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# Technical Report Overview

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**Report:** Permit 107517 Annual Water Quality Monitoring Report, 2015 (March 31, 2016)

**Overview:** This report presents the 2015 results of the surface water monitoring program required under Permit 107517. The report summarizes environmental incidents (i.e., non-compliances) recorded in 2015, summarizes monitoring data for discharges and receiving environment water sampling sites set forth in Permit 107517, and provides an assessment of the data and associated recommendations, as appropriate.

This report was prepared by Teck.

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Future studies will be made available at [teck.com/elkvalley](http://teck.com/elkvalley)

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Permit 107517

# Annual Water Quality Monitoring Report

March 31, 2016

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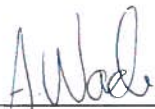
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## Abbreviations

ABMP	Area Based Management Plan (also known as the Elk Valley Water Quality Plan)
BC FAL WQG	British Columbia Freshwater Aquatic Life Water Quality Guideline
BRS	Burnt Ridge South
CaCO <sub>3</sub>	Calcium carbonate
CCME	Canadian Council of Ministers of the Environment
CMO	Coal Mountain Operations
EMA	Environmental Management Plan
EMS	Environmental Monitoring Site
EPA	Environmental Protection Agency
EVO	Elkview Operations
FRO	Fording River Operations
GHO	Greenhills Operations
LCO	Line Creek Operations
MDL	Method detection Limit
MoE	BC Ministry of Environment
MRL	Method reporting Limit
NO <sub>3</sub> <sup>-</sup>	Nitrate
QA/QC	Quality assurance/quality control
RAEMP	Regional Aquatic Effects Monitoring Program
RPD	Relative percent difference
RSD	Relative standard deviation
Se	Selenium
SO <sub>4</sub> <sup>2-</sup>	Sulphate
SP&P	Standard Practices and Procedures
SPO	Site performance objective
TIE	Toxicity Identification Evaluation
TKN	Total Kjeldahl Nitrogen
WLC AWTF	West Line Creek Active Water Treatment Facility

## Executive Summary

Permit No. 107517 takes an area based approach to authorizing and managing water quality constituents of interest originating from current and historical mining activities in the Elk Valley. To do so, requires an extensive surface water monitoring program that includes 95 authorized discharge, receiving environment and other sampling sites; seven authorized discharge compliance points; and seven Order Stations for which Site Performance Objectives have been established. These 95 permitted sampling locations are used to evaluate compliance, and overall effectiveness of the Area Based Management Plan. The following report is submitted in fulfillment of Section 10.2.4 of Permit No. 10517 and summarizes: non-compliances experienced in 2015; water quality/quantity measurements relative to appropriate compliance limits, Site Performance Objectives, and/or approved and working water quality guidelines; toxicity tests; and Quality Assurance/Quality Control issues during the 2015 calendar year.

In 2015 non-compliances were the result of either: 1) permit limit exceedances, 2) missed sample collection, 3) late reporting, or 4) failure to follow standard protocols (i.e., sampling procedures and laboratory analyses). A portion of permit limit exceedances recorded were associated with conditions outside of Teck's control. Specifically, hydrologic challenges associated with Fording River Operations' Compliance Point E300071 (FR\_FRCP1) have resulted in compliance issues. It has become increasingly evident that Compliance Point E300071 (FR\_FRCP1) is not a representative location for compliance monitoring. As outlined within Permit No. 107517, compliance points are intended to monitor all or most of the point and non-point discharges from the mine operation. The Fording River Operations Compliance Point instead measures isolated surface water that is predominantly mine-influenced water from one creek during low flow winter conditions. Teck is committed to improving water quality within the Elk Valley, and as outlined in the Area Based Management Plan, significant improvements are targeted with proposed water treatment mitigation at Fording River.

Other non-compliances were associated with our Line Creek Operations. Throughout 2015, Line Creek Operations has been dewatering Burnt Ridge South to allow for safe mining of the North Line Creek Extension pit while trying to maintain compliance with the nitrate-N monthly average permit limit at sampling site E297110 (LC\_LCDSSLCC). Despite efforts to manage nitrate concentrations by modifying pumping rates, there were two monthly average non-compliances in 2015 (February and December). As a result and in consideration of changing compliance limits at this sampling site in 2016, a number of mitigative activities have been initiated including: active management of pumping, nitrate source control efforts, additional toxicity testing to evaluate potential effects of nitrate and ongoing nitrate removal through operation of the West Line Creek Active Water Treatment Facility.

Non-compliances were also recorded in 2015 associated with *Daphnia magna* acute toxicity testing. Work completed to date suggests that laboratory procedures (i.e., heating of the water) are directly influencing chemical reactions within test chambers, which in turn are adversely affecting *D. magna* survival. As a result, the interim corrective action is to collect split-samples. *D. magna* acute toxicity testing (i.e., single concentration) results are evaluated for each split-sample. One split is tested at the standard temperature of 20°C; while the other is tested at 10°C, or the field measured water temperature (whichever is highest). Results of both tests are reported and reports will include findings

for hardness, alkalinity, pH, temperature, and formation of precipitate either in the testing vessel or on the organism.

Other non-compliances encountered in 2015 were largely the result of operator error. Therefore improvements in planning (e.g., scheduling of sample collection/shipping around statutory holidays), internal and external communications (e.g., timely reporting), and following standard protocols are anticipated to mitigate encountered non-compliances.

In consideration of the extensive surface water monitoring program required under Permit No. 107517, in conjunction with all other active monitoring programs (e.g., Regional Aquatic Effects Monitoring), it is not anticipated that any additional monitoring is required at this time.

## 1 Introduction

After consideration of the July 22, 2014 Elk Valley Area Based Management Plan (ABMP) and approval by the Minister on November 18, 2015, Permit 107517 was issued under provisions of the Environmental Management Act (EMA). Permit 107517 takes an area-based approach to authorizing and managing water quality constituents of interest originating from current and historical mining activities in the Elk Valley.

The Elk Valley, located in the southeast corner of British Columbia, is bisected by the Elk River which in turn is fed by a number of tributaries of which the Fording River and Michel Creek are the largest. Primary communities in the Elk Valley include Elkford, Sparwood, Hosmer, Fernie, and Elko. Presently, five steelmaking coal mines are operated by Teck Coal Limited (Teck) within the Elk Valley. They include Fording River Operations, Greenhills Operations, Line Creek Operations, Elkview Operations, and Coal Mountain Operations, see Figure 1. The following report summarizes environmental incidents (i.e., non-compliances) recorded in 2015, summarizes monitoring data for discharges and receiving environment water sampling sites set forth in Permit 107517, and provides an assessment of the data and associated recommendations, as appropriate.

### 1.1 Authorized Discharge and Receiving Environment Water Sampling Sites

Permit 107517 requires the collection of water samples from 82 authorized discharges, receiving environment, and other sampling sites. The relative allocation of water sampling sites per Operation is as follows:

- Fording River Operations (FRO) collects samples from 18 water sampling sites
- Greenhills Operations (GHO) collects samples from 19 water sampling sites
- Line Creek Operations (LCO) collects samples from 14 water sampling sites
- Elkview Operations (EVO) collects samples from 21 water sampling sites
- Coal Mountain Operations (CMO) collects samples from six (6) water sampling sites
- Lake Kooacanusa for which there are four (4) water sampling sites

Authorized discharge and receiving environment water sampling sites noted above are numerically identified via dedicated Environmental Monitoring Site (EMS) numbers and corresponding site-specific sampling codes, a summary of which sampling sites are respectively presented in Tables 1 through 6, see below.



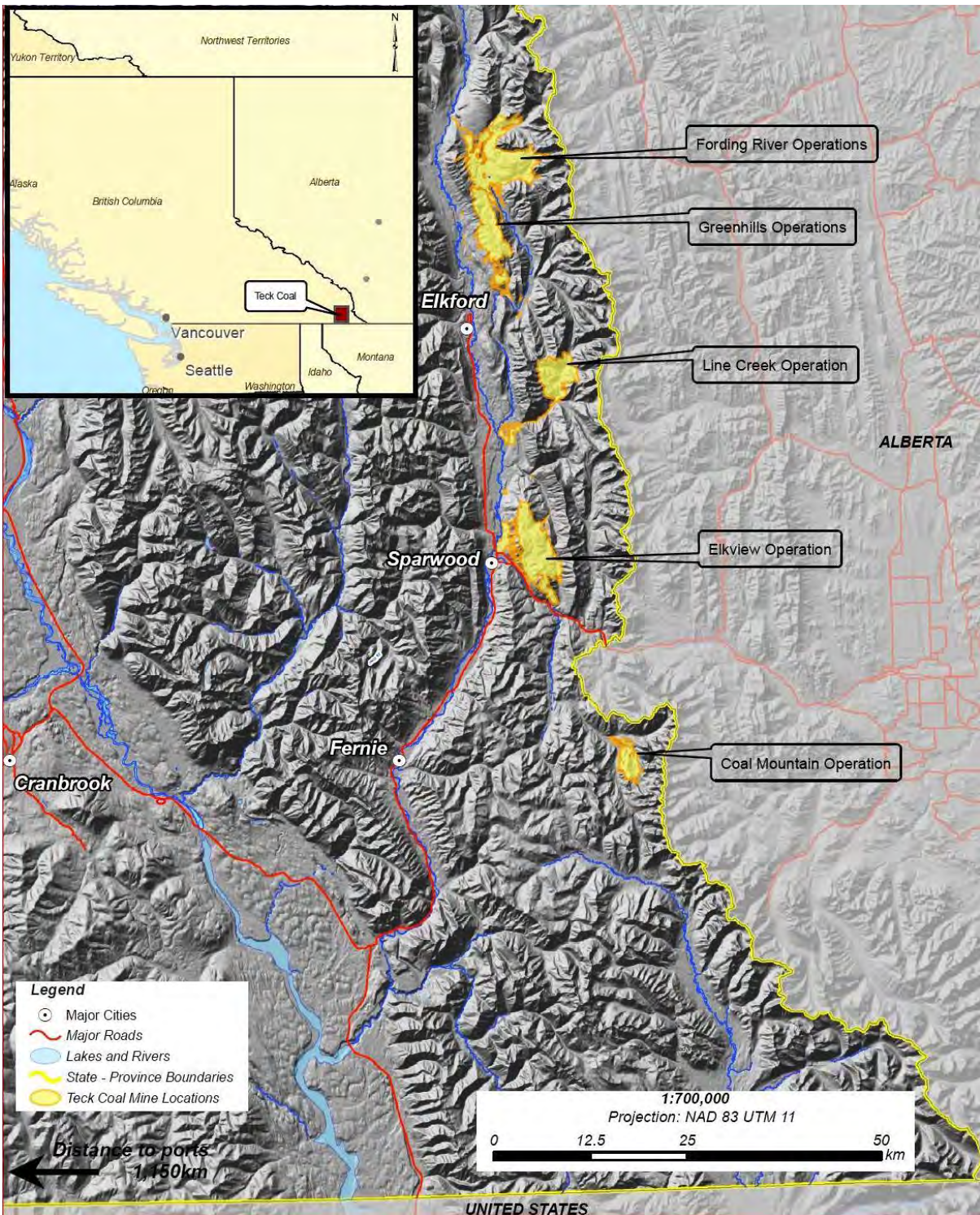


Figure 1. Location of Teck's five steelmaking coal operations within the Elk Valley, British Columbia.

**Table 1. Summary of discharge, receiving environment, and other water sampling sites for Fording River Operations.**

EMS ID	Site ID	Sampling Site Type	Sampling Site Description
E216777	FR_UFR1	Receiving Environment	Fording River upstream of Henretta
E300096	FR_HC3	Receiving Environment	Henretta Creek upstream of McQuarrie Creek
E216779	FR_HC2	Receiving Environment	Henretta Creek upstream of McMillan Creek
E216781	FR_HP1	Authorized Discharge	Henretta Pit Effluent into Diversion Culverts
E216778	FR_HC1	Receiving Environment	Henretta Creek at Mouth
0200251	FR_FR1	Receiving Environment	Fording River Downstream of Henretta
E102481	FR_CC1	Authorized Discharge	Clode Pond Decant
E105060	FR_NGD1	Other	North Greenhills Diversion Ditch at Mouth
E102480	FR_EC1	Authorized Discharge	Eagle Pond Decant
E102475	FR_TP1	Authorized Discharge	Tailings Slurry to North Tailings Pond
E102476	FR_NL1	Authorized Discharge	North Loop Pond
E206660	FR_TP3	Authorized Discharge	Tailings Slurry to South Tailings Pond
E261897	FR_SP1	Authorized Discharge	Smith Ponds
0200201	FR_FR2	Receiving Environment	Fording River Upstream of Kilmarnock Creek
0200252	FR_KC1	Other	Kilmarnock at Downstream of Rock Drain
E208394	FR_SKP1	Authorized Discharge	South Kilmarnock Sedimentation Pond – Phase I
E208395	FR_SKP2	Authorized Discharge	South Kilmarnock Sedimentation Pond – Phase II
E300097	FR_FRRD	Receiving Environment	Fording River near Fording Road

Notes: 1. Environmental Monitoring Site (EMS) identification numbers (IDs) correspond to those listed in the Ministry's monitoring data repository.

