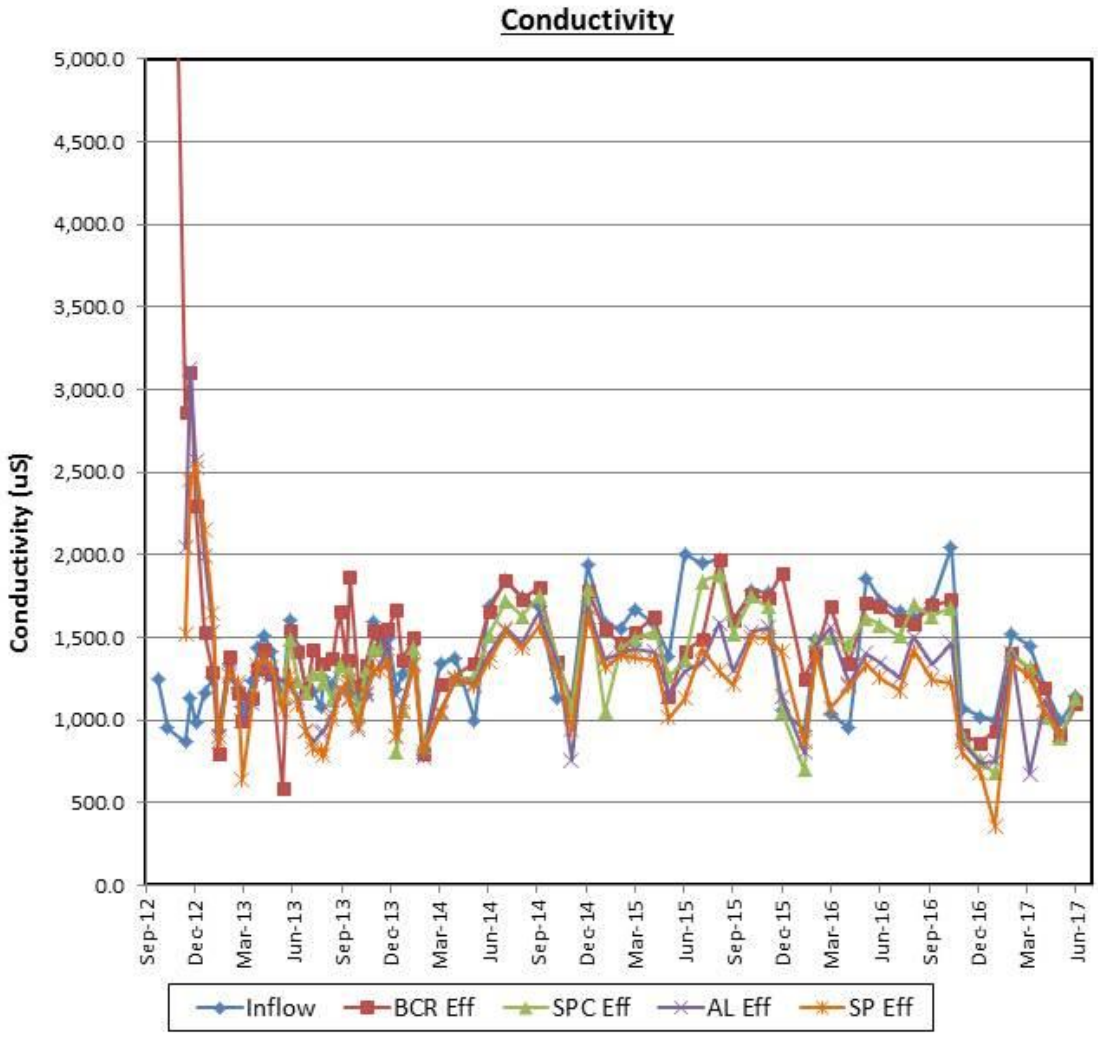


In aqueous solutions, the oxidation-reduction potential is a measure of the tendency of the solution to either gain or lose electrons when it is subject to change by introduction of a new species. The ORP is low in BCR effluent due to sulphate reducing micro-organisms encouraging reduction of sulphate to sulphide.

ORP values at or below -200µS indicate that conditions are favorable for sulphate reduction to sulphide. The ORP chart shows that the BCR is consistently achieving conditions that can provide sulphate reduction, particularly with warmer ambient temperatures.

The ORP in the SPC increases due to sulphide polishing material (ferric compounds) deposited in the media. The ORP further increases in AL and SP as oxygen is introduced and oxidizes many of the species.

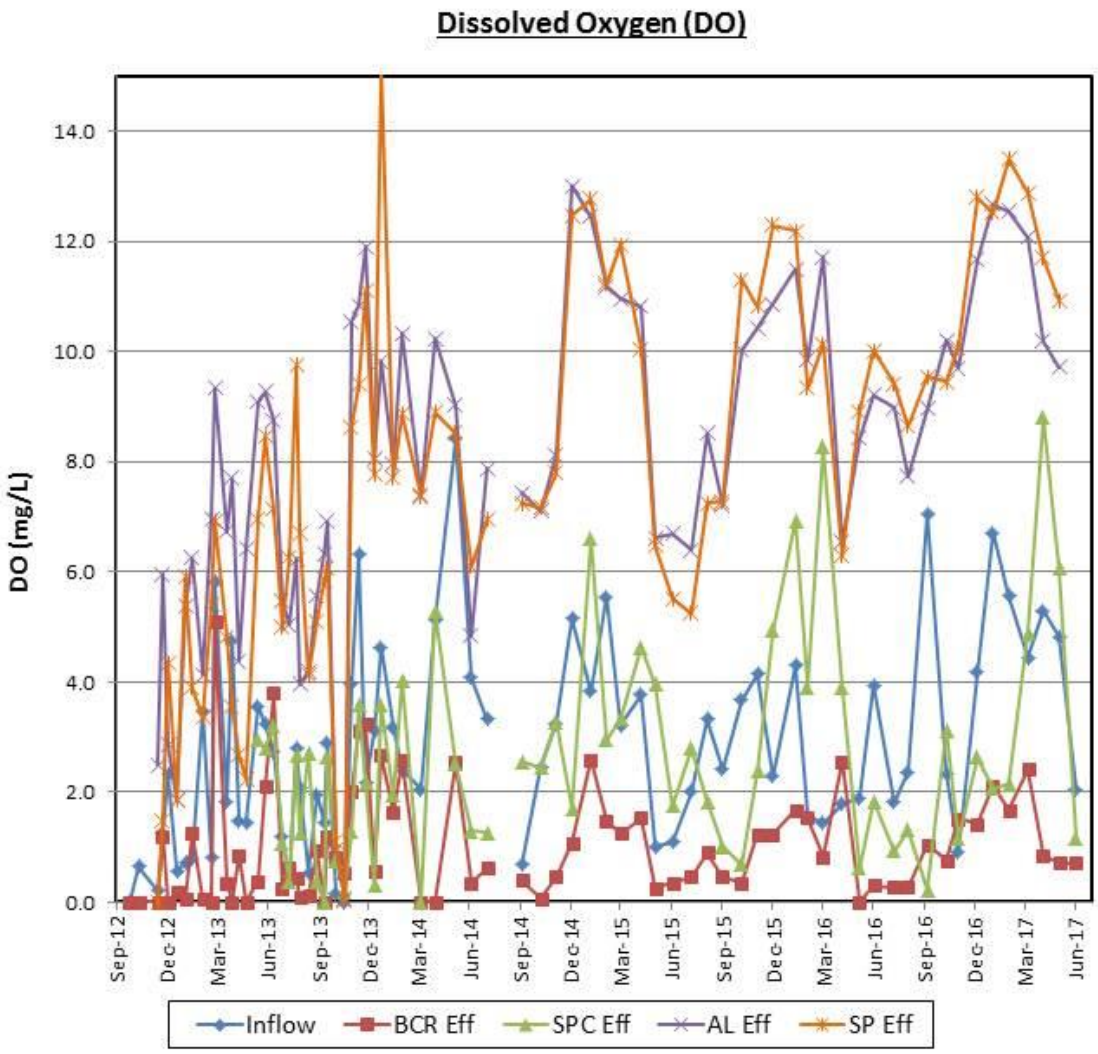
Figure 3: Oxidation-Reduction Potential



Conductivity is a measure of a liquid's ability to transmit an electrical current. Higher conductivity values indicate that an electrical current can flow more easily through the water. Dissolved ions in the water help create an easy path for electrical currents therefore, conductivity can be directly correlated to dissolved materials present in solution.

Figure 4 displays that conductivity has stabilized since startup of the treatment system. There have been variable fluctuations in conductivity throughout the system that can be attributed to inflow water, dilution from precipitation or ice and evapoconcentration during warm, dry weather.

Figure 4: Conductivity



Microbes that reduce sulphate anaerobically, do not tolerate high levels of oxygen; therefore, dissolved oxygen (DO) in the BCR effluent should be less than 1 mg/L to maximize sulphate reduction. Oxygen that is present in the influent water is generally consumed by aerobic microbes before the sulphate reducing microbes can metabolize sulphate.

Figure 5 shows that DO values in the BCR effluent follow a seasonal pattern with higher levels recorded during cooler periods and lower levels recorded in the warmer (more productive) periods. These fluctuations are correlated to reduction efficiency within the BCR. As expected, DO increases in the AL where the surface aerator and mixers diffuse oxygen into the water removing nutrients and precipitates metals for settling.

Figure 5: Dissolved Oxygen

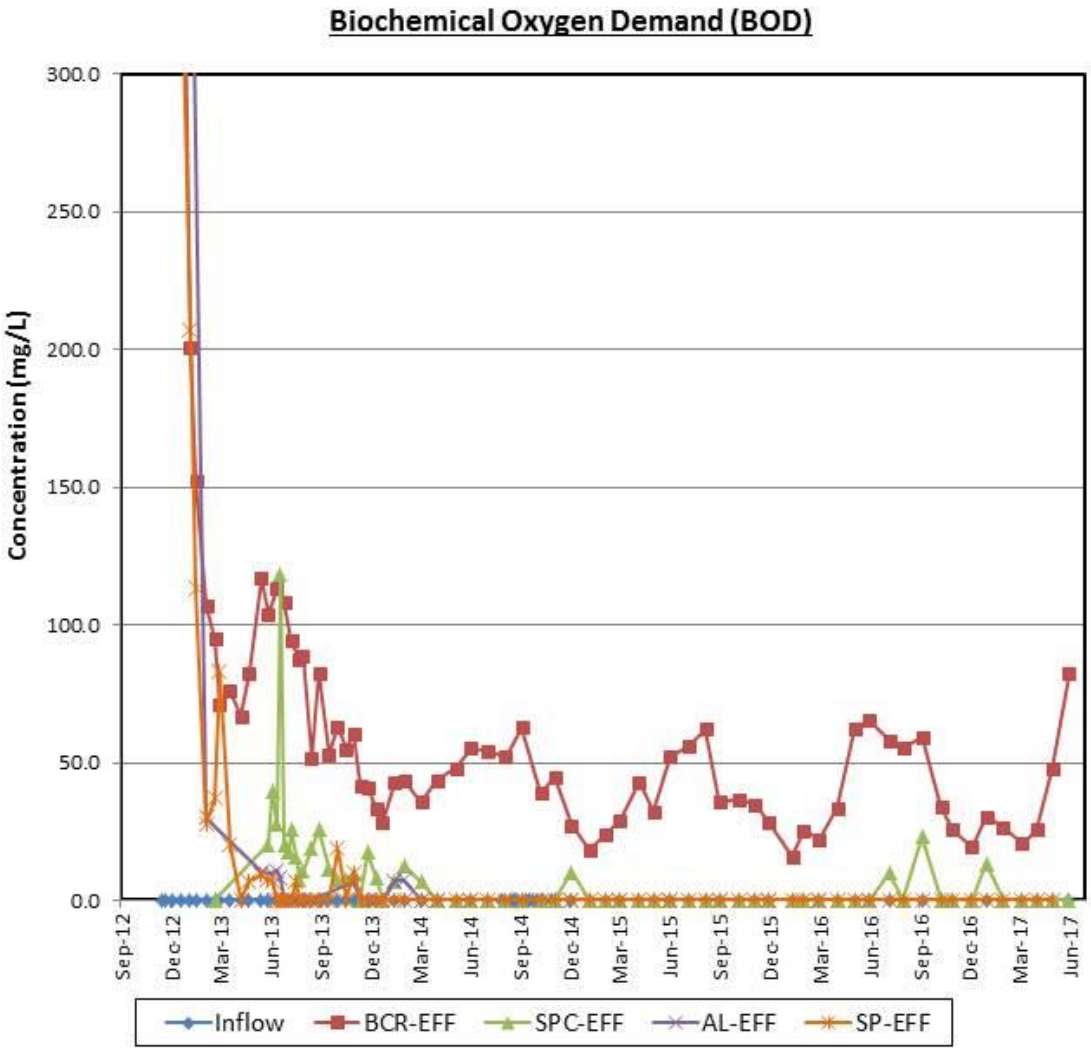


Figure 6 represents the biochemical oxygen demand (BOD) which is the amount of dissolved oxygen consumed by aerobic biological organisms to metabolize organic material present in solution relative to temperature and time.