The spatial location and distribution of authorized discharge, receiving environment, and other water sampling sites for FRO are presented in Map 1.

**Table 2. Summary of discharge and receiving environment water sampling sites for Greenhills Operations.**

EMS ID	Site ID	Sampling Site Type	Sampling Site Description
E105061	GH_SC2	Authorized Discharge	Swift Creek Sed. Pond Bypass
E221329	GH_SC1	Authorized Discharge	Swift Creek Sed. Pond Decant
0200384	GH_CC1	Authorized Discharge	Cataract Creek Sed. Pond Decant
0200385	GH_PC1	Authorized Discharge	Porter Creek Sed. Pond Decant
E287438	GH_TPS	Authorized Discharge	Tailings Pond Water
E102709	GH_GH1	Authorized Discharge	Greenhills Creek Sed. Pond Decant
E207437	GH_RLP	Authorized Discharge	Rail Loop Sed. Pond Decant
0200389	GH_ER2	Receiving Environment	Elk River upstream of Greenhills Operations
E287437	GH_BR_F	Authorized Discharge	Branch F at LRP Road
E287436	GH_WOLF	Authorized Discharge	Wolf Creek at LRP Road
E287434	GH_WILLOW	Authorized Discharge	Willow Creek North at LRP Road
E287435	GH_WILLOW_S	Authorized Discharge	Willow Creek South at LRP Road
E287433	GH_WADE	Authorized Discharge	Wade Creek at LRP Road
E287432	GH_COUGAR	Authorized Discharge	Cougar Creek at LRP Road
0200388	GH_MC1	Authorized Discharge	Mickelson Creek
E257796	GH_LC1	Authorized Discharge	Leask Creek Sed. Pond Decant
E257795	GH_WC1	Authorized Discharge	Wolfram Creek Sed. Pond Decant

EMS ID	Site ID	Sampling Site Type	Sampling Site Description
E207436	GH_TC2	Authorized Discharge	Thompson Creek Sed. Pond Decant
E102714	GH_TC1	Authorized Discharge	Thompson Creek at LRP Road

Notes: 1. Environmental Monitoring Site (EMS) identification numbers (IDs) correspond to those listed in the Ministry's monitoring data repository.

The spatial location and distribution of authorized discharges and receiving environment water sampling sites for GHO are presented in Map 2.

**Table 3. Summary of discharge and receiving environment water sampling sites for Line Creek Operations.**

EMS ID	Site ID	Sampling Site Type	Sampling Site Description
E288273	LC_DC3	Receiving Environment	Dry Creek Upstream of East Tributary Creek
E216142	LC_LC1	Receiving Environment	Line Creek Upstream MSA North Pit
0200335	LC_LC2	Receiving Environment	Line Creek Upstream of Rock Drain (~140 meters [m] Upstream of the WLC WTP outfall)
E216144	LC_LC7	Authorized Discharge	MSA North Ponds Effluent to Line Creek
E223240	LC_LC12	Receiving Environment	North Horseshoe Creek Near Mouth
E221268	LC_LC9	Authorized Discharge	No Name Creek Pond Effluent to Line Creek
E293369	LC_LCUSWLC	Receiving Environment	Line Creek Upstream of West Line Creek, Below Rock Drain
E261958	LC_WLC	Receiving Environment	West Line Creek
E293372	LC_WTF_IN	Receiving Environment	WLC WTP Combined Flow (Influent)
E282149	LC_SLC	Receiving Environment	South Line Creek
E291569	LC_WTF_OUT	Authorized Discharge	WLC WTP Outfall (Effluent)
0200337	LC_LC3	Receiving Environment	Line Creek downstream of West Line Creek (~200 m Downstream of the WLC WTP Outfall)
E219411	LC_LC8	Authorized Discharge	Contingency Treatment System Effluent to Line Creek
0200044	LC_LC4	Receiving Environment	Line Creek upstream of Process Plant (~5,550 m Downstream of the WLC WTP Outfall)

Notes: 1. Environmental Monitoring Site (EMS) identification numbers (IDs) correspond to those listed in the Ministry's monitoring data repository.  
2. WLC WTP = West Line Creek Water Treatment Plant.

The spatial location and distribution of authorized discharges and receiving environment water sampling sites for LCO are presented in Map 3.



**Table 4. Summary of discharge, receiving environment, and other sampling sites for Elkview Operations.**

EMS ID	Site ID	Sampling Site Type	Sampling Site Description
0200203	EV_MC3	Receiving Environment	Michel Creek Upstream of Erickson Creek
E296311	EV_SP1	Authorized Discharge	South Pit Creek Sed. Pond Decant
E208057	EV_MG1	Authorized Discharge	Milligan Creek Sed. Pond Decant
E298593	EV_TC1	Monitoring	Thresher Creek at Milligan Road
E206231	EV_GT1	Authorized Discharge	Gate Creek Sed. Pond Decant
E102685	EV_BC1	Authorized Discharge	Bodie Creek Sed. Pond Decant
E210369	EV_AQ1	Authorized Discharge	Aqueduct Creek Upstream of Michel Creek
E298594	EV_SPR2	Monitoring	Spring Creek at Mouth
0200027	EV_ER4	Receiving Environment	Elk River Upstream of Grave Creek
E298595	EV_WF_NW	Monitoring	West Fork North Monitoring Well
E298596	EV_WF_SW	Monitoring	West Fork South Monitoring Well
E298590	EV_DC1	Authorized Discharge	Dry Creek Sed. Pond Decant
E102681	EV_SM1	Authorized Discharge	6 Mile Creek Sed. Pond Decant
E298592	EV_BLM2	Monitoring	Balmer Creek at CFI Road
E298591	EV_FC1	Monitoring	Fennelon Creek at CFI Road
E258135	EV_LC1	Authorized Discharge	Lindsay Creek Infiltration
E296310	EV_GH1	Authorized Discharge	West Fork Tailings Effluent
E208043	EV_GC2	Authorized Discharge	Goddard Creek Sed. Pond Decant
E102679	EV_OC1	Authorized Discharge	Otto Creek Sed. Pond Decant
0200097	EV_EC1	Authorized Discharge	Erickson Creek at Mouth
0200111	EV_ER2	Receiving Environment	Elk River Upstream of Michel Creek

Notes: 1. Environmental Monitoring Site (EMS) identification numbers (IDs) correspond to those listed in the Ministry's monitoring data repository.

The spatial location and distribution of authorized discharges, receiving environment, and other water sampling sites for EVO are presented in Map 4.

**Table 5. Summary of discharge and receiving environment water sampling sites for Coal Mountain Operations.**

EMS ID	Site ID	Sampling Site Type	Sampling Site Description
E258175	CM_MC1	Receiving Environment	Michel Creek Upstream of Operations
E206438	CM_CCPD	Authorized Discharge	Decant Discharge from Corbin Sedimentation Pond to Corbin Creek
E298733	CM_PC2	Authorized Discharge	Pengelly Channel to Corbin Creek
E298734	CM_SOW	Authorized Discharge	Sowchuck Sump
E102488	CM_SPD	Authorized Discharge	Decant Discharge from Main Interceptor Sedimentation Ponds to Corbin Creek
E200209	CM_CC1	Receiving Environment	Corbin Creek Near Confluence with Michel Creek

Notes: 1. Environmental Monitoring Site (EMS) identification numbers (IDs) correspond to those listed in the Ministry's monitoring data repository.

The spatial location and distribution of authorized discharges and receiving environment water sampling sites for CMO are presented in Map 5.



**Table 6. Summary of receiving environment water sampling sites for Lake Koochanusa.**

EMS ID	Site ID	Sampling Site Type	Sampling Site Description
E300095	RG_KERRRD	Receiving Environment	Lake Koochanusa Downstream of Kikkoman Creek
E300092	RG_GRASMERE	Receiving Environment	Lake Koochanusa West of Grasmere
E300093	RG_USGOLD	Receiving Environment	Lake Koochanusa Upstream of Gold Creek
E300094	RG_BORDER	Receiving Environment	Lake Koochanusa Upstream of the Canada/US border

- Notes:
1. Environmental Monitoring Site (EMS) identification numbers (IDs) correspond to those listed in the Ministry's monitoring data repository.
  2. All receiving water sampling sites within Lake Koochanusa are located on lands and waters of Canada.

The spatial location and distribution of receiving environment water sampling sites within Lake Koochanusa are presented in Map 6.

### 1.1.1 Compliance Points

In addition to the 82 authorized discharges, receiving environment, and other water sampling sites outlined in Section 1.1, seven compliance points (i.e., authorized discharge locations) have also been designated within the Elk Valley. The intent of compliance points is to capture and reflect all or most point and non-point discharges from Operations, and as such, reflect an accumulated (i.e., holistic) discharge from the Operation within the receiving environment. As with other authorized discharges, compliance points are subject to discharge limits set forth in Permit 107517. A summary of the seven compliance points and their dedicated EMS numbers and corresponding site-specific sampling codes is presented in Table 7 below.

**Table 7. Summary of authorized discharge compliance points within the Elk Valley.**

EMS ID	Site ID	Sampling Site Type	Sampling Site Description
E300071	FR_FRCP1	Authorized Discharge / Receiving Environment	<b>FRO</b> - Fording River, 525 m Downstream of Cataract Creek
0200378	GH_FR1	Authorized Discharge / Receiving Environment	<b>GHO</b> Fording River - Fording River, 205 m Downstream of Greenhills Creek
E300090	GH_ERC	Authorized Discharge / Receiving Environment	<b>GHO</b> Elk River - Elk River, 220 m downstream of Thompson Creek
E297110	LC_LCDSSLCC	Authorized Discharge / Receiving Environment	<b>LCO</b> - Line Creek immediately downstream of South Line Creek Confluence (~700 m downstream of the WLC WTP outfall)
E102682	EV_HC1	Authorized Discharge / Receiving Environment	<b>EVO</b> Harmer - Harmer Spillway
E258937	CM_MC2	Authorized Discharge / Receiving Environment	<b>CMO</b> - Michel Creek, 50 m Upstream of Andy Good Creek
E300091	EV_MC2	Authorized Discharge / Receiving Environment	<b>EVO</b> Michel Creek - Michel Creek at Highway -3 Bridge

- Notes:
1. Environmental Monitoring Site (EMS) identification numbers (IDs) correspond to those listed in the Ministry's monitoring data repository.
  2. The **bold font** reflects which Operation the compliance point applies to and is intended to reflect, all or most point and non-point discharges from the Operation (e.g., FRO's compliance point is EMS E300071; FR\_FRCP1).

The spatial location and distribution of the authorized discharge compliance points is presented in Map 7.

## 1.1.2 Order Stations

In addition to the 82 authorized discharges, receiving environment, and other water sampling sites, and seven authorized discharge compliance points, Teck collects water samples at seven Order Stations for which Site Performance Objectives (SPOs) have been established. Order Stations are used to monitor water quality in the Elk Valley (i.e., the Designated Area<sup>1</sup>), and ultimately the implementation success of the ABMP. A summary of the seven Order Stations and their dedicated EMS numbers and corresponding site-specific sampling codes is presented in Table 8 below. The spatial location and distribution of the authorized discharge compliance points is presented in Map 8.

**Table 8. Summary of order stations within the Elk Valley.**

EMS ID	Site ID	Sampling Site Type	Sampling Site Description
0200378	GH_FR1	Receiving Environment / Authorized Discharge	Upper Fording River (Upstream Josephine Falls)
0200028	LC_LC5	Receiving Environment	Lower Fording River (Fording River Downstream of Line Creek)
E206661	GH_ER1	Receiving Environment	Elk River upstream of Boivin Creek (Upstream of Fording River)
0200027	EV_ER4	Receiving Environment	Elk River upstream of Grave Creek (from Fording River to Michel Creek)
200393	EV_ER1	Receiving Environment	Elk River Downstream Michel Creek
E294312	RG_ELKORES	Receiving Environment	Elk River at Elko Reservoir
E300230	RG_DSELK	Receiving Environment	Lake Koochanusa – South of the Elk River

- Notes:
1. Environmental Monitoring Site (EMS) identification numbers (IDs) correspond to those listed in the Ministry's monitoring data repository.
  2. Water sampling site EMS 200378; GH\_FR1 serves both as an Order Station (i.e., receiving environment sampling site), and as a Compliance Point (i.e., authorized discharge) for the Greenhills Operation.

<sup>1</sup> The Designated Area as defined within Permit 107517 is: "a portion of southeastern British Columbia that contains the Elk Valley Watershed and the portion of Lake Koochanusa within Canada, and is geographically defined by Ministerial Order M113. References to the Elk Valley are references to the Designated Area."

## 2 Compliance

A number of water quality sampling sites have been established within Permit 107517 to evaluate compliance, and overall effectiveness of the ABMP and its implementation. The following section summarizes authorized discharge limits established for operation-specific compliance points, and SPOs established at Order Stations. Environmental non-compliances recorded in 2015 (e.g., Ministry of Environment (MoE) inspection reports) and associated corrective actions are also summarized.

### 2.1 Effluent Limits and Site Performance Objectives – Compliance Points

As noted in Section 1.1.1, seven compliance points have been designated within the Elk Valley. The intent of each compliance point is to capture and reflect, all or most point and non-point discharges from an Operation, and as such, reflect an accumulated (i.e., integrated) discharge from that Operation. A summary of the seven compliance points and their respective discharge effluent limits is presented in Table 9 below.

**Table 9. Authorized discharge effluent limits established at compliance points within the Elk Valley (2015).**

EMS ID	Site ID	Constituent	Monthly Average Limit	Daily Maximum Limit
E300071	FR_FRCP1	Total Selenium	130 µg/L	155 µg/L
		Nitrate-N	27 mg/L as N	32.5 mg/L as N
		Sulphate	580 mg/L	-
0200378	GH_FR1	Total Selenium	80 µg/L	100 µg/L
		Nitrate-N	24 mg/L as N	29 mg/L as N
E300090	GH_ERC	Total Selenium	15 µg/L	-
		Nitrate-N	3 mg/L as N	-
E297110	LC_LCDSSLCC	Total Selenium	80 µg/L	95 µg/L
		Nitrate-N	14 mg/L as N	20 mg/L as N
E102682	EV_HC1	Total Selenium	45 µg/L	-
		Nitrate-N	4 mg/L as N	-
		Sulphate	300 mg/L	-
E300091	EV_MC2	Total Selenium	28 µg/L	-
		Nitrate-N	6 mg/L as N	-
E258937	CM_MC2	Total Selenium	19 µg/L	-
		Nitrate-N	5 mg/L as N	-
		Sulphate	500 mg/L	-

- Notes:
1. Environmental Monitoring Site (EMS) identification numbers (IDs) correspond to those listed in the Ministry's monitoring data repository.
  2. Although daily maximum discharge effluent limits have not been established at a number of the above-listed compliance points, it is expected that daily concentrations do not adversely affect the overall monthly average limit established.

In addition the above-listed effluent limits, compliance points are expected to maintain SPOs for sulphate and dissolved cadmium per the following water hardness (expressed in terms of calcium carbonate (CaCO<sub>3</sub>)) dependent relationships:

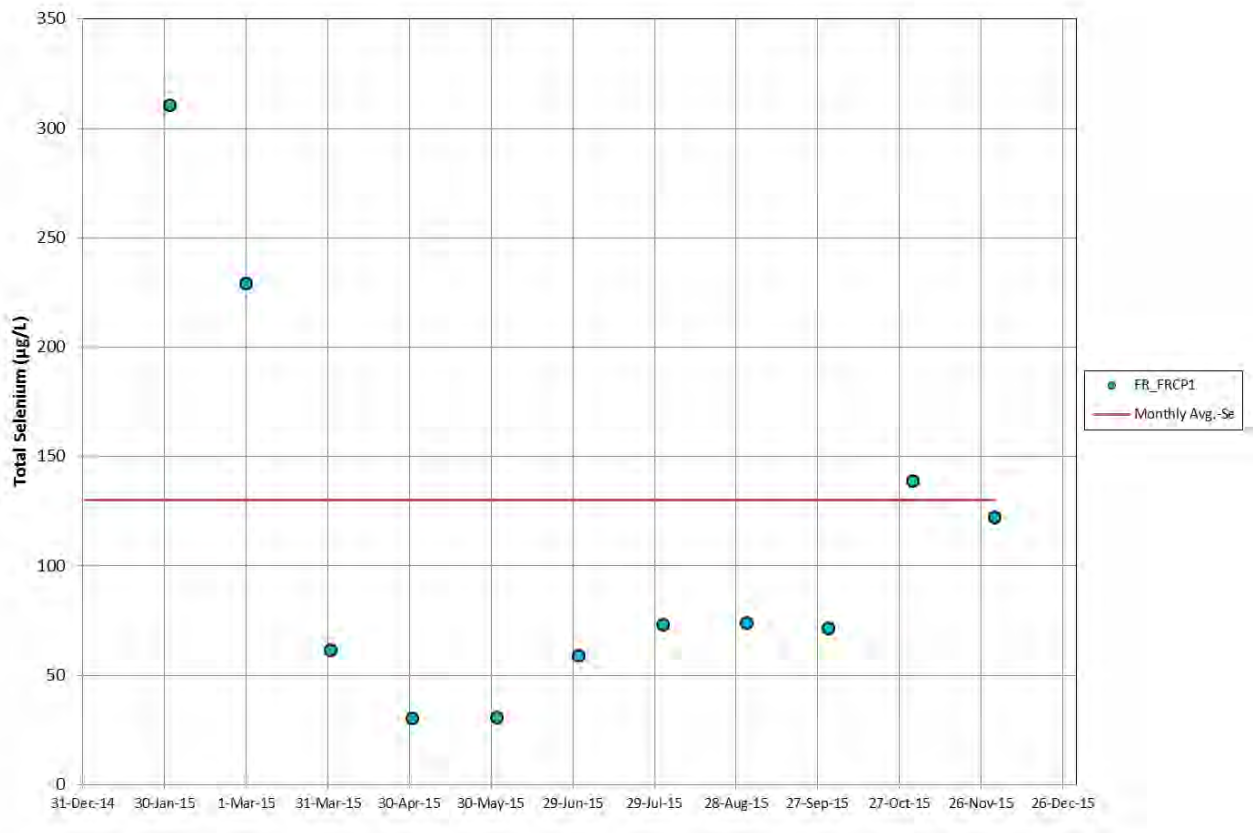
Sulphate (SO<sub>4</sub>): 128 mg/L @ ≤ 30 mg/L as CaCO<sub>3</sub>, 218 mg/L @ 31-75 mg/L as CaCO<sub>3</sub>, 309 mg/L @ 76-180 mg/L as CaCO<sub>3</sub>, 429 mg/L @ 181-250 mg/L as CaCO<sub>3</sub>, and 429 mg/L @ >250 mg/L as CaCO<sub>3</sub>.

Cadmium (Cd):  $Cd (\mu g/L) = 10^{0.831 \log(hardness) - 2.53}$

Analytical data as received from the laboratory for cadmium (total and dissolved fractions) are reported in units of milligrams per liter (mg/L). Therefore to minimize the potential for error (e.g., transcription error) in data presentation and/or evaluation, cadmium concentrations and associated limits are expressed in terms of mg/L. The above-listed cadmium SPO can be converted from µg/L to mg/L by dividing by 1000.

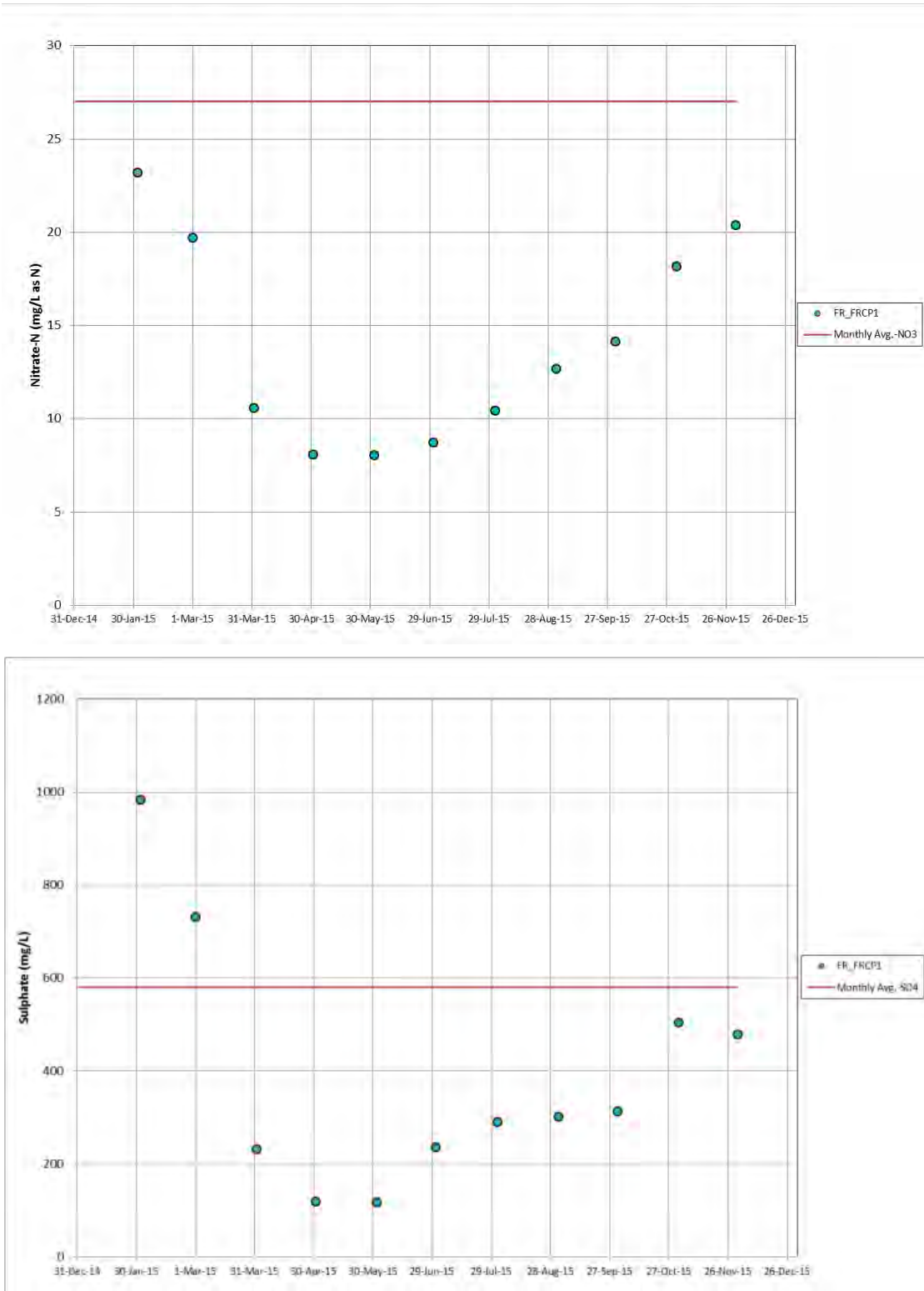
A summary of 2015 water quality data recorded at compliance points relative to the above-listed effluent discharge limits is presented below in Figures 2 to 18. Exceedances in effluent limits (i.e. non-compliances) are discussed in Section 2.3.