The BOD concentrations illustrated on Chart 6 remain within expected levels, with the BCR Eff continuing to display the highest BOD results. BOD values increase with respect to temperature indicating periods in which aerobic microorganisms are most active. The relationship between DO and BOD is theoretically inversely proportional which is generally observed in BCR.

Figure 6: Biochemical Oxygen Demand

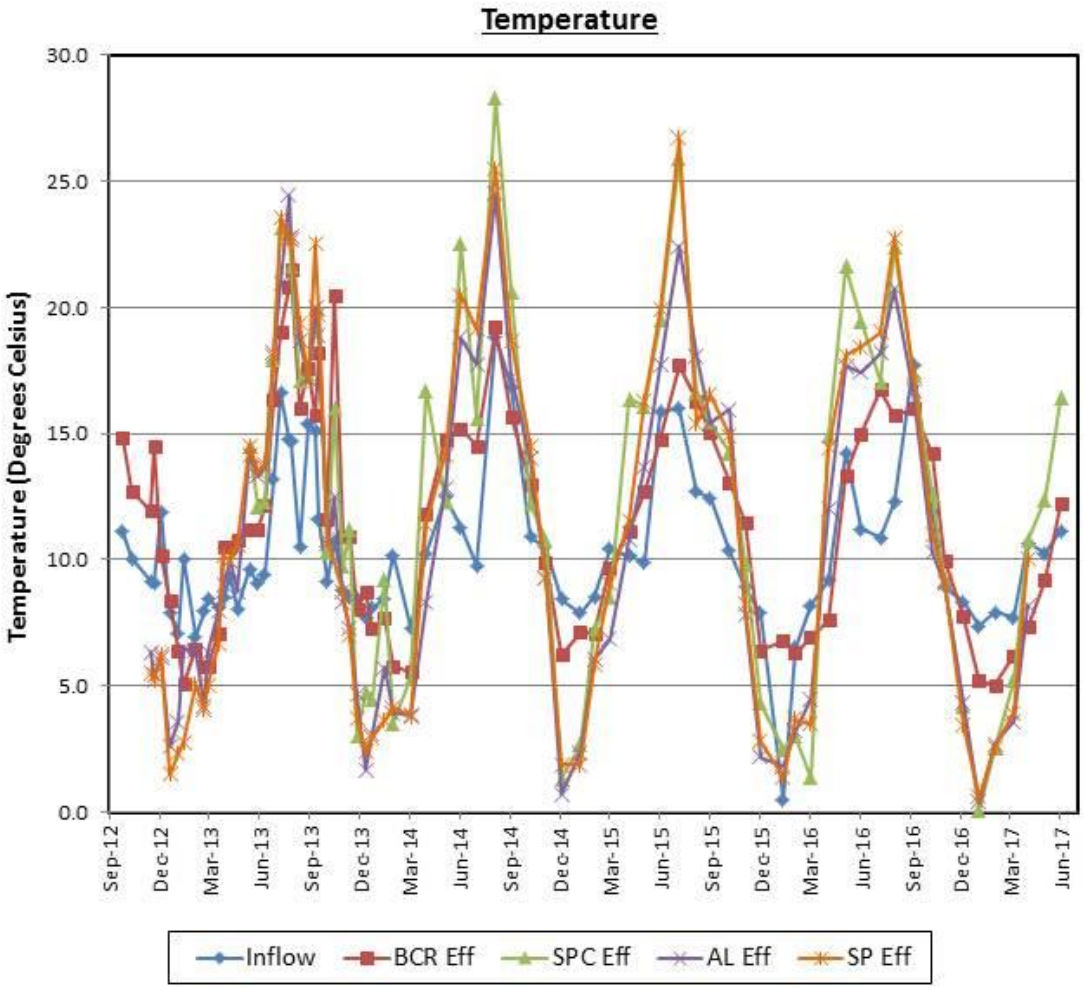


Figure 7 represents temperature values through each sector of the system. There are seasonal trends in water temperature that are a direct result of ambient air temperature. Microbial activity in the system is dependent on temperature and results indicate that decreased sulphate reduction is apparent when temperatures fall below 10°C.

Figure 7: Temperature

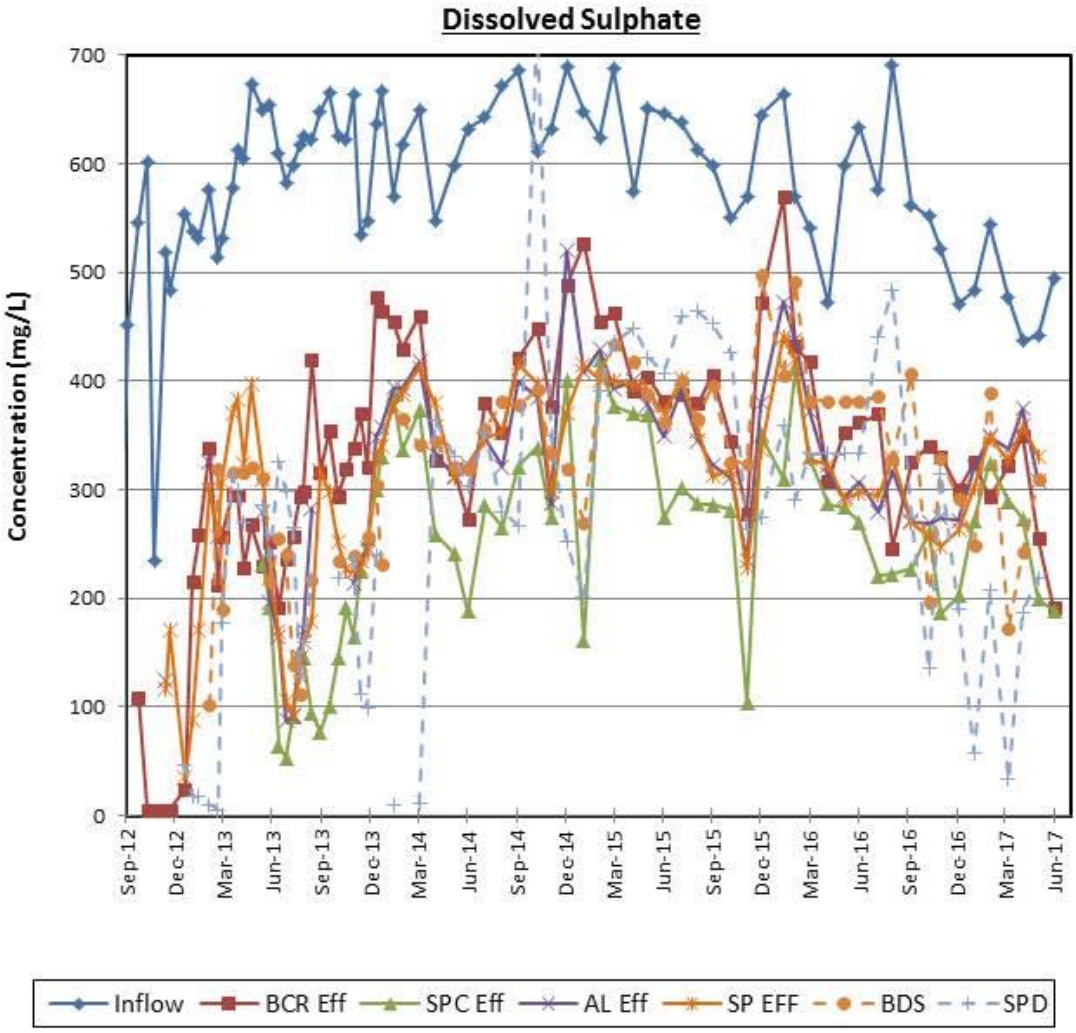


Figure 8 displays dissolved sulphate concentrations through the system. During 2016-17, the influent sulphate concentration (water pumped from the 2-South underground mine pool) generally declined resulting in decreased reduction concentrations.

It is noted that sulphate concentrations through the system may be diluted by heavy precipitation and may have biased results low when sampling occurs during heavy rainfall events.

Figure 8: Dissolved Sulphate

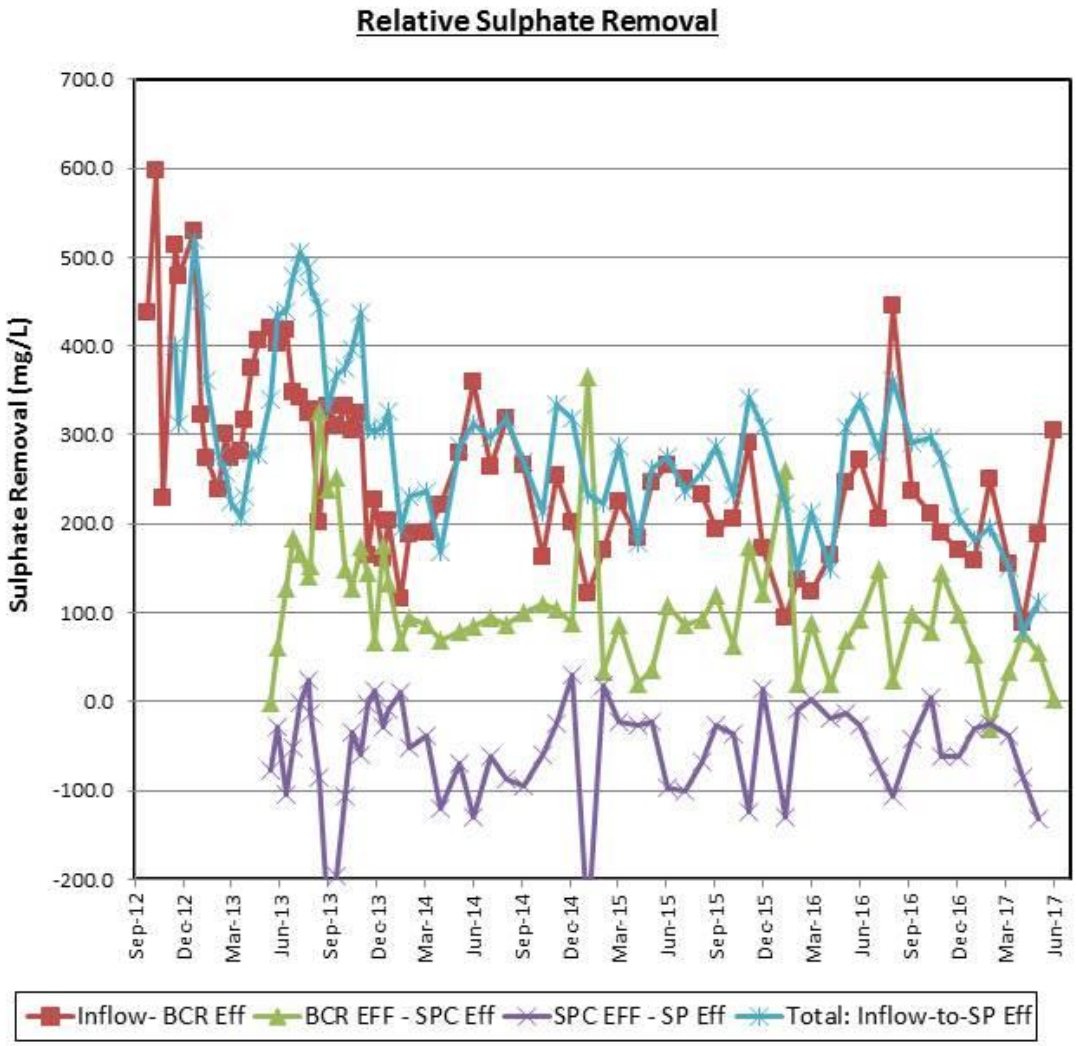


Figure 9 displays sulphate removal at monthly sampling events through the different components of the system. Sulphate reductions observed in the BCR effluent vary from 150 – 250 mg/L in the winter months to upwards of ~ 300 mg/L or greater in the summer months. Since startup, sulphate reduction efficiency has declined marginally as the system ages.

A negative sulphate removal from the SPC effluent to SP effluent indicates that some sulphur species (sulphide) are being converted back to sulphate. This negative removal can be attributed to aeration as dissolved oxygen is introduced and oxidizes sulphides that are not sequestered in the SPC.

Introduction of the carbon amendment with molasses injected into the BCR has appeared to have a positive effect in sulphate reduction during periods of warm temperatures. A steep decline in system performance was observed with decreasing temperatures in Q3 while variable performance (sometimes worse than previous years) was observed in Q4.