**Compliance Point E300071 (FR\_FRCP1)**



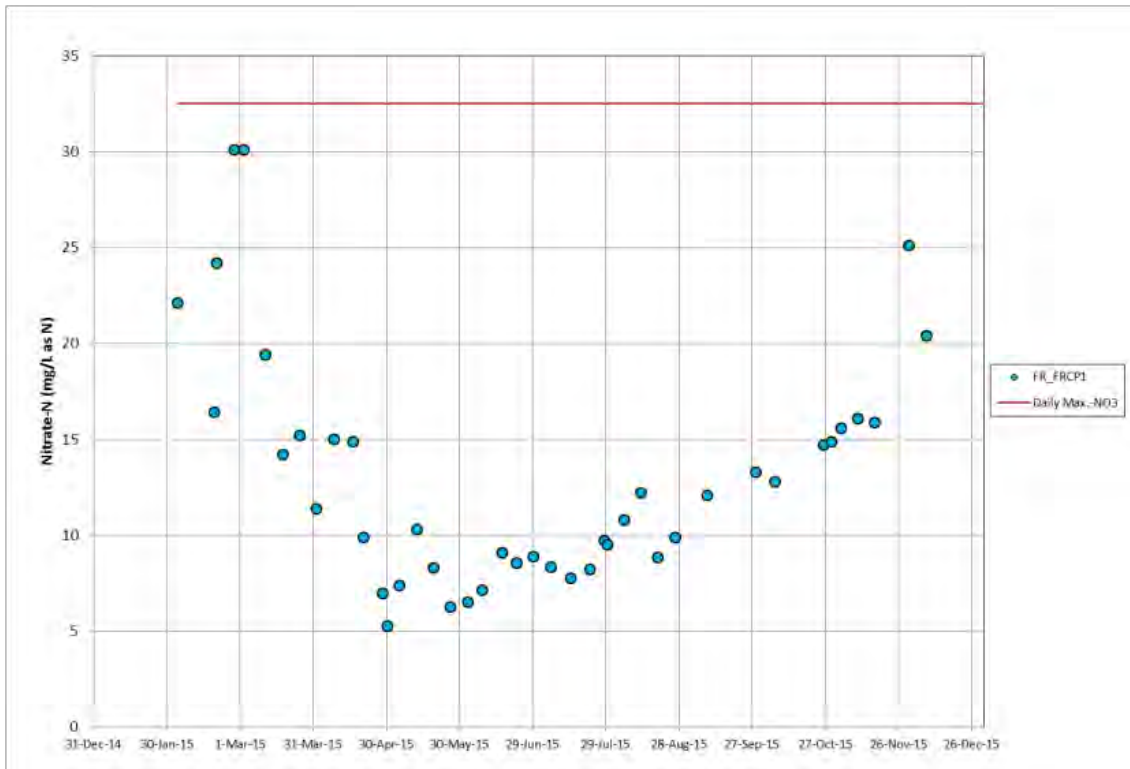
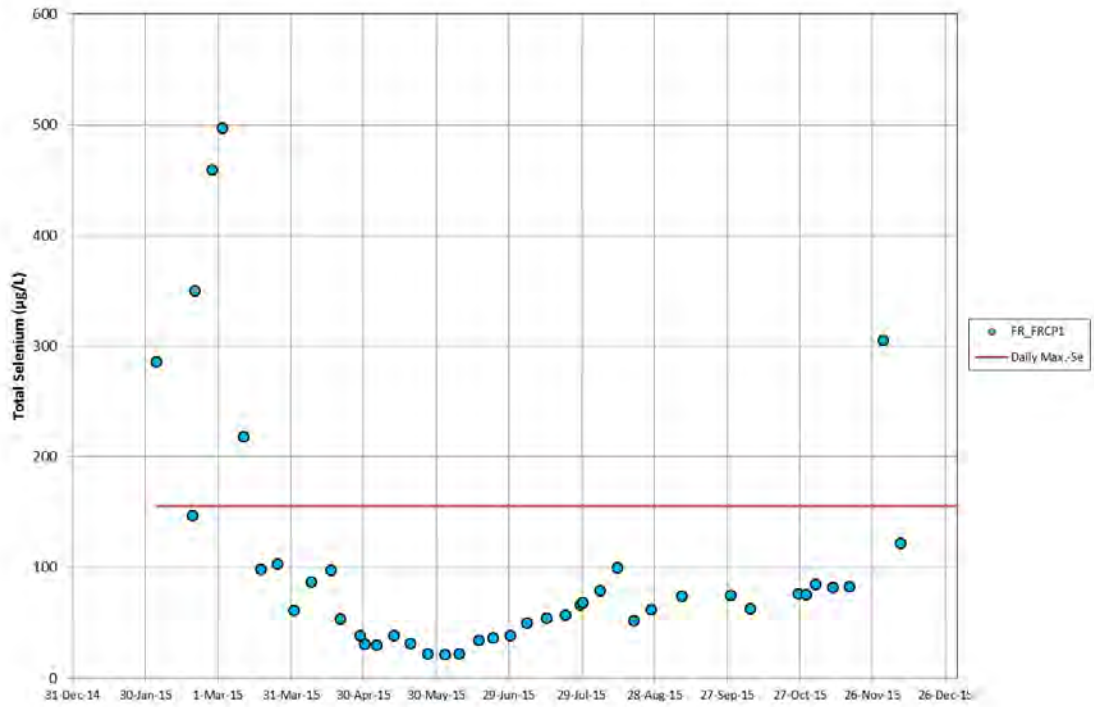
**Figure 2. Monthly average total selenium concentrations recorded at Fording River Operations Compliance Point E300071 (FR\_FRCP1).**

**Note: The monthly average compliance limit for total selenium was exceeded in February, March, and November. Compliance limit is illustrated by the horizontal line.**



**Figure 3. Monthly average nitrate (top panel) and sulphate (bottom panel) concentrations recorded at Fording River Operations Compliance Point E300071 (FR\_FRCP1).**

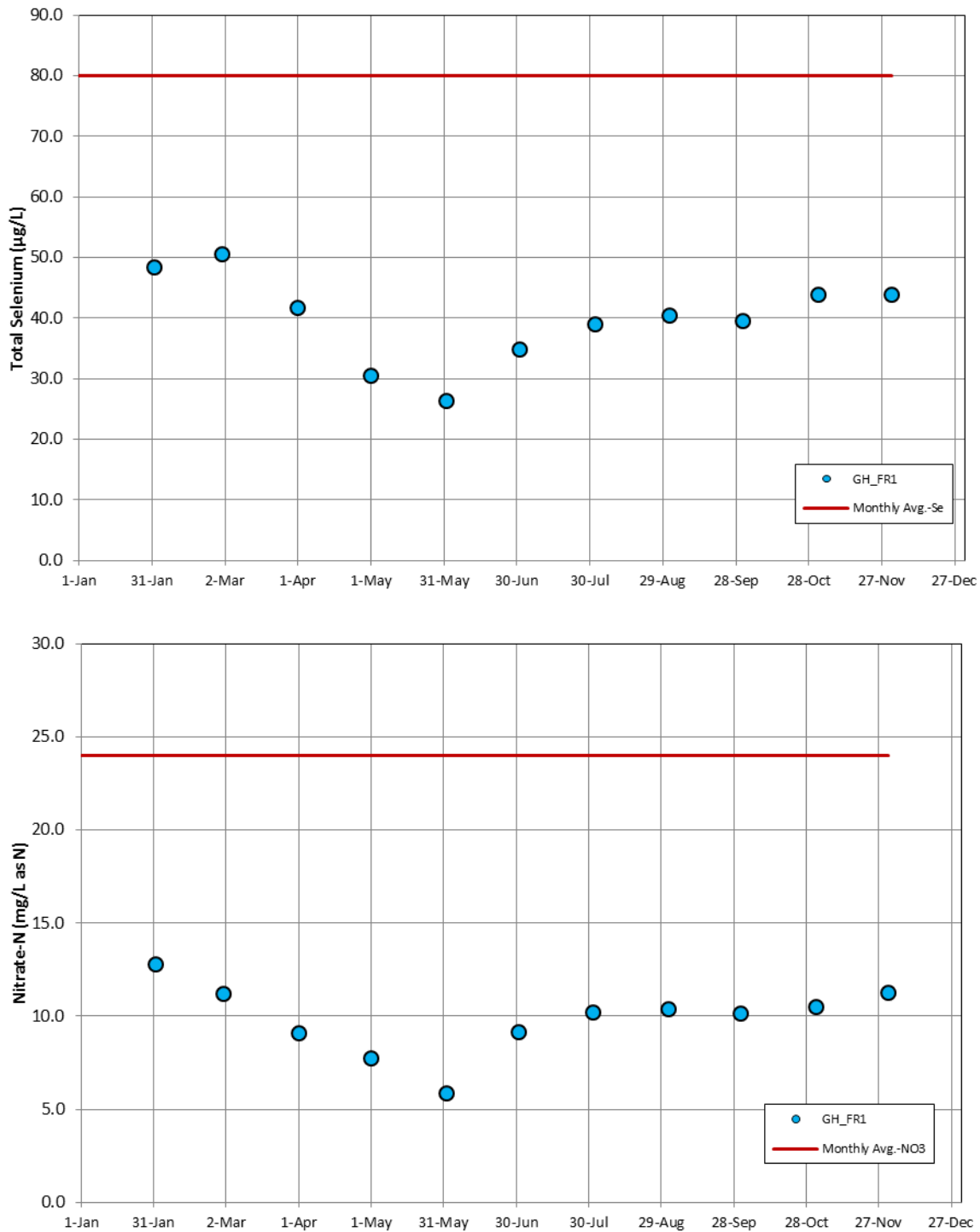
**Note: The monthly average compliance limit for sulphate was exceeded in February, March, and November. Compliance limits are illustrated by the horizontal line.**



**Figure 4. Daily maximum total selenium (top panel) and nitrate-N (Bottom Panel) concentrations recorded at Fording River Operations Compliance Point E300071 (FR\_FRCP1).**

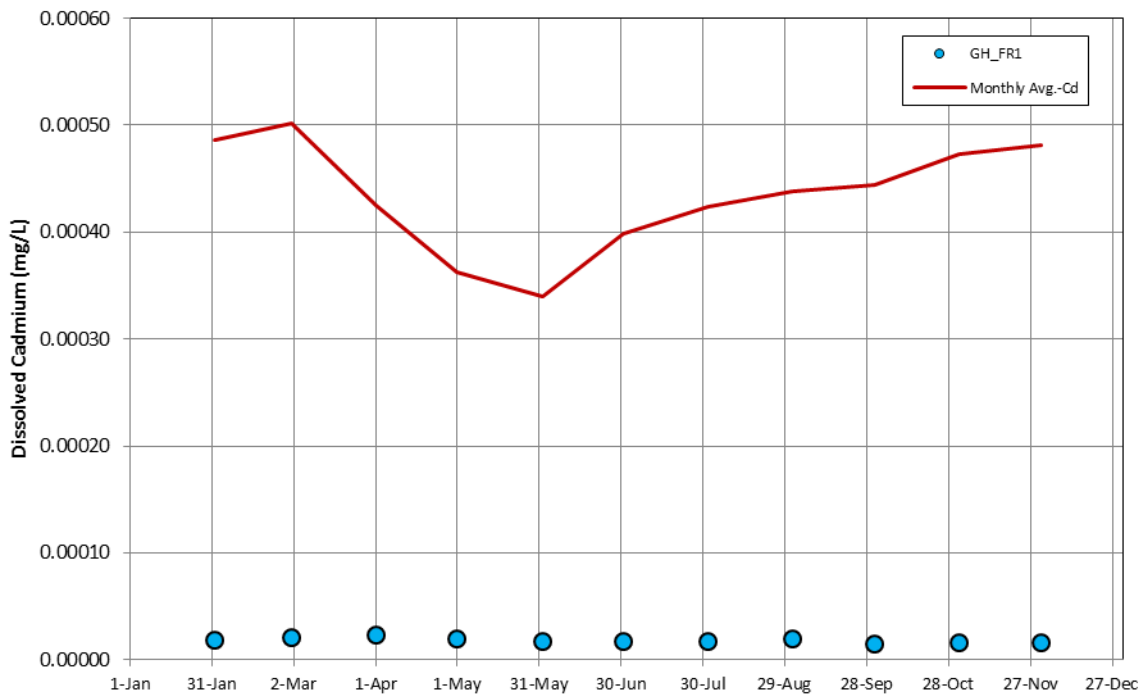
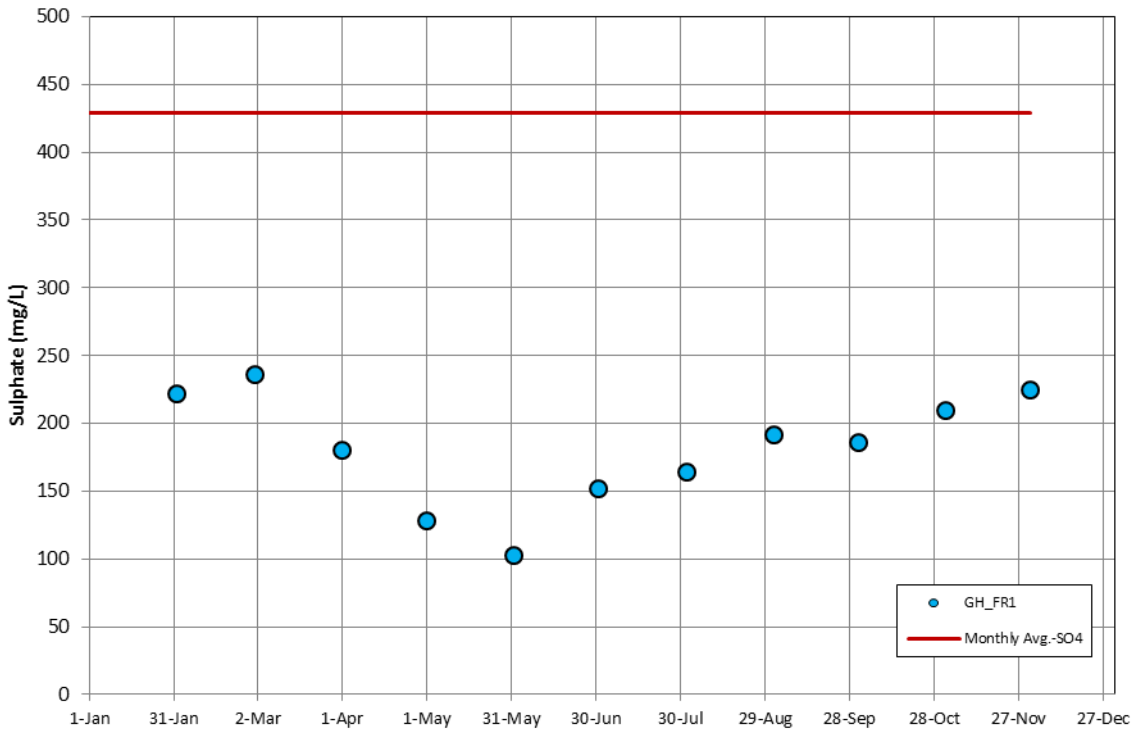
**Note: Compliance limit exceedances in February, March, and November for selenium are discussed in Section 2.3 below. Compliance limits are illustrated by the horizontal line.**

### Compliance Point 0200378 (GH\_FR1)



**Figure 5. Monthly average total selenium (top panel) and nitrate-N (bottom panel) concentrations recorded at Greenhills Operations Compliance Point 0200378 (GH\_FR1).**

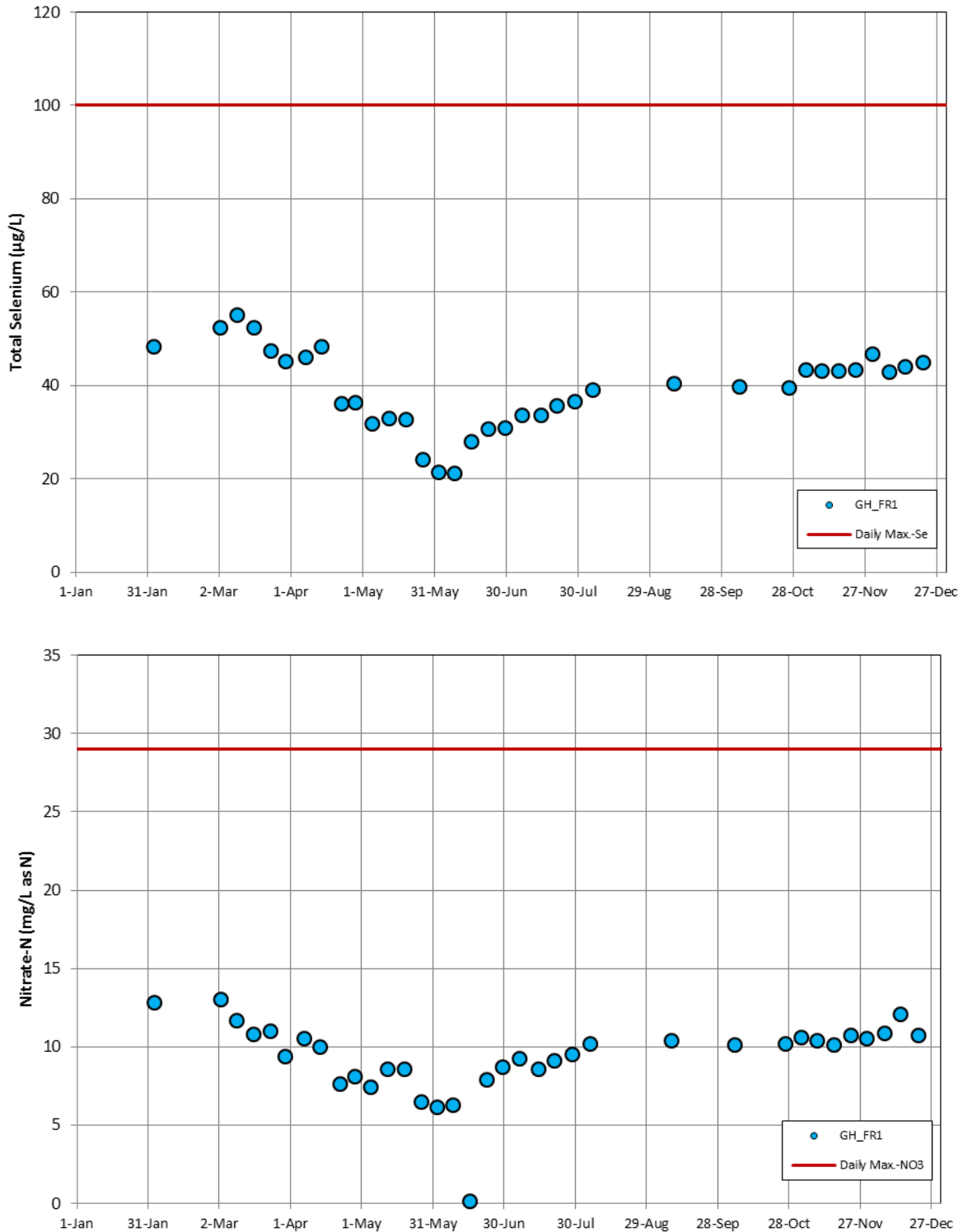
**Note: No exceedances in average monthly compliance limits were recorded in 2015. Compliance limits are illustrated by the horizontal line.**



**Figure 6. Monthly average sulphate (top panel) and cadmium (bottom panel) concentrations recorded at Greenhills Operations Compliance Point 0200378 (GH\_FR1).**

**Note: No exceedances in average monthly compliance limits were recorded in 2015. Compliance limits are illustrated by the horizontal line. The cadmium SPO is hardness dependent and as such, reflects temporal variation in water hardness.**

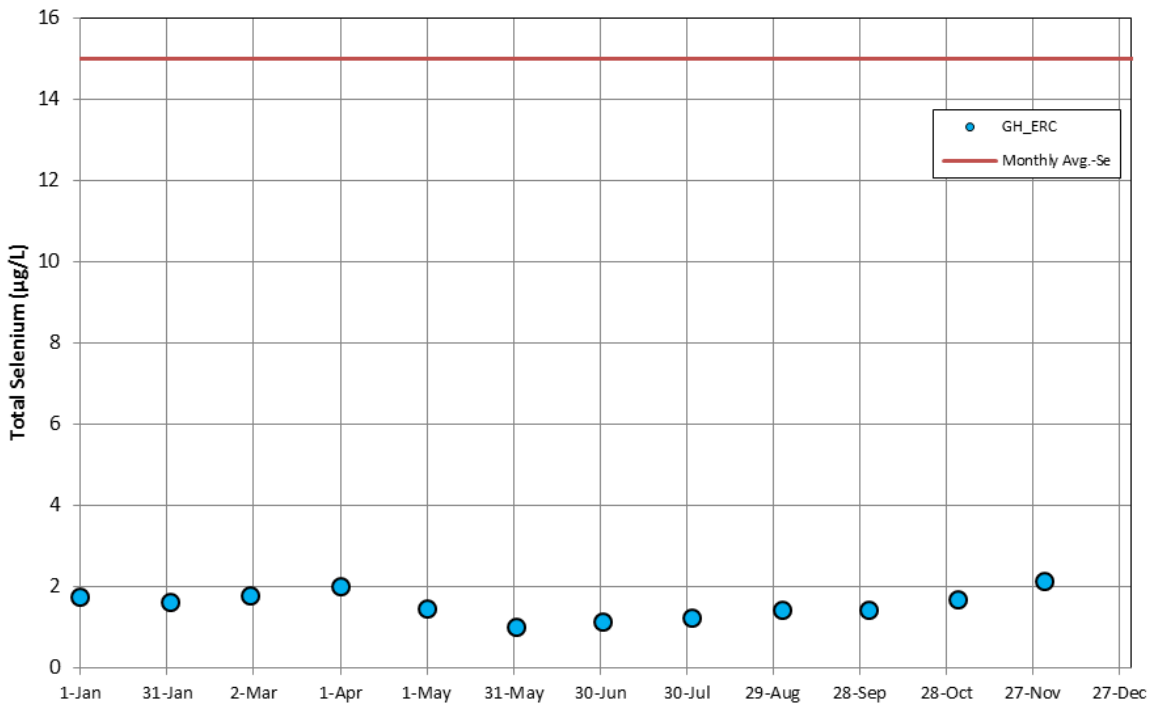
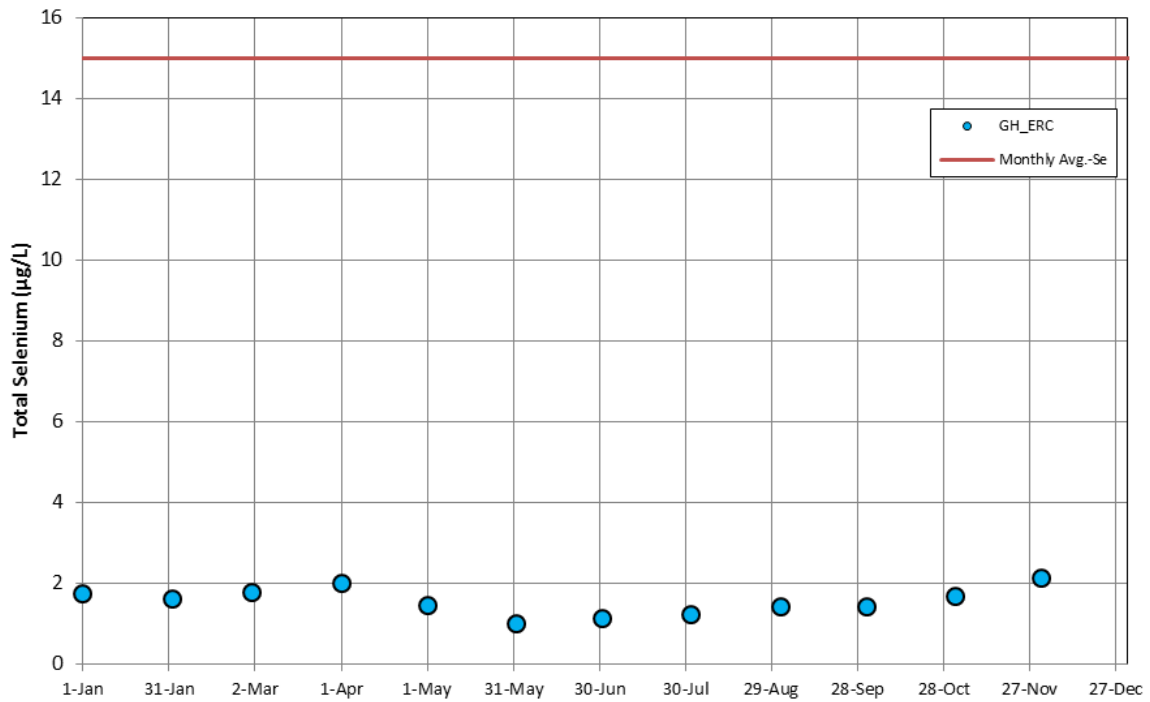




**Figure 7. Daily maximum selenium (top panel) and nitrate-N (bottom panel) concentrations recorded at Greenhills Operations Compliance Point 0200378 (GH\_FR1).**