Figure 9: Relative Sulphate Removal

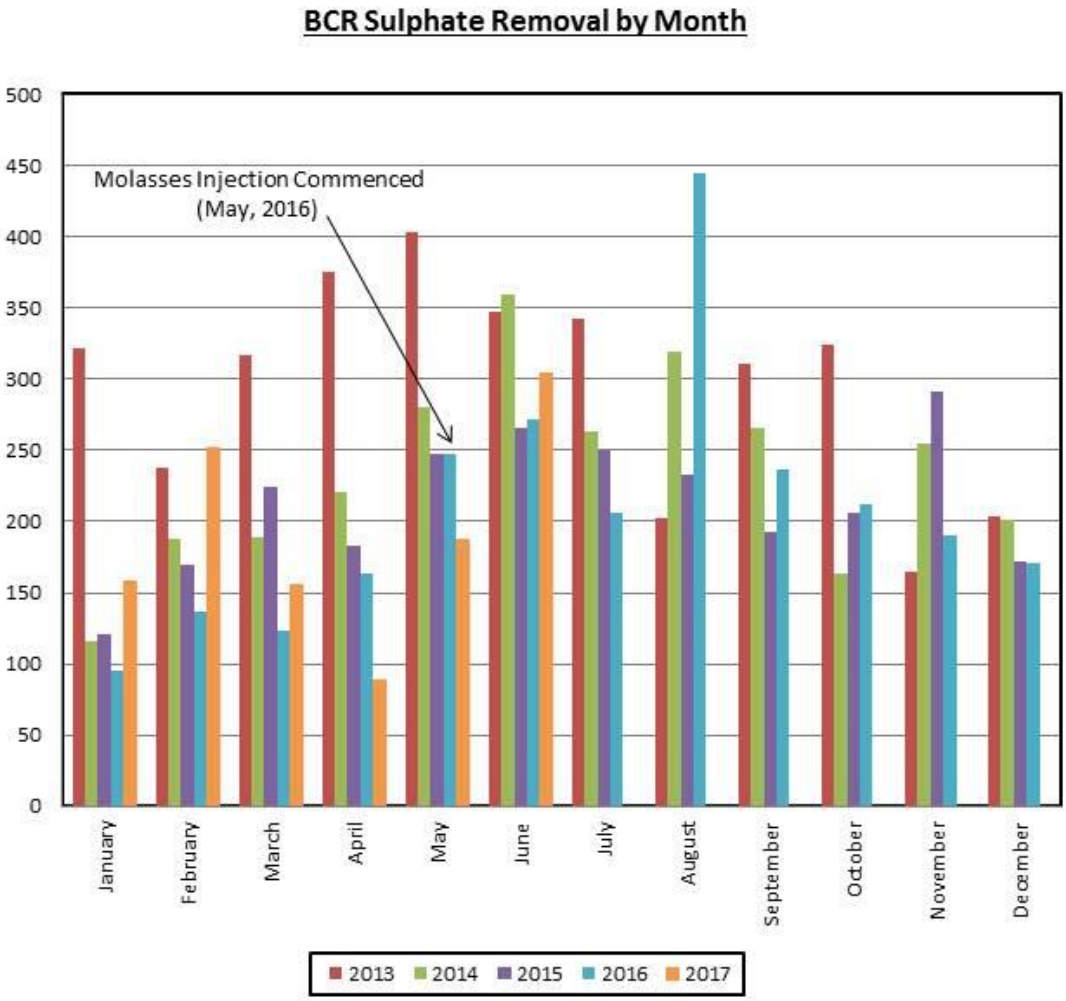


Figure 10 displays sulphate reductions using **monthly** sampling results within BCR by year over year comparison. Monthly reduction concentrations were observed to decrease year over year and demonstrated the need for addition of molasses into the BCR. Monthly sulphate reduction in May through October 2016 has increased compared to that observed in 2014 and 2015. Commencement of the carbon addition into the BCR in May 2016 has had a positive effect on sulphate reduction efficiency. Compared to the previous year, there was a sharp decrease in system reduction performance in November and December 2016 while January and March 2017 saw marginal declines. January through March2017 however, saw improved reductions compared to 2016. Additional results will be captured throughout the proceeding months along with the change of a carbon source.

Figure 10: Relative Sulphate Removal by Month

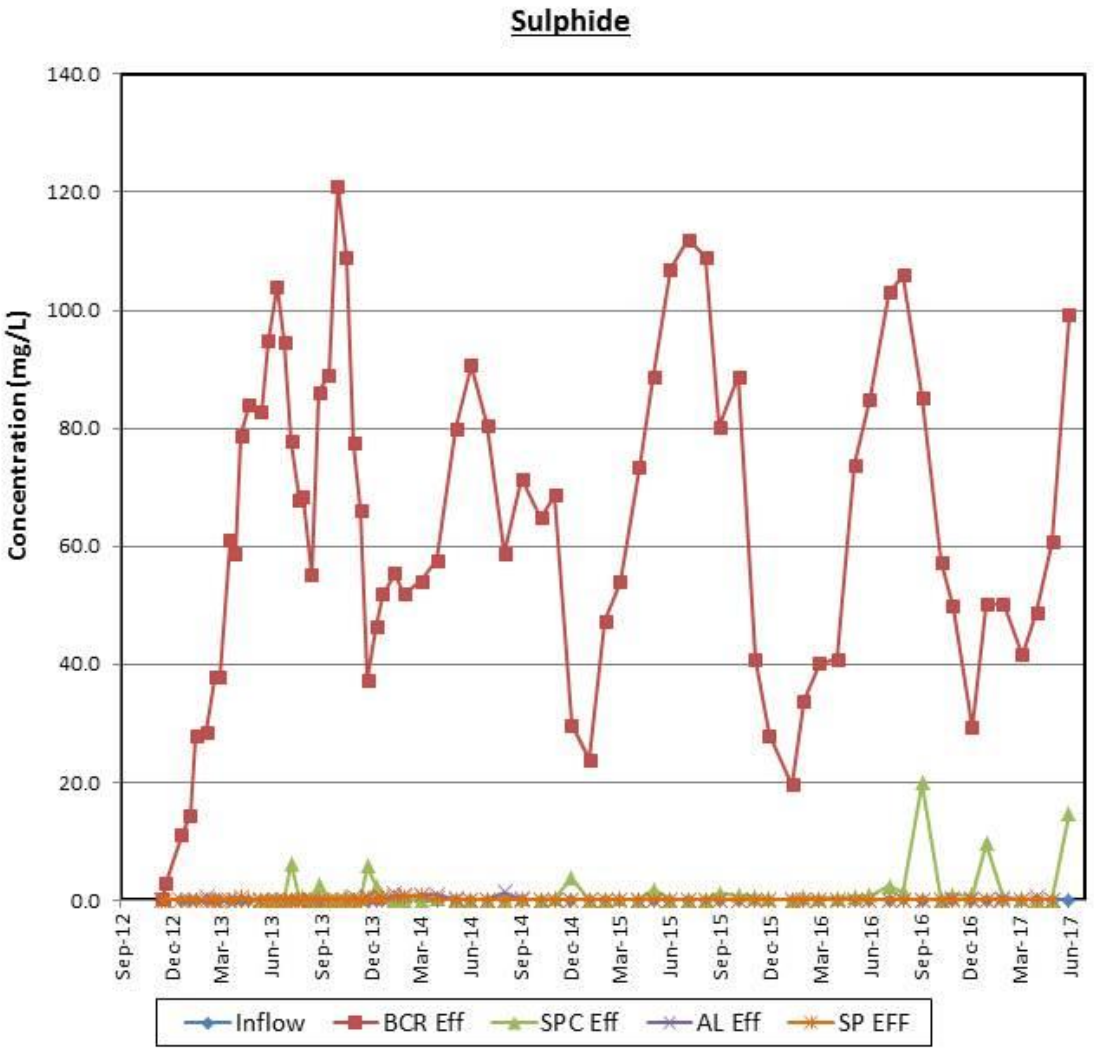


Figure 11 displays the seasonal variation of sulphide concentrations reflective of water temperature, inflow sulphate concentrations, and ultimately, sulphate reduction. Increased sulphide production indicates increased sulphate reduction and vice versa. Sulphide generation within the BCR has generally declined since system startup. Sequestration of sulphide in SPC Eff has remained efficient since startup with varying concentrations found in BCR Eff indicative of metabolic activity of sulphate reducing micro organisms.

Figure 11: Sulphide

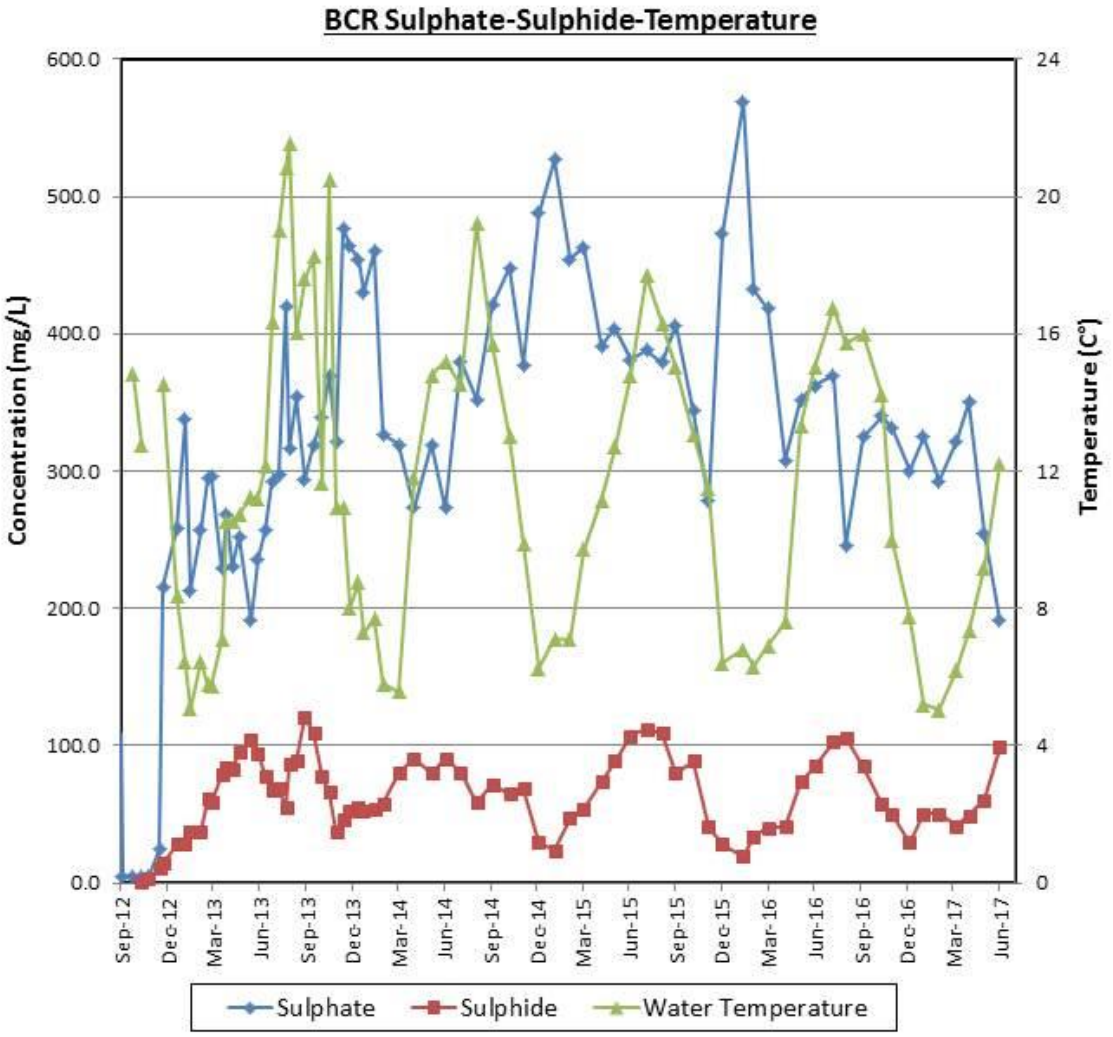


Figure 12 illustrates the inverse relationship between water temperature within BCR Eff and sulphate concentrations. Consequently, decreased sulphate concentrations due to higher temperatures and metabolic activity increase the amount of sulphide present.