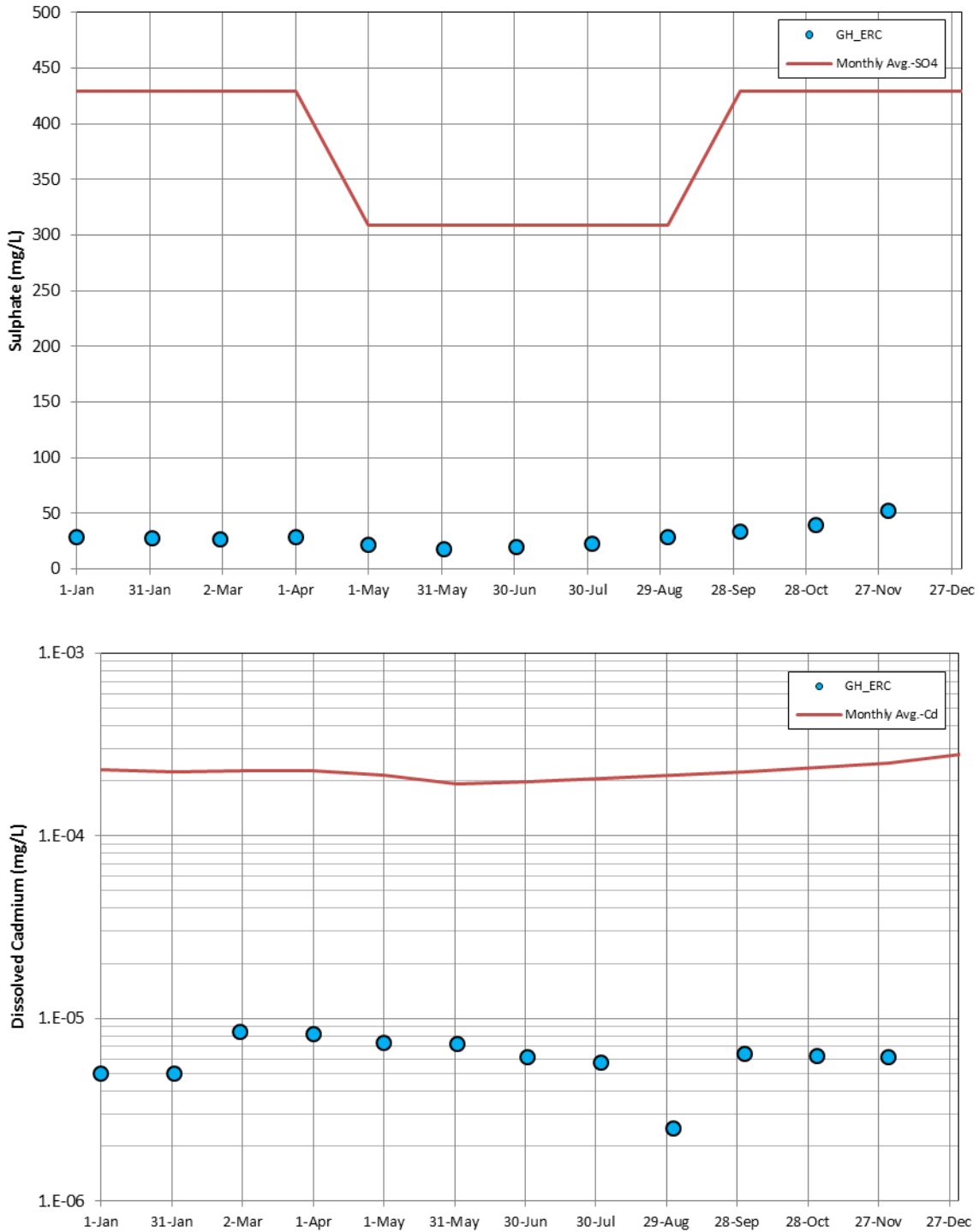
**Note: No exceedances in average monthly compliance limits were recorded in 2015. Compliance limits are illustrated by the horizontal line.**

### Compliance Point E300090 (GH\_ERC)



**Figure 8. Monthly average total selenium (top panel) and nitrate-N (bottom panel) concentrations recorded at Greenhills Operations Compliance Point E300090 (GH\_ERC).**

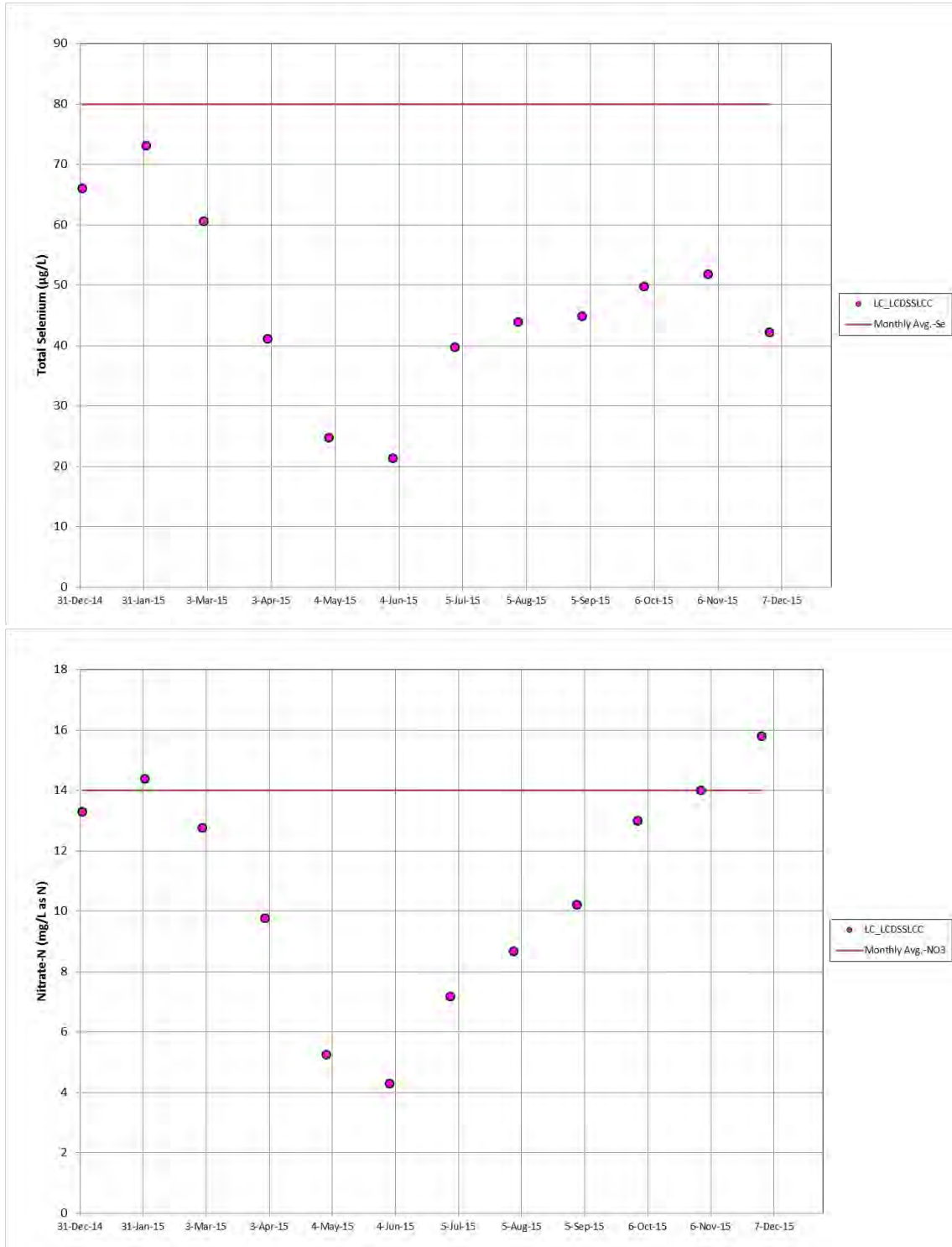
**Note: No exceedances in average monthly compliance limits were recorded in 2015. Compliance limits are illustrated by the horizontal line.**



**Figure 9. Monthly average sulphate (top panel) and cadmium (bottom panel) concentrations recorded at Greenhills Operations Compliance Point E300090 (GH\_ERC).**

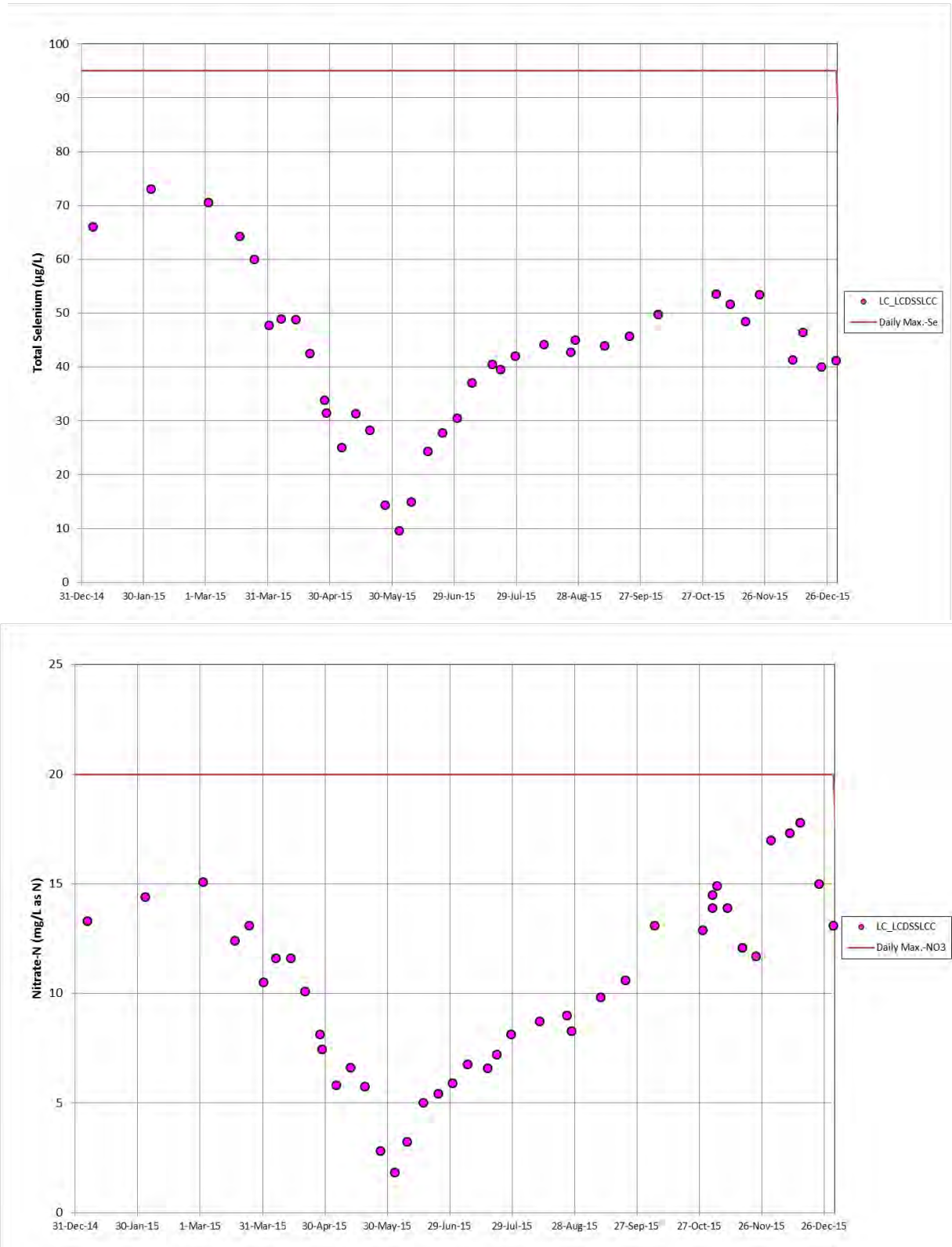
**Note: No exceedances in average monthly compliance limits were recorded in 2015. The sulphate and cadmium SPOs are hardness dependent and as such, reflect temporal variation in water hardness. Cadmium concentrations are on a logarithmic scale. Compliance limits are illustrated by the horizontal line.**

### Compliance Point E297110 (LC\_LCDSSLCC)

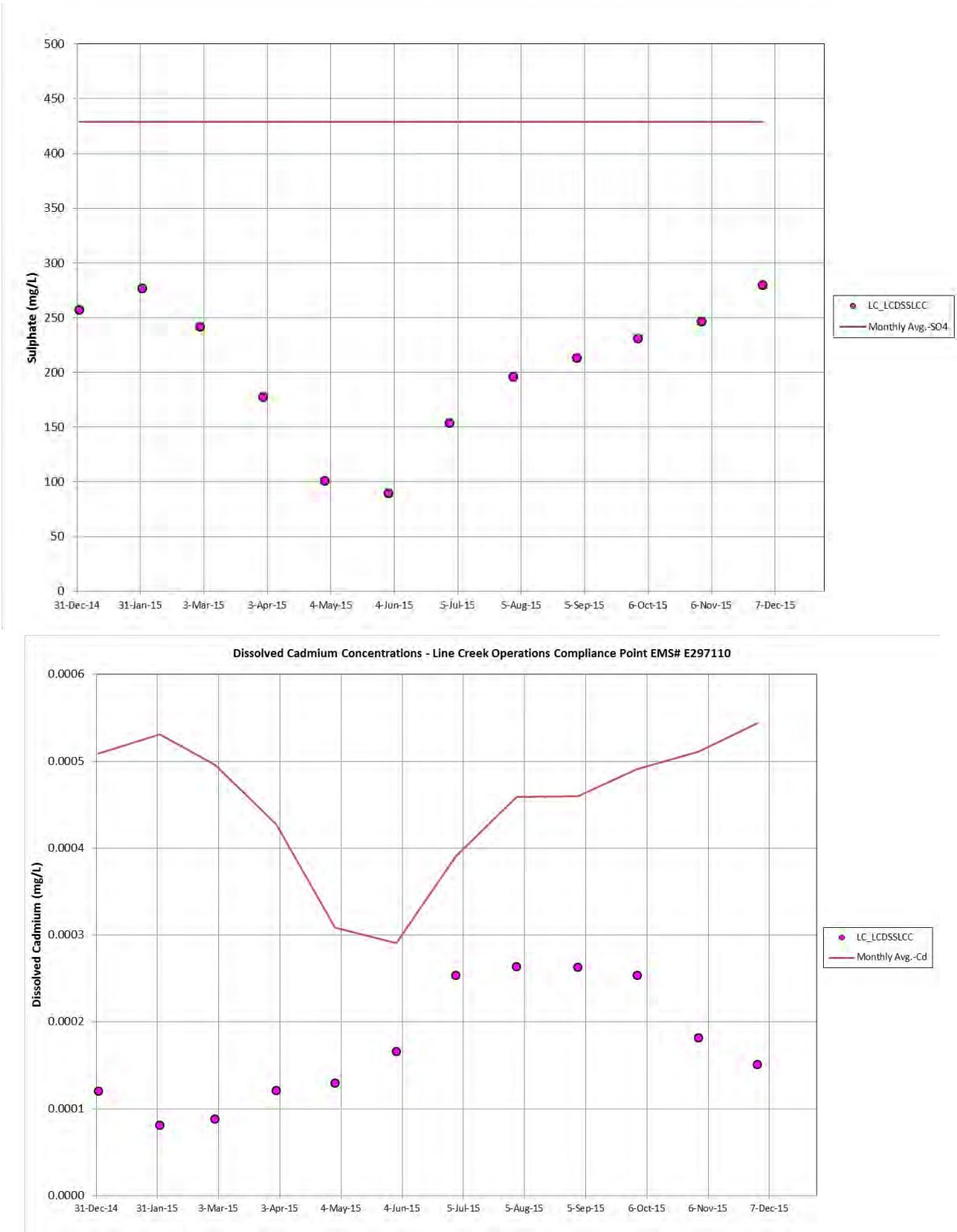


**Figure 10. Monthly average total selenium (top panel) and nitrate-N (bottom panel) concentrations recorded at Line Creek Operations Compliance Point E297110 (LC\_LCDSSLCC)**

**Note: The monthly average compliance limit for nitrate was exceeded in February, November, and December and will be further discussed in Section 2.3. Compliance limits are illustrated by the horizontal line.**



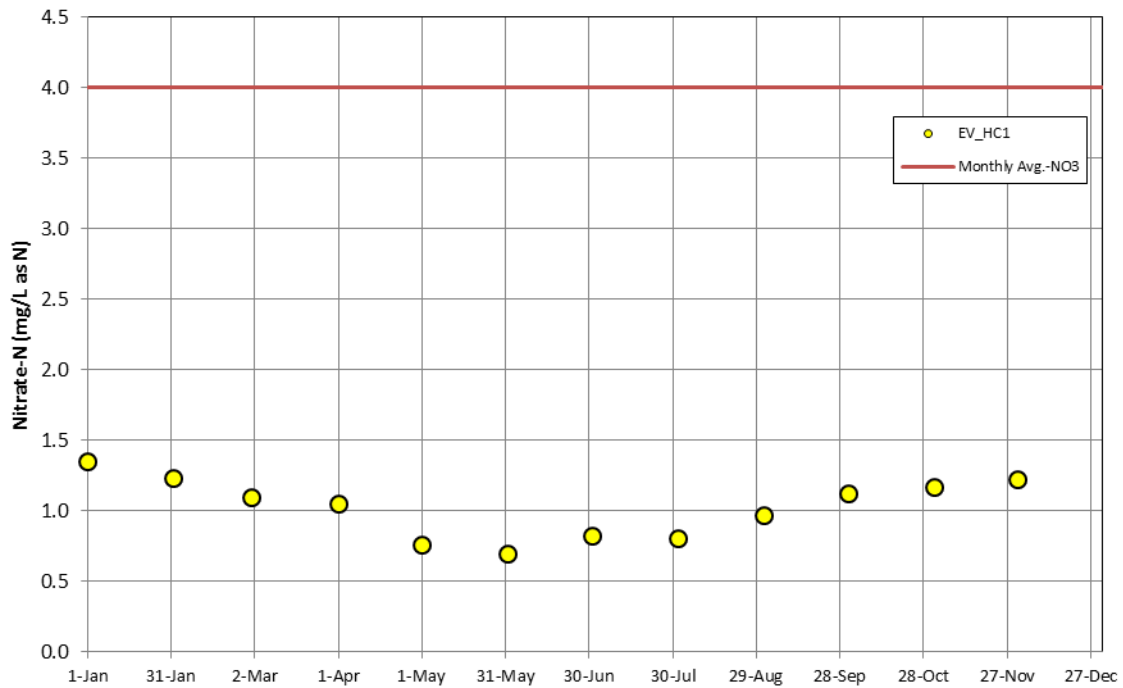
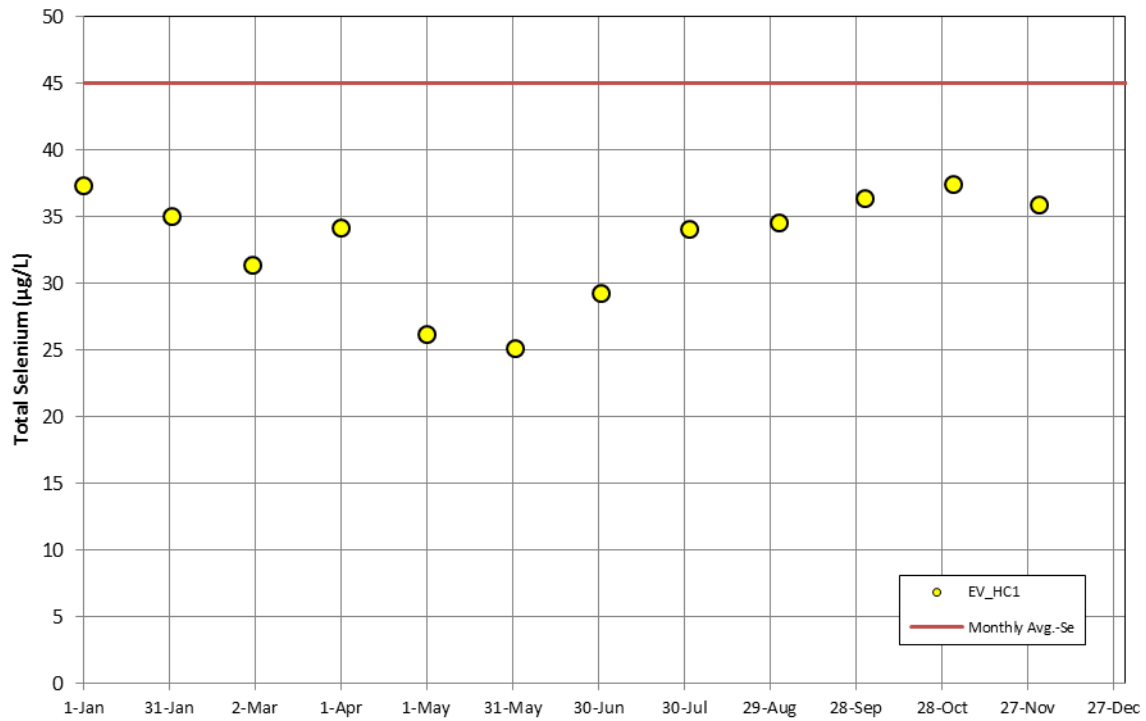
**Figure 11. Daily maximum total selenium (top panel) and nitrate-N (bottom panel) concentrations recorded at Line Creek Operations Compliance Point E297110 (LC\_LCDSSLCC).**



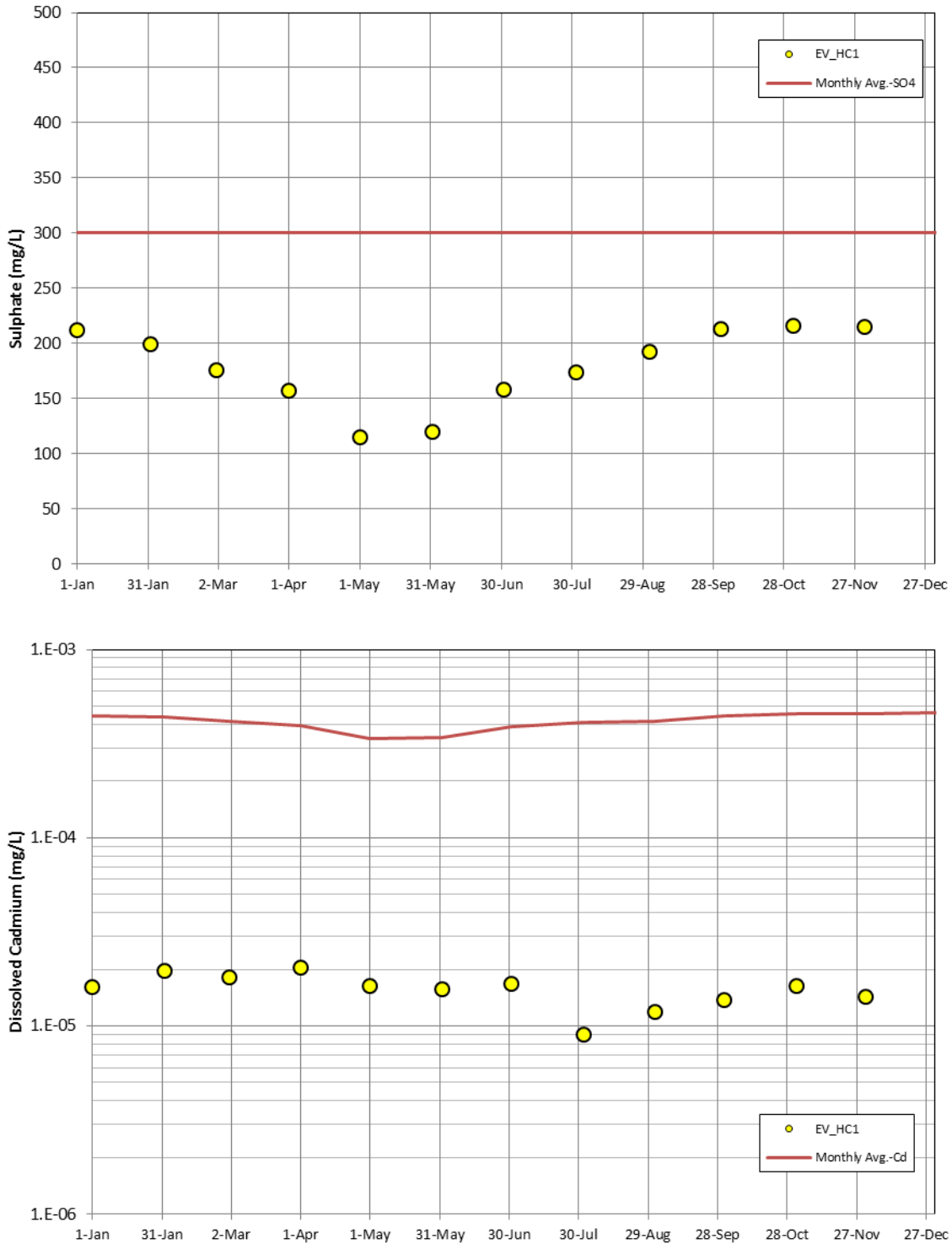
**Figure 12. Monthly average sulphate (top panel) and cadmium (bottom panel) concentrations recorded at Line Creek Operations Compliance Point E297110 (LC\_LCDSSLCC).**

**Note: Sulphate and cadmium SPOs are hardness dependent and as such, reflect temporal variation in water hardness. Compliance limits are illustrated by the horizontal line.**

### Compliance Point E102682 (EV\_HC1)



**Figure 13. Monthly average total selenium (top panel) and nitrate-N (bottom panel) concentrations recorded at Elkview Operations Compliance Point E102682 (EV\_HC1).**