Figure 12: BCR Sulphate-Sulphide-Temperature

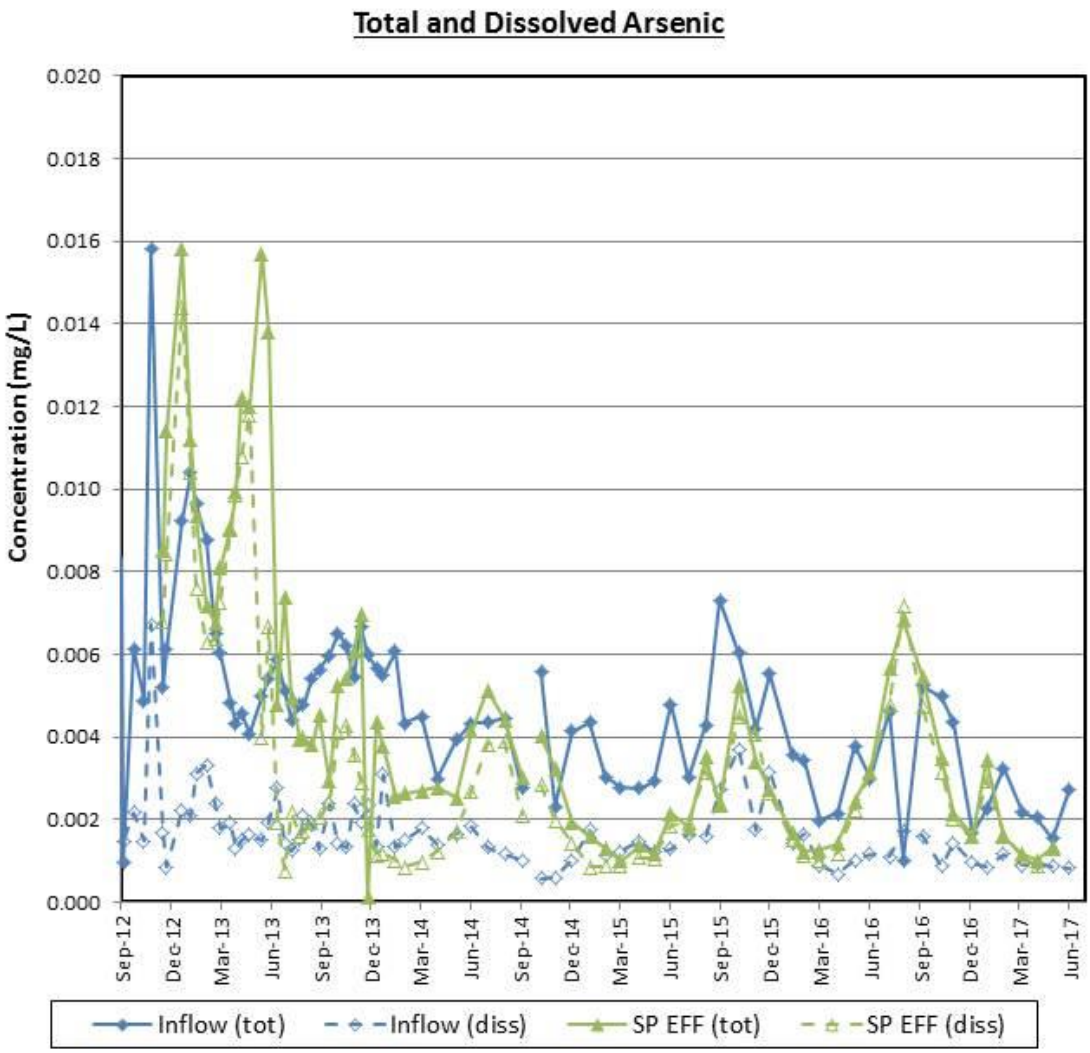


Figure 13 shows the total and dissolved arsenic concentrations in SP effluent and inflow water. Arsenic concentrations have generally declined since April 2013, concurrent with initiation of the SPC. It is noted that arsenic concentrations in SP effluent (both total and dissolved) are reduced relative to concentrations observed in inflow water. The reduction in arsenic may be a result of reduced arsenic concentrations in BCR media, arsenic absorption in the SPC media, co-precipitation with iron as a hydroxide in the AL or a combination of all three.

Figure 13: Total and Dissolved Arsenic

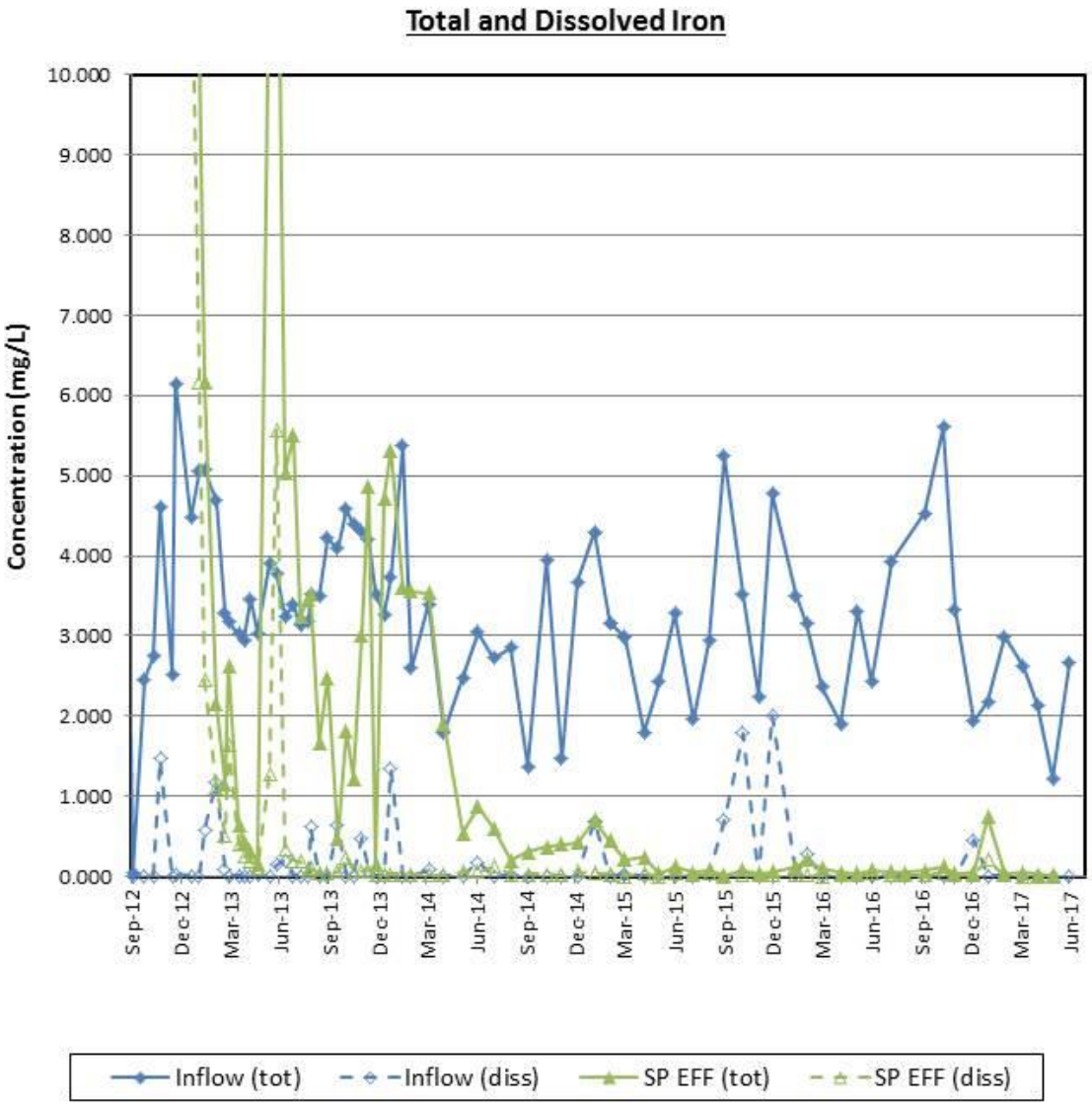


Figure 14 illustrates the total and dissolved iron concentrations in SP effluent in comparison to inflow water. Since startup, iron concentrations have decreased and stabilized in SP effluent due to flushing of materials and as additional pore volumes pass through the SPC.

Total and dissolved iron concentrations are reduced to low levels through the treatment system and settle out, mainly in the SP. Iron discharged in SP effluent is almost entirely in particulate form and continues to settle out on the rock lined channel.

Figure 14: Total and Dissolved Iron

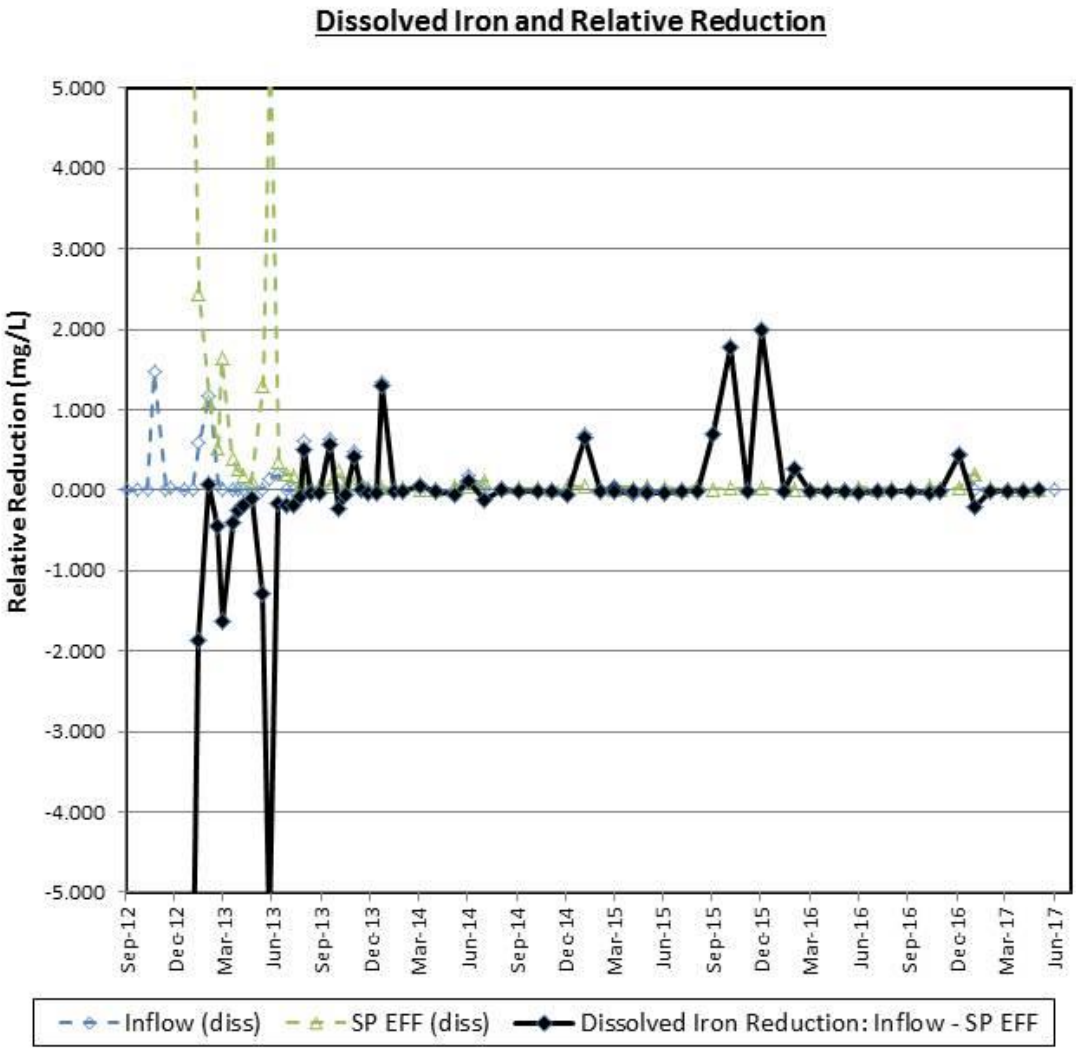


Figure 15 illustrates the difference in dissolved iron concentrations between the inflow and effluent from SP. Since the "flushing" period associated with the commissioning of the SPC, dissolved iron remains low. Spikes noted in reduction indicate sampling events in which dissolved iron concentrations in the inflow were elevated. Values below zero indicated by the black line indicate iron introduced into the system from the media. Iron sequestration and overall reduction has proved successful within the system.

Figure 15: Dissolved Iron and Relative Reduction

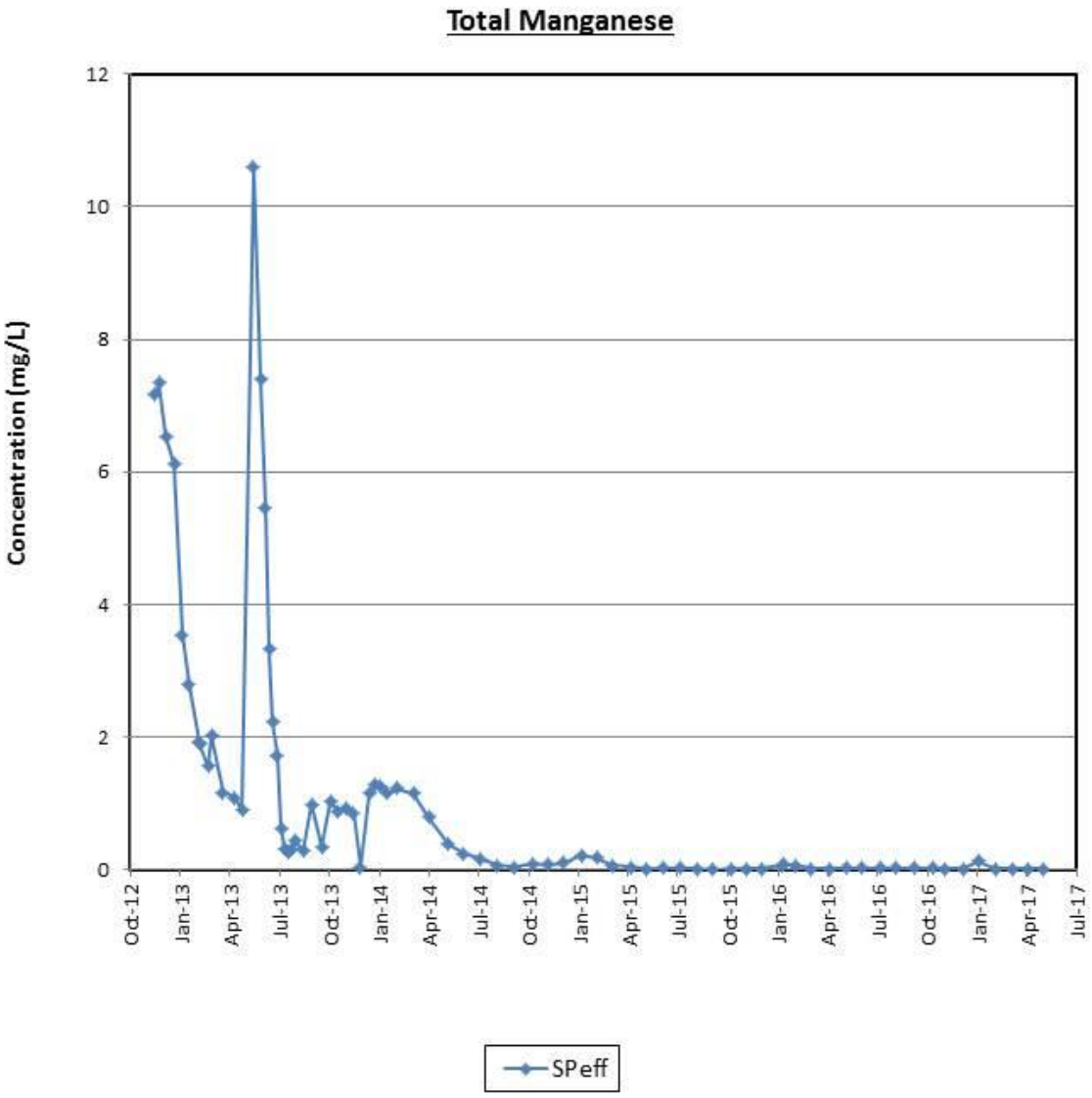


Figure 16 illustrates the total manganese concentrations in SP effluent. Since startup, total manganese concentrations have decreased and stabilized in SP effluent due to flushing of materials. It is noted that manganese concentrations discharged from the treatment system are negligible and not expected to significantly influence manganese concentrations in Long Lake.