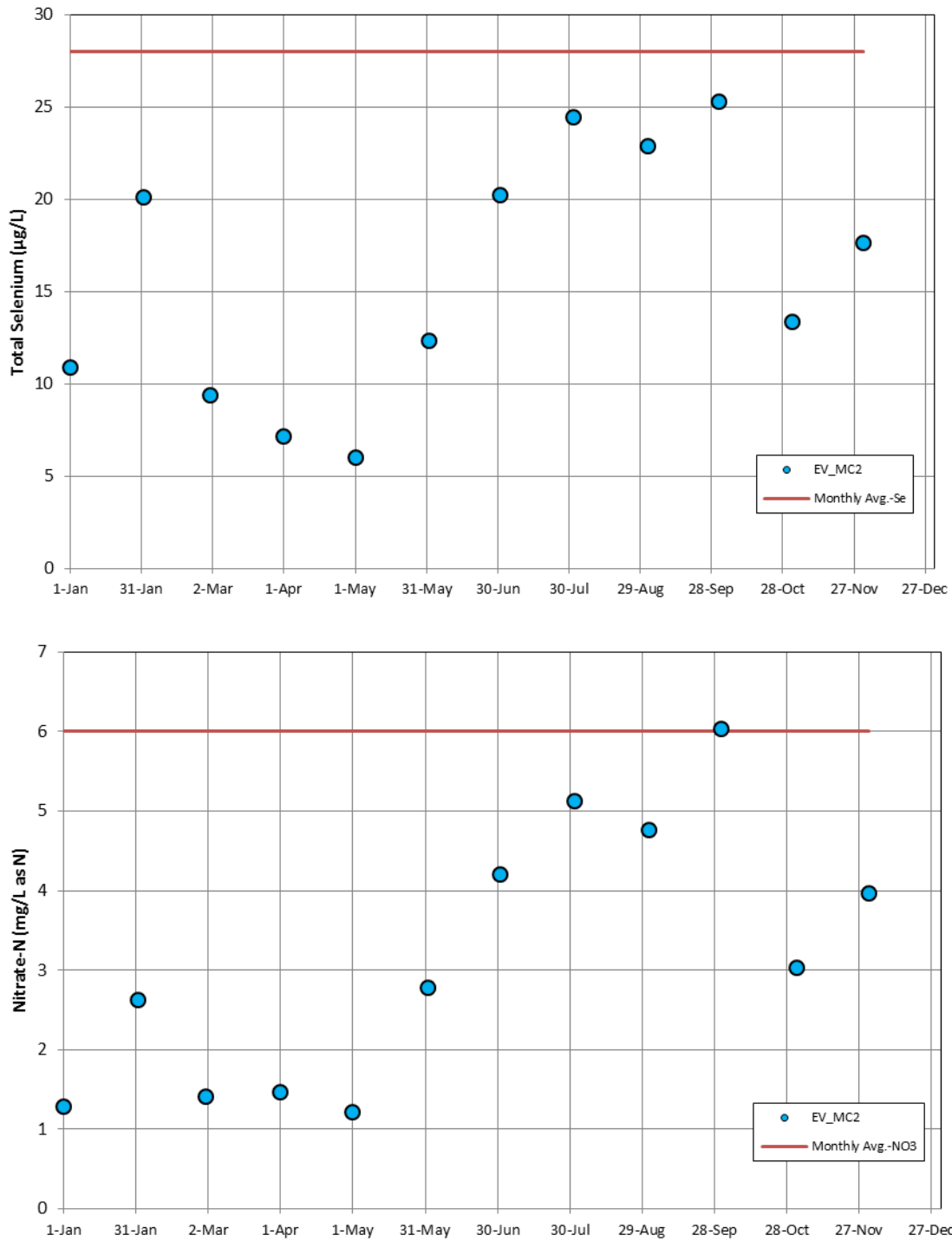


**Figure 14. Monthly average sulphate (top panel) and cadmium (bottom panel) concentrations recorded at Elkview Operations Compliance Point E102682 (EV\_HC1).**

**Note: The cadmium SPOs is hardness dependent and as such, reflects temporal variation in water hardness. Cadmium concentrations are on a logarithmic scale. Compliance limits are illustrated by the horizontal line.**

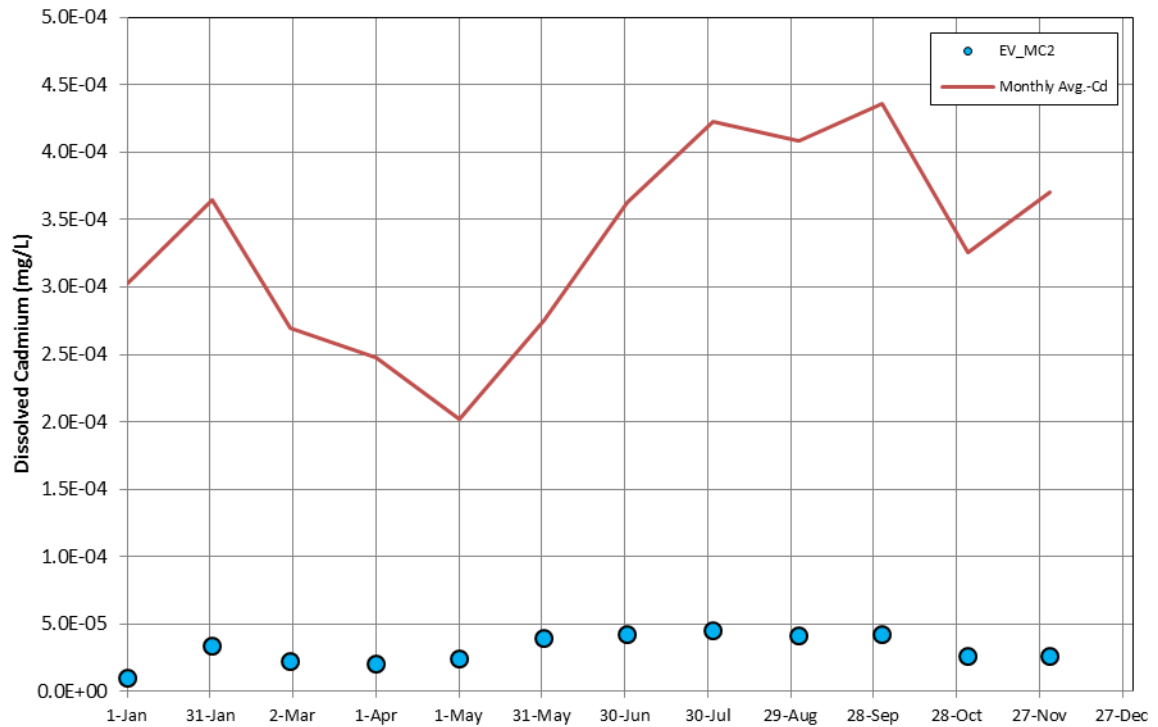
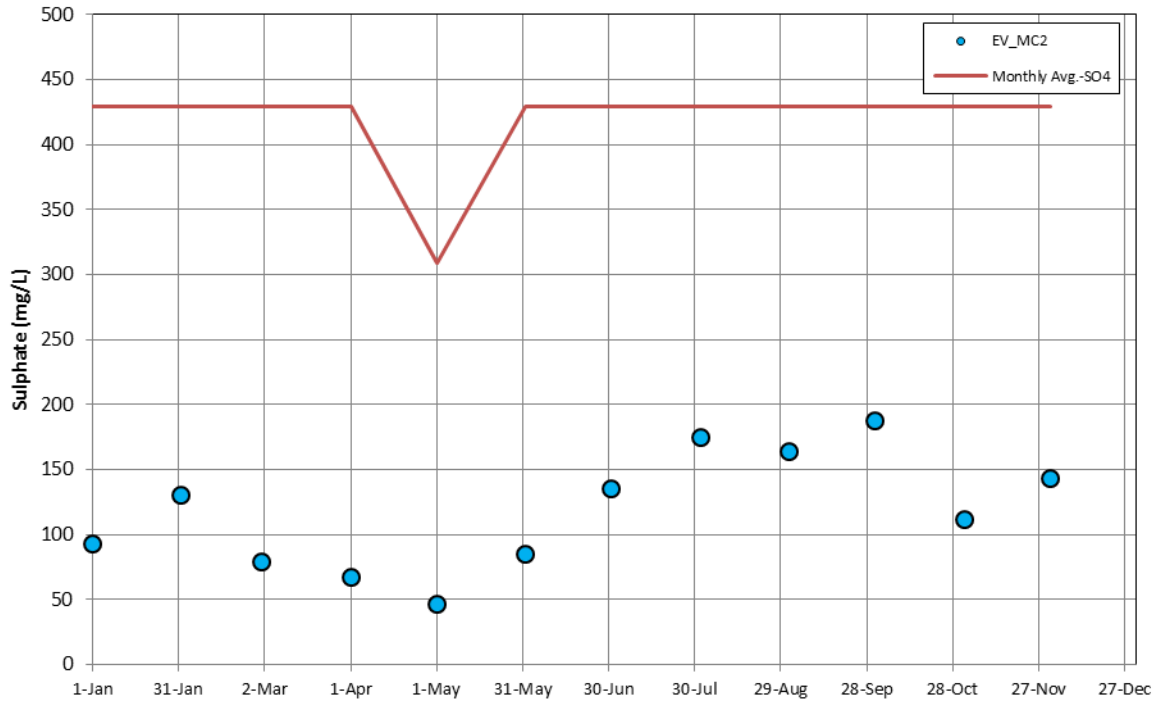


### Compliance Point E300091 (EV\_MC2)



**Figure 15. Monthly average total selenium (top panel) and nitrate-N (bottom panel) concentrations recorded at Elkview Operations Compliance Point E300091 (EV\_MC2).**

**Note: The October monthly average nitrate-N concentrations were at the compliance limit with a calculated monthly average concentration of 6.03 mg/L as N. Compliance limits are illustrated by the horizontal line.**



**Figure 16. Monthly average sulphate (top panel) and cadmium (bottom panel) concentrations recorded at Elkview Operations Compliance Point E300091 (EV\_MC2)**

**Note: Sulphate and cadmium SPOs are hardness dependent and as such, reflect temporal variation in water hardness. Compliance limits are illustrated by the horizontal line.**

### Compliance Point E258937 (CM\_MC2)

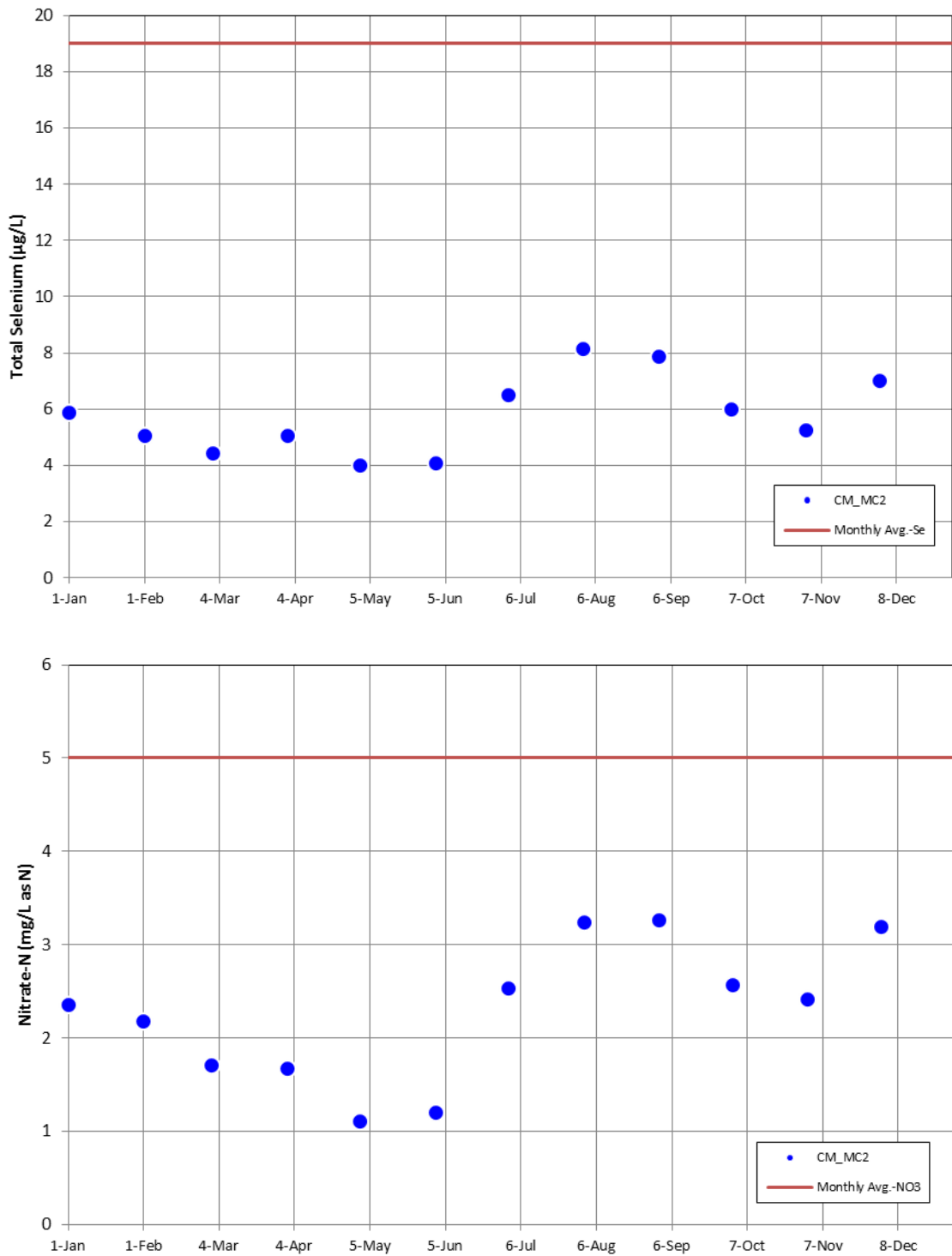