Figure 16: Total Manganese Concentrations Discharge

3.2 BDS Permit Compliance

Figure 17: BDS Chemical Parameters (red) vs. Permit Limits (green)

Analytical results obtained from sampling at BDS indicate compliance with all permit limits aside from dissolved phosphorus for the South Mining Operation up to in the 2016/17 monitoring year. The dissolved phosphorus exceedance was encountered during the April sampling event and a follow up was conducted to determine the source of the phosphorus and potential techniques to mitigate phosphorus levels. An extended sampling regime including sampling through the treatment system, SPD and BDS was initiated by Quinsam Coal staff. There were no elevated levels of phosphorus discovered in the samples obtained and it was determined that the phosphorus exceedance was an anomaly and no immediate action or mitigation was needed.

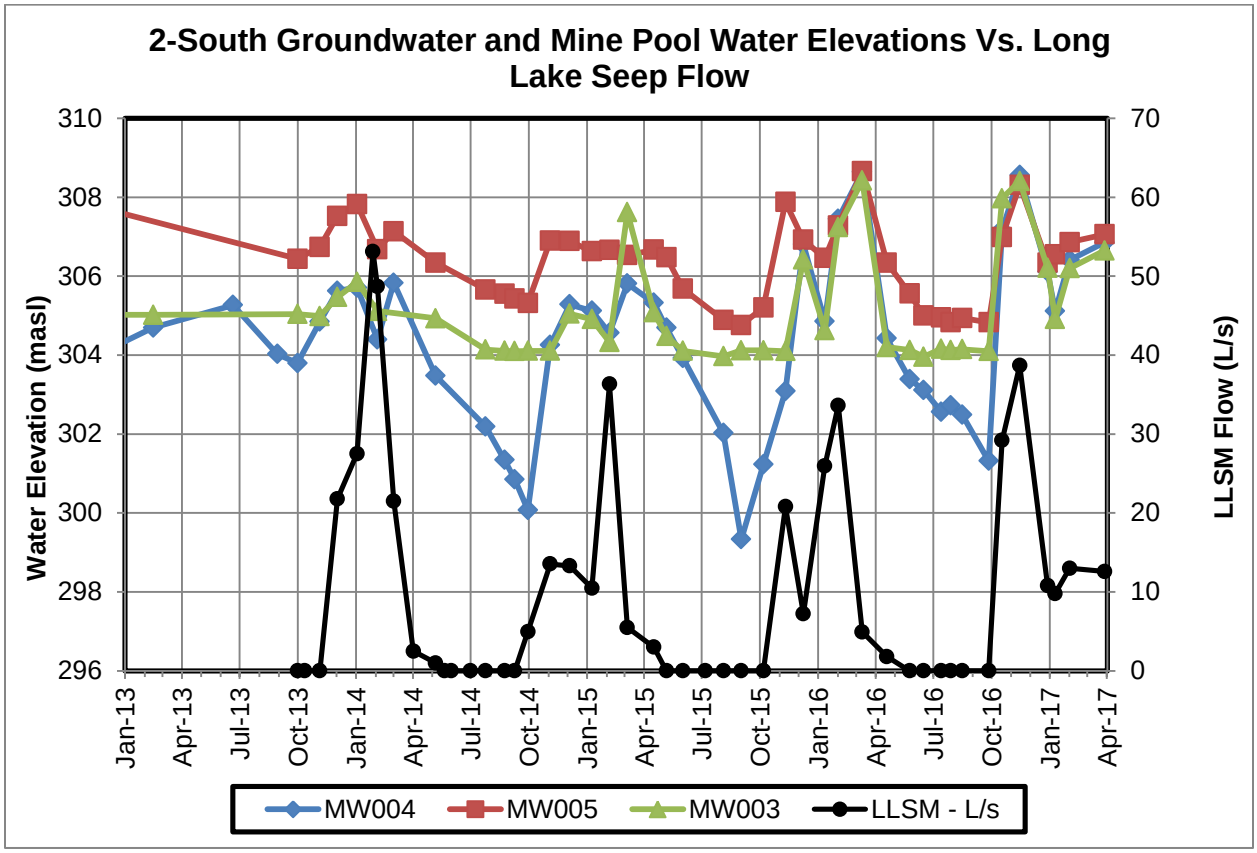


Figure 18: 2-South Mine-pool Elevation vs. Long Lake Seep Flow

The flows recorded at the Long Lake Seeps indicate a dependency on mine pool (void) water levels as depicted in Figure 18. Mine pool water levels correlate with seasonal precipitation with higher levels observed during fall through early spring. As mine pool levels decrease below a certain elevation in late spring, flow at the seep decreases significantly and eventually stops. It is determined that seep flow is most closely related to water level at the monitoring well MW00 4 and the threshold level for seep flow is approximately 303.5-304 metres above sea level (mASL). This trend will continue to be observed and validated in year over year observations.

The Long Lake Seep Passive Treatment System continues to achieve the performance objectives established for the demonstration phase(s) through Q4 including: sulphate reduction, molasses addition, metals sequestration, nutrient reduction and discharging within permit limits at the site BDS.

3.3 Loading into Long Lake

Figure 19 displays the total annual discharge (m^3) and total loading (kg) into Long Lake from each point source, including relative percentages of aggregate load. As indicated by this table, the greatest point source contributor of dissolved iron and dissolved sulphate into Long Lake was SPD, largely due to its high discharge quantities. The high Iron found within SPD waters is thought to be largely dependent on dewatering of the 5-South mine. Arsenic loading was near identical for each point source.

Site	Total Discharge (m^3)	Site	Arsenic	Iron	Sulphate
Seeps	304,603	**Seeps Annual % of Total**	33.4%	2.3%	37.8%
		Seeps Annual Load (kg)	0.3693	1.885	142,483
SPeff	126,144	**SPeff Annual % of Total**	34.0%	6.3%	9.8%
		SPeff Annual Load (kg)	0.3768	5.088	37,019
SPD	913,498	**SPD Annual % of Total**	32.6%	91.4%	52.4%
		SPD Annual Load (kg)	0.3609	74.308	197,914
Total Discharge (m^3)	**1,344,245**	**Total Annual Load (kg)**	**1.107**	**81.281**	**377,416**

Figure 19: Annual Discharge and Loading into Long Lake

Discharge at SPD is a result of seasonal precipitation, local runoff as well as runoff into the 2/3-South PAG/CCR storage facilities from which excess water is directed into SPD. Additionally, water levels in the flooded 5-South mine workings are managed during periods of high precipitation by pumping excess into SPD. Loading from the seeps fluctuates seasonally as a result of water levels in the 2-South mine-pool and precipitation. It has been determined that seep flow and mine pool water elevations are correlated while water elevations in the 2-South mine workings are influenced by precipitation and pumping into the LLSTS. Figure 20 demonstrates the relationship between site precipitation and total discharge while Figures 21, 25 and 28 depict the relationship between overall loading and discharge. It is noted that loading at SPD and the seeps are generally influenced by discharge quantities to a greater extent than POI concentrations as discharge quantities see the greatest variance. SPeff loading is driven exclusively by POI concentrations as flow through the system is controlled.

With precipitation much lower than expected for April and May 2016, precipitation quantities for the Q1 were low (130mm) resulting in low aggregate loading into Long Lake when compared to previous years. This low precipitation resulted in a diminished volume in the 2-South mine pool and saw seep discharges at LLSM cease very early in the year (late April).

Q2 saw the lowest loading totals during this monitoring year as persisting low precipitation occurred resulting in minimal SPD discharge and no discharge at the larger seep.

Precipitation experienced on the mine site through the annual monitoring period totaled 1327.7mm. More than half of this annual precipitation (743.8mm) occurred in Q3 when heavy autumn rains persisted through October and November. High precipitation during this period restarted seep flow, initiated dewatering of 5-south and increased discharges at SPD significantly. Cumulative loading across all sites for all parameters was highest in Q3 for this monitoring year.

Discharge quantities released from SPD in Q4 were approximately 1/3 of that released in Q3 and had the largest influence in loading reduction when comparing the 2 quarters. The reduced amount of precipitation accumulation and consequent groundwater infiltration in Q4 saw discharge rates at the larger seep collection site diminish and stabilize compared to Q3, a trend that was observed to begin early December. It was calculated that the discharge quantity at the seeps in Q4 was about 37% less than Q3. Although minimal rainfall was received, persistent freezing temperatures, considerable snowfall and subsequent snowmelt were recorded which contributed to discharges into Long Lake.

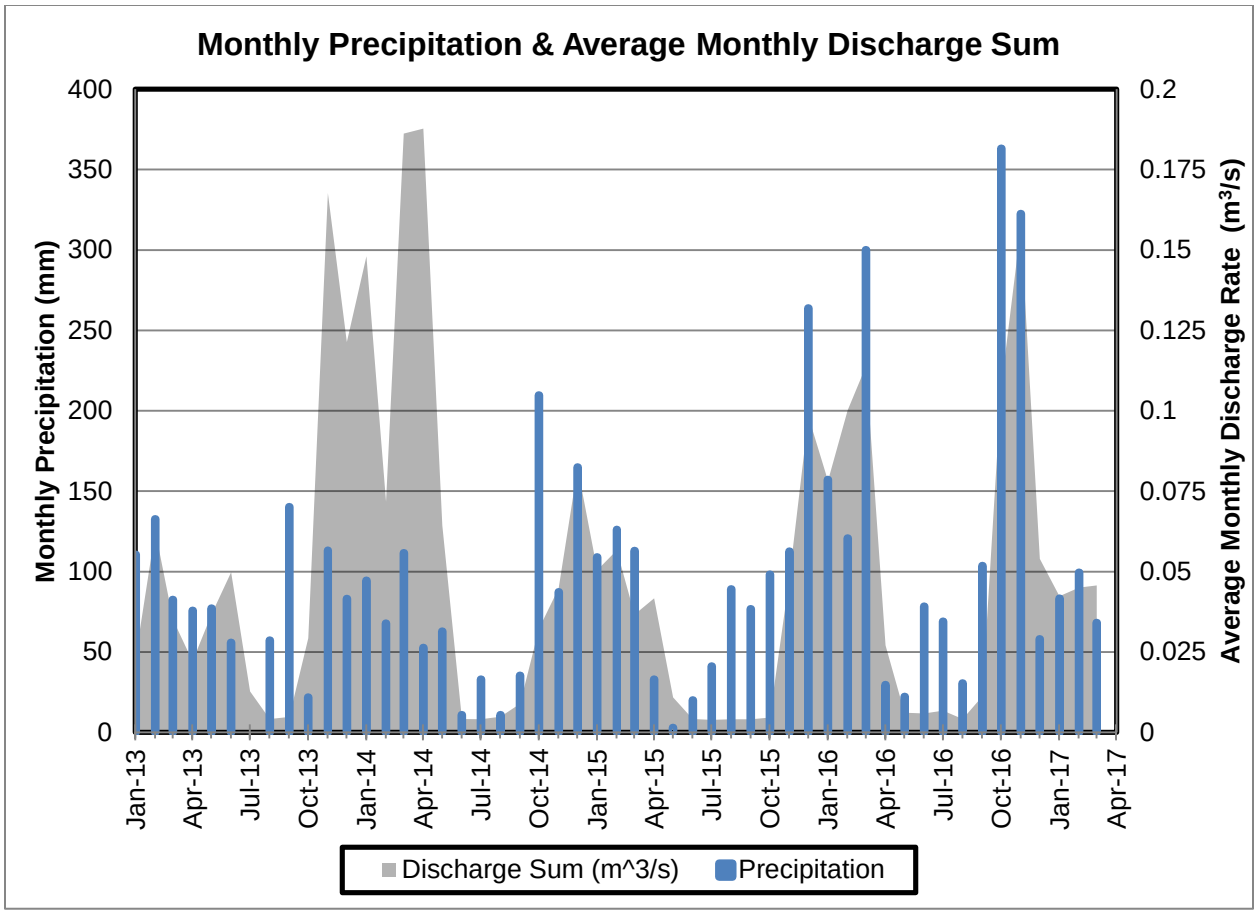


Figure 20: Monthly Precipitation and Loading Discharge

3.3.1 Sulphate

Seasonal trending for sulphate loading is evident, and is primarily driven by the quantity of water discharged; largely from SPD and to a lesser extent, the Seeps. During the fall flush and spring freshet, precipitation (and snow-melt) increases the decant volume resulting in a cumulatively higher monthly loading. During the summer low flow period, discharge is significantly reduced (ceased at larger seep and often at SPD) and consequently, loading. Sulphate concentrations observed at SPD are largely variable due to dilution from precipitation and runoff whereas sulphate concentrations at the seeps are less variable. Sulphate loads at SPeff however, are driven almost exclusively by concentrations found within the pumped mine water and system reduction efficiency as flow through the system are regulated and stable. Reduced loading from SPeff during higher ambient temperatures are a direct result of increased sulphate reduction efficiency within the treatment system.

Based on observation, SPD contributes the highest percent of sulphate loads annually although there are periods where monthly loading from the Seeps is higher. Q4 for example, saw higher loading from the seeps as 2-South mine pool levels were high and discharges from SPD were below average. Figure 22 highlights the monthly percent load by point source for sulphate.

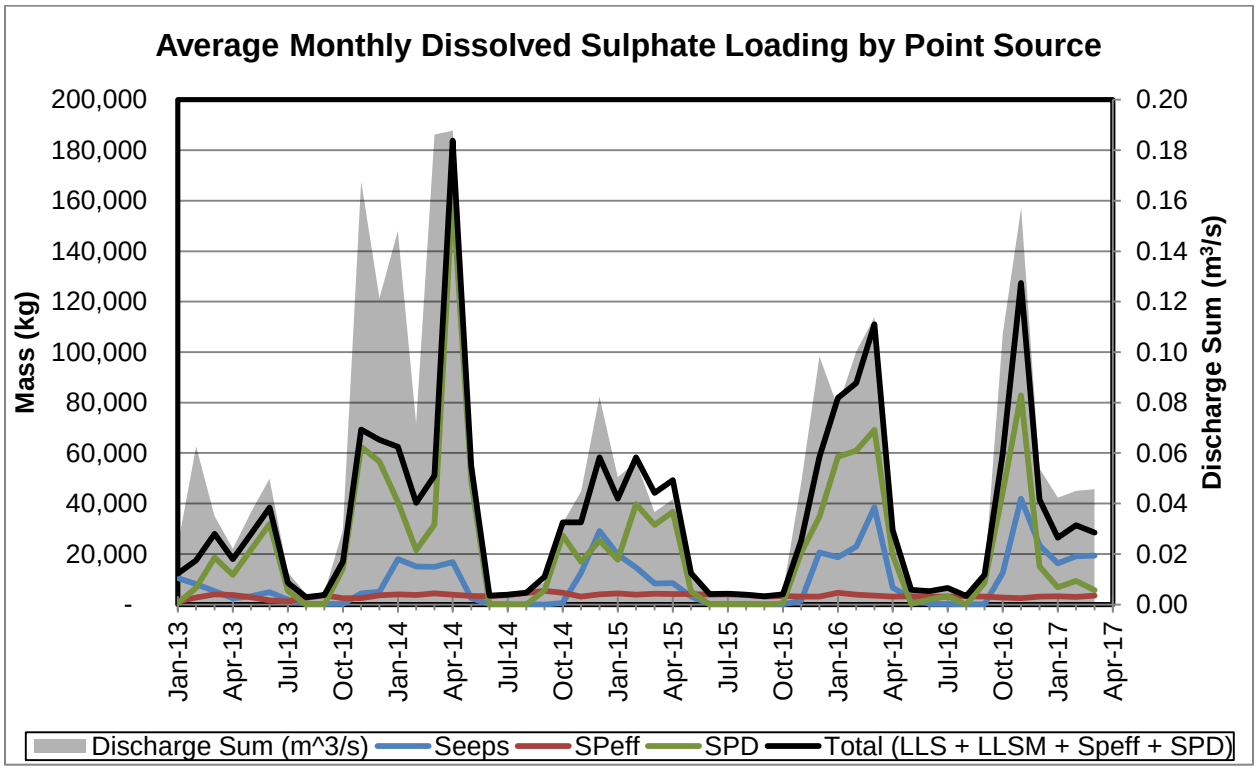


Figure 21: Average Monthly Dissolved Sulphate Loading by Point Source

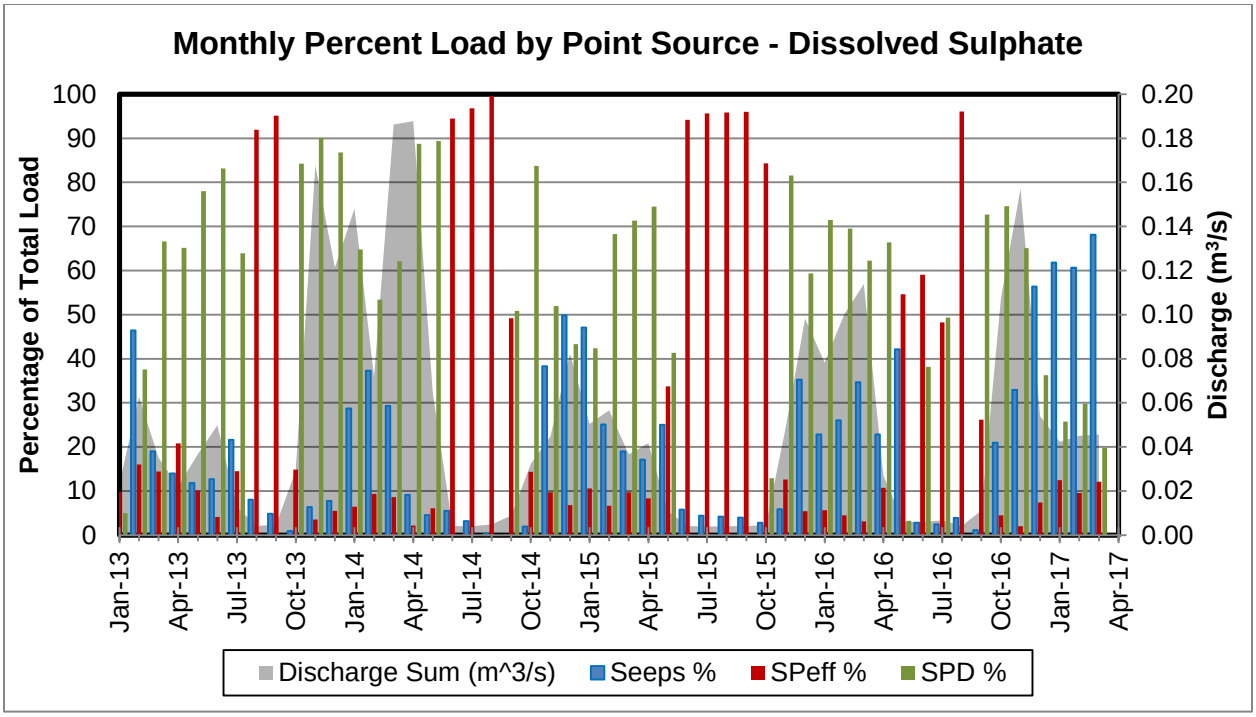


Figure 22: Monthly Percent Load by Point Source - Dissolved Sulphate

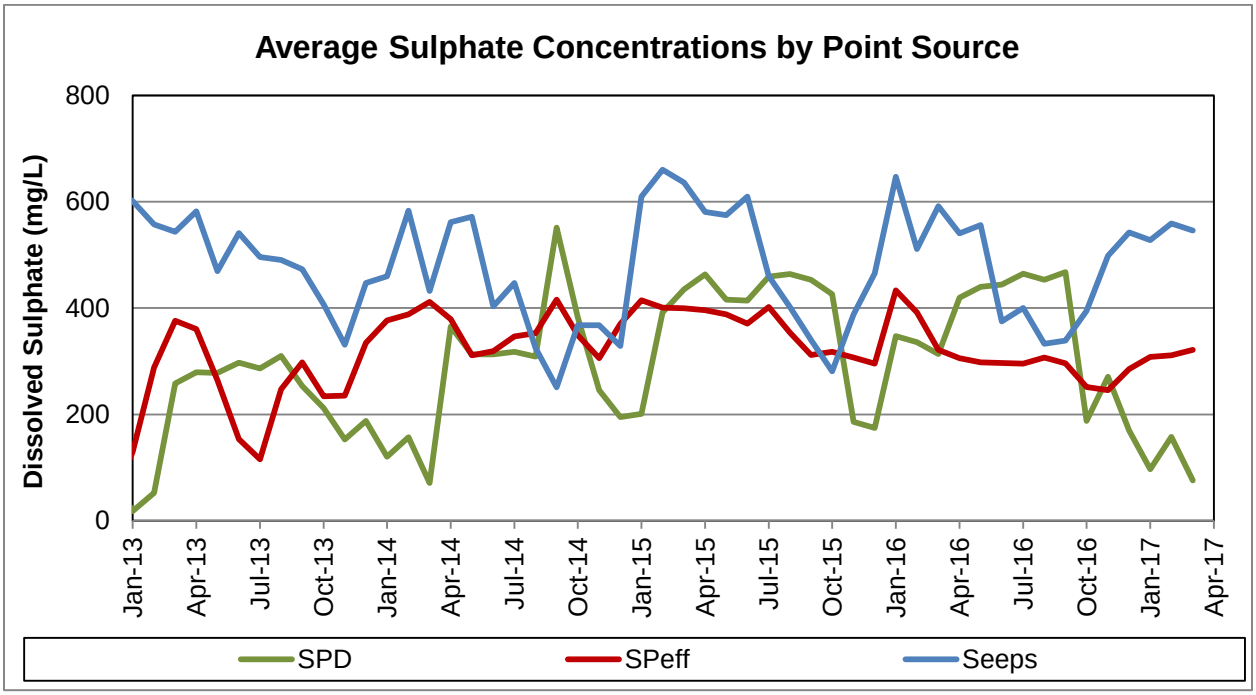


Figure 23: Average Monthly Dissolved Sulphate Concentrations by Point Source

As depicted in Figure 23, sulphate concentrations have shown fluctuations in throughout the year highlighted by a distinct and consistent decrease at SPD and seasonal fluctuations (lower in the summer)

at the seeps. Concentrations observed at SPeff are a function of inflow sulphate and system reduction efficiencies.

Sulphate concentrations in Long Lake (Figure 24) have remained steady with a marginal, yet distinct increase at the bottom depth in 2016. It is unclear whether the increase in Long Lake directly correlates with point source discharges with respect to time. Further monitoring and investigation will provide more information. The other depths measured tend to be more dynamic and fluctuate with precipitation and exhibit different thermal stratification profiles observed in different seasons and years..

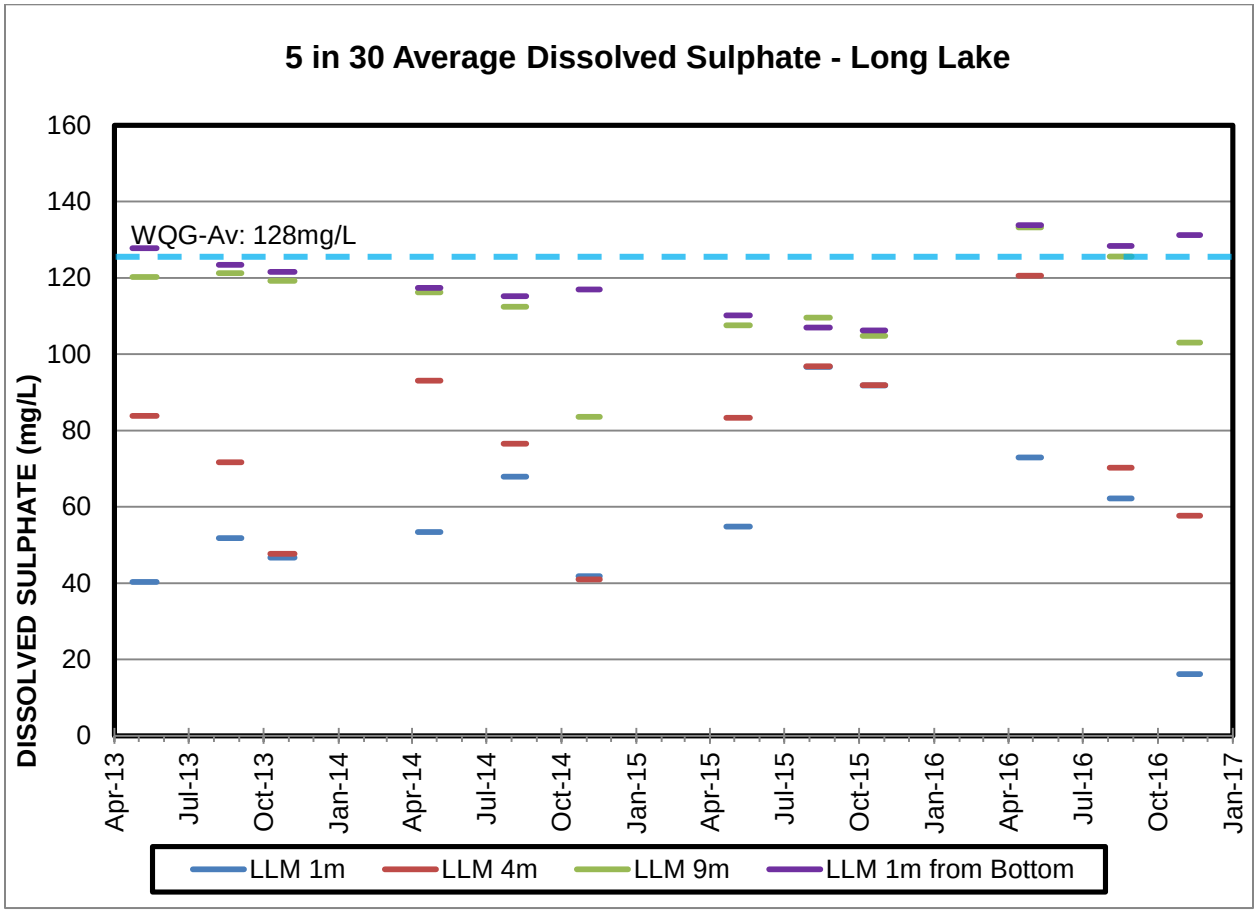


Figure 24: 5 in 30 Average Dissolved Sulphate - Long Lake

3.3.2 Iron

Similar to the seasonal trends identified with sulphate, iron loading is also mainly driven by discharge. Dissolved iron concentrations can be somewhat dynamic with occasional peaks but have remained consistently low throughout the last three years. It has been observed that iron concentrations do rise in SPD during months with high precipitation and run-off. This has been attributed to dewatering efforts in

the 5-South mine that are directed to SPD that have been analyzed and reported with elevated iron concentrations. Since startup of the LLST, concentrations of dissolved iron have decreased significantly at SPeff and remain at low levels (Figure 27). Concentrations of iron discharged from the LLST are reduced relative to levels observed in water entering the system and are thought to be precipitated in the media or at the aerobic polish cell. Total and dissolved iron levels have remained well below water quality guidelines in Long Lake at all monitored depths. Future monitoring and loading calculations will be important tools to determine if iron loading from mine site activities has detrimental effects on the lake.

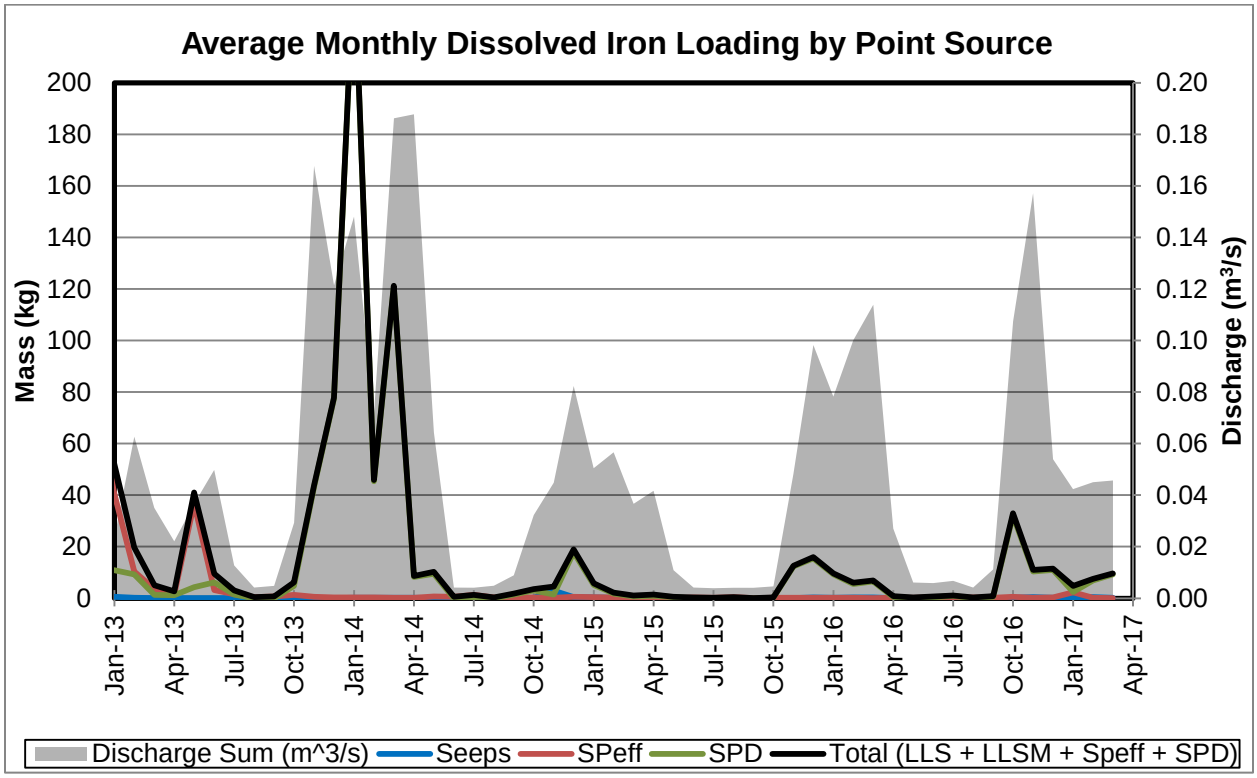


Figure 25: Average Monthly Dissolved Iron Loading by Point Source

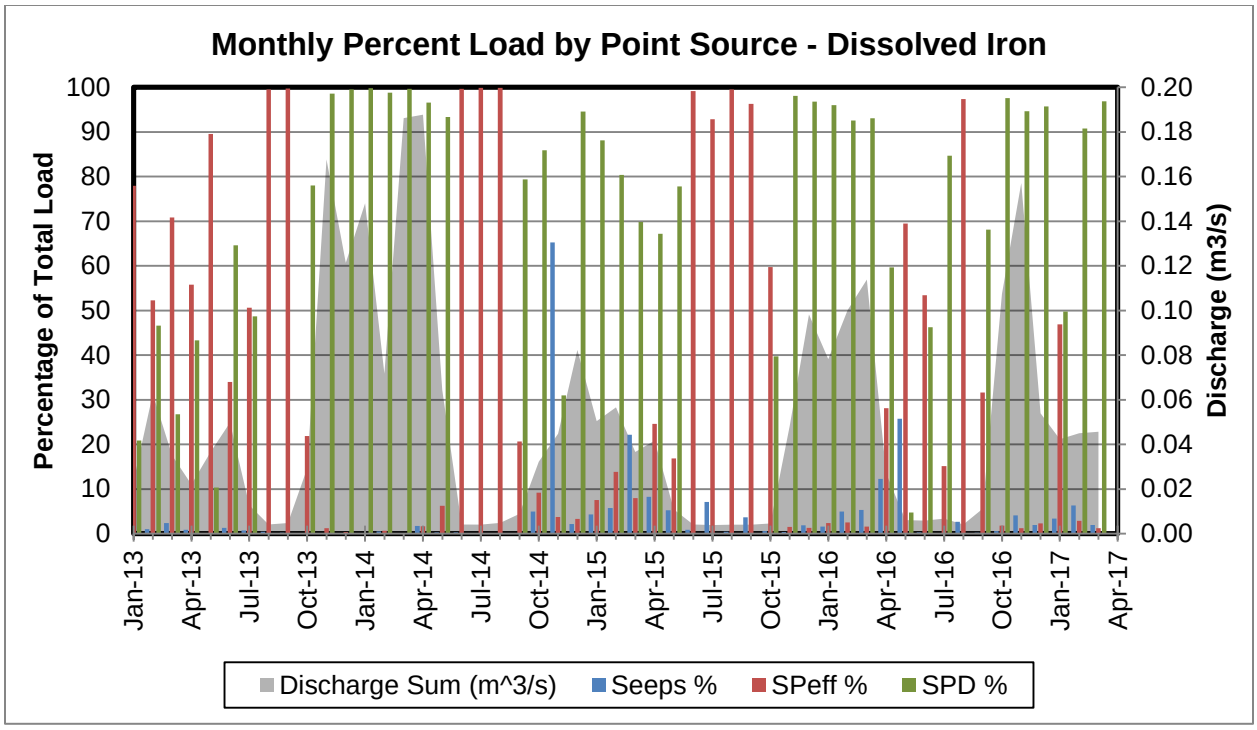


Figure 26: Monthly Percent Load by Point Source - Dissolved Iron

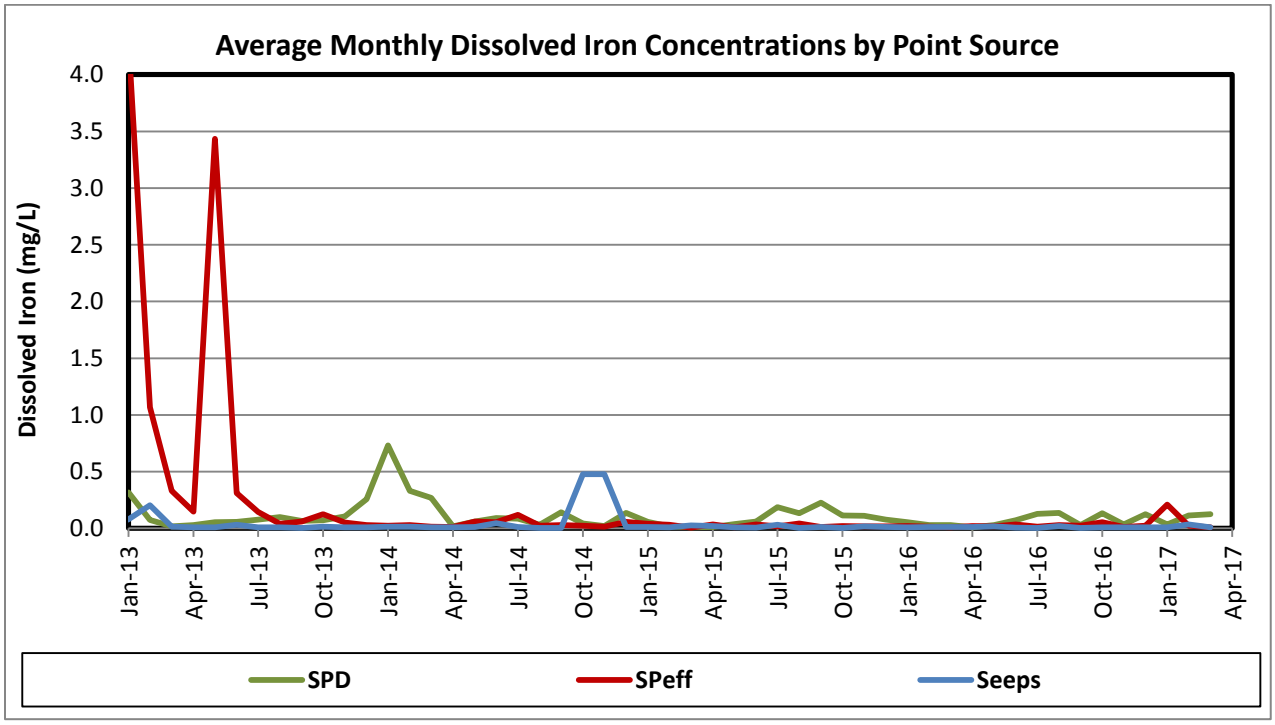


Figure 27: Average Monthly Dissolved Iron Concentrations by Point Source

3.3.3 Arsenic

Arsenic loading in Long Lake from the point sources is deemed to be insignificant. Figures 28 and 29 display point source loading and percent load indicating that amounts of arsenic discharged into Long Lake are minimal. Figure 31 displays 5 in 30 concentrations of total arsenic in Long Lake and demonstrate that concentrations at all depths are well below the maximum Water Quality Guideline level of 0.005 mg/L for freshwater aquatic life. Along with iron, future monitoring and loading calculations will be important tools to determine if mine site activities have detrimental effects on the lake.

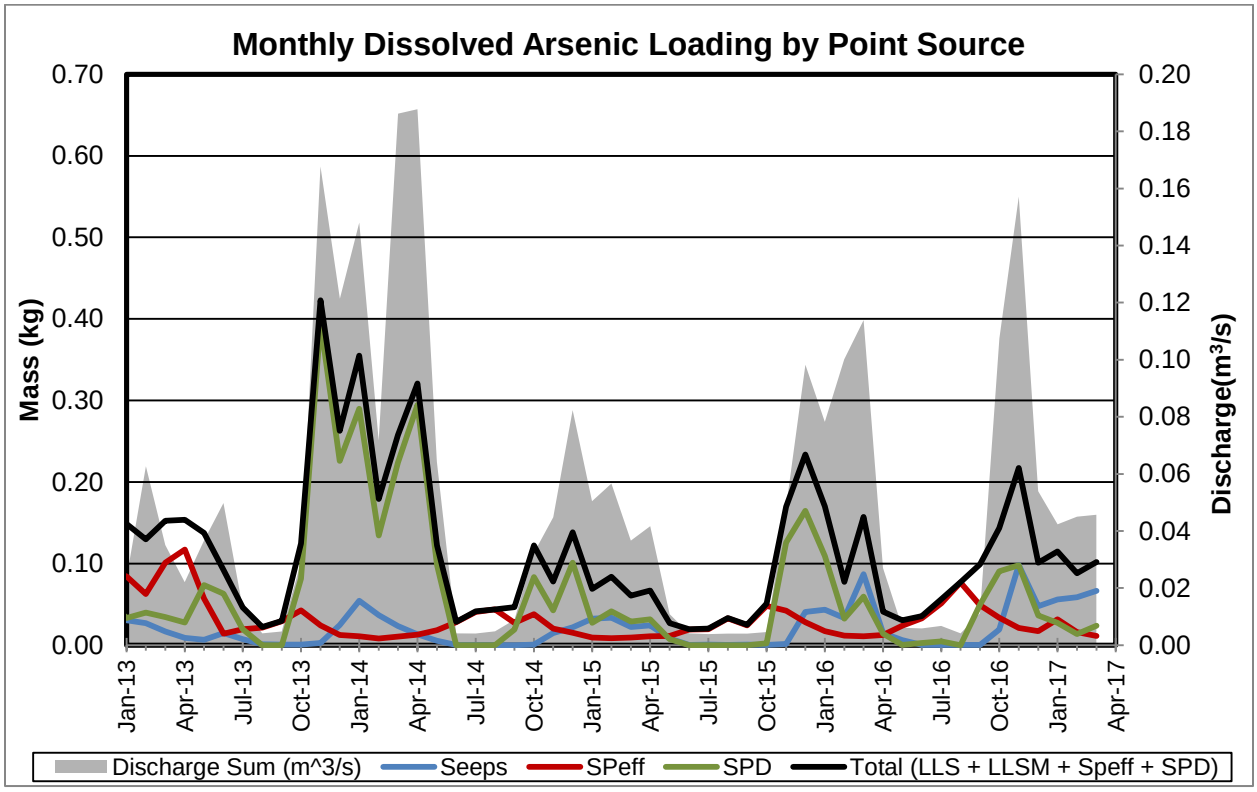


Figure 28: Average Monthly Dissolved Arsenic Loading by Point Source

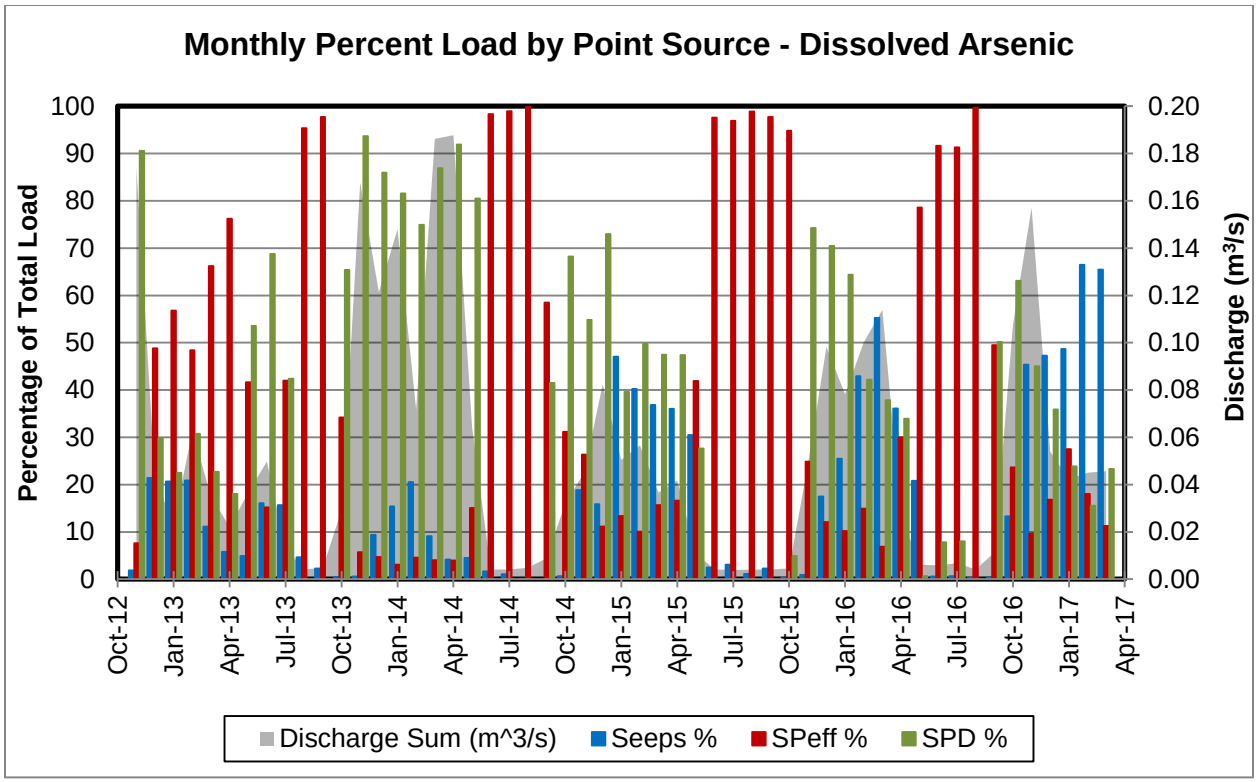


Figure 29: Monthly Percent Load by Point Source - Dissolved Arsenic

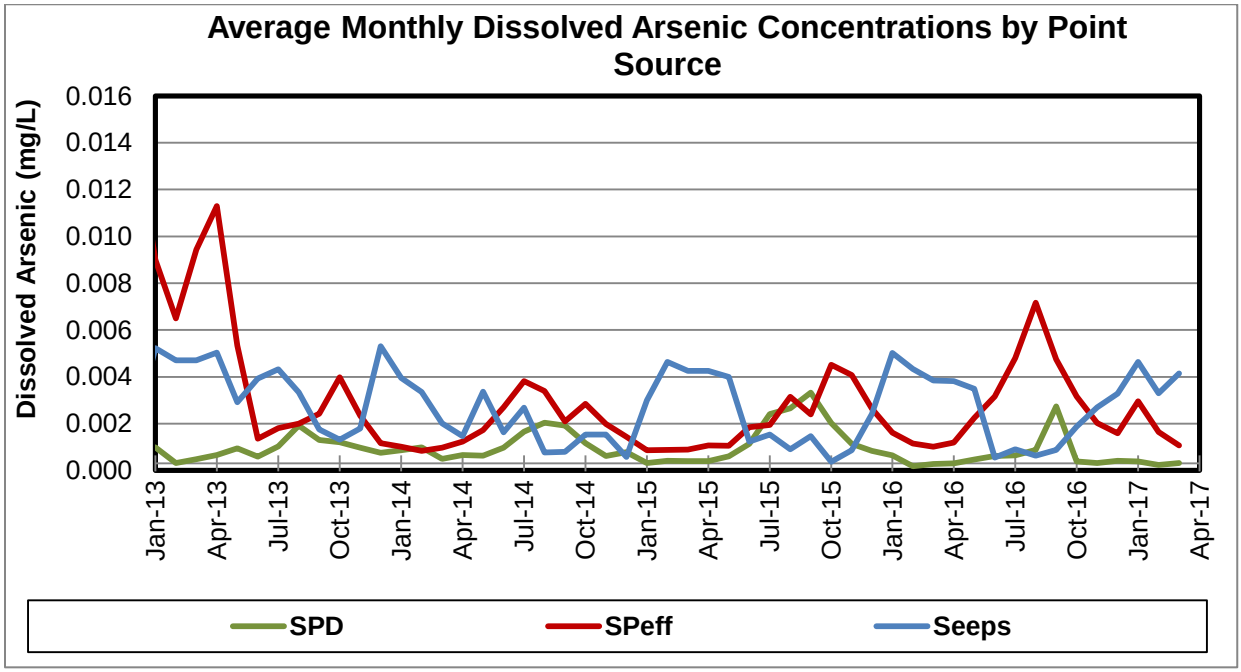


Figure 30: Average Monthly Dissolved Arsenic Concentrations by Point Source

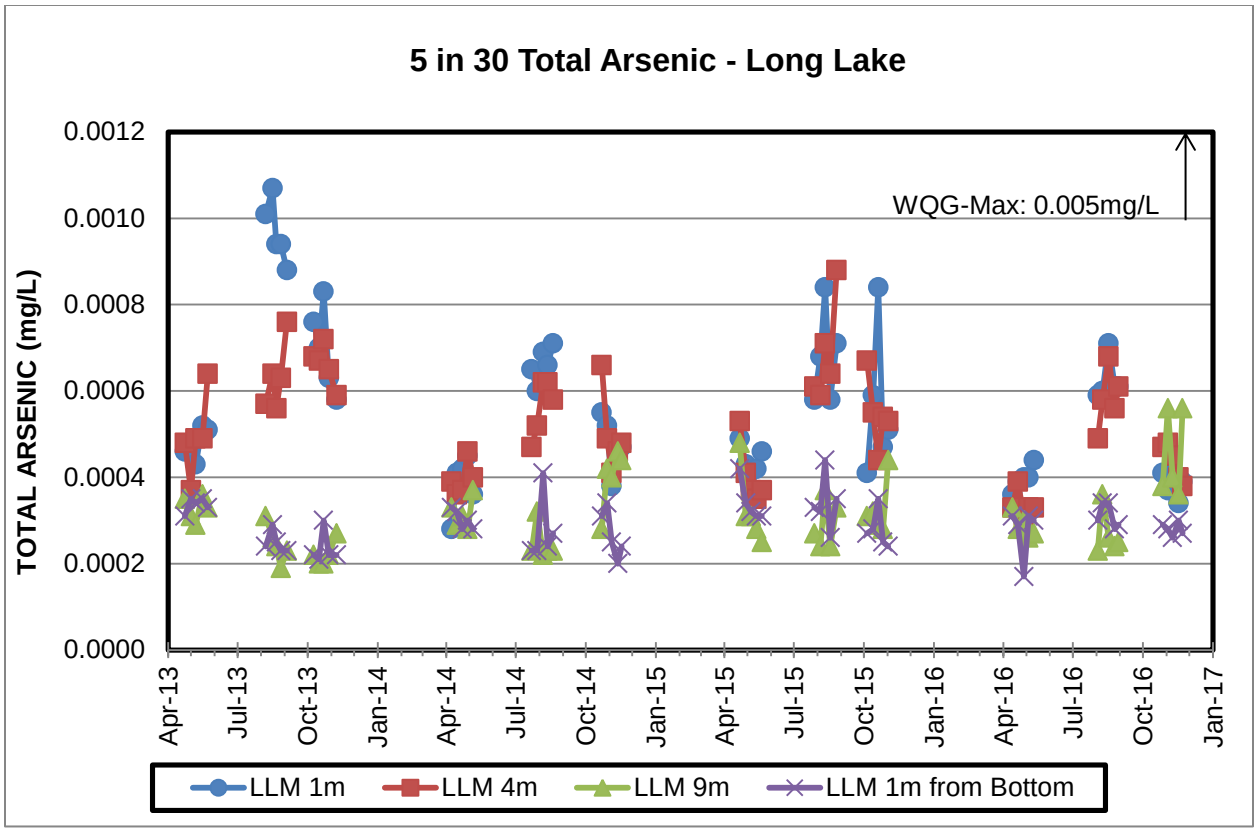


Figure 31: 5 in 30 Total Arsenic - Long Lake

Going forward, this assessment will continue to provide valuable monitoring information and potential opportunities to mitigate cumulative loading for POI in Long Lake.

4.0 Current and Future Strategies

Previous bench scale testing for the treatment system has highlighted the potential for increased sulphate reduction and/or higher flow rates through the system. Detailed results from this testing was submitted in previous quarterly treatment system reports and can be provided upon request.

Ongoing work to improve the efficiency of the LLST includes the recent (May, 2016) addition of a “carbon amendment system”. The “carbon amendment system” that has been commissioned injects molasses into the BCR cell influent at a current rate of approximately 100 litres per week. The potential benefits being assessed are:

- Improving sulphate reduction and minimizing loading into Long Lake
- Increasing the life of the substrate in the bio-chemical reactor cell (BCR cell)
- The possibility of increasing flow rate through the system inhibiting water from entering Long Lake via the seeps

Ongoing maintenance and minor tweaking of the system have optimized dosing and reliability of the system.

Figure 32: Carbon Amendment System

Overall sulphate reduction through the LLST since the molasses addition began has shown variable results with respect to previous year's and month to month performance. Additional evaluation from Golder is in progress to aid in the understanding of system performance and to direct future treatment system performance objectives.

Loading calculations will continue for aggregate loading into Long Lake from mine-related point sources of discharge. Improvements will be explored as necessary and research will continue on the mitigation of mine-related impacts on Long Lake. A decision will be made shortly regarding whether the carbon source "MicroC" would be more suitable for system performance. Discussions between Golder Associates and Quinsam staff have been ongoing to determine best practices and any potential system modifications.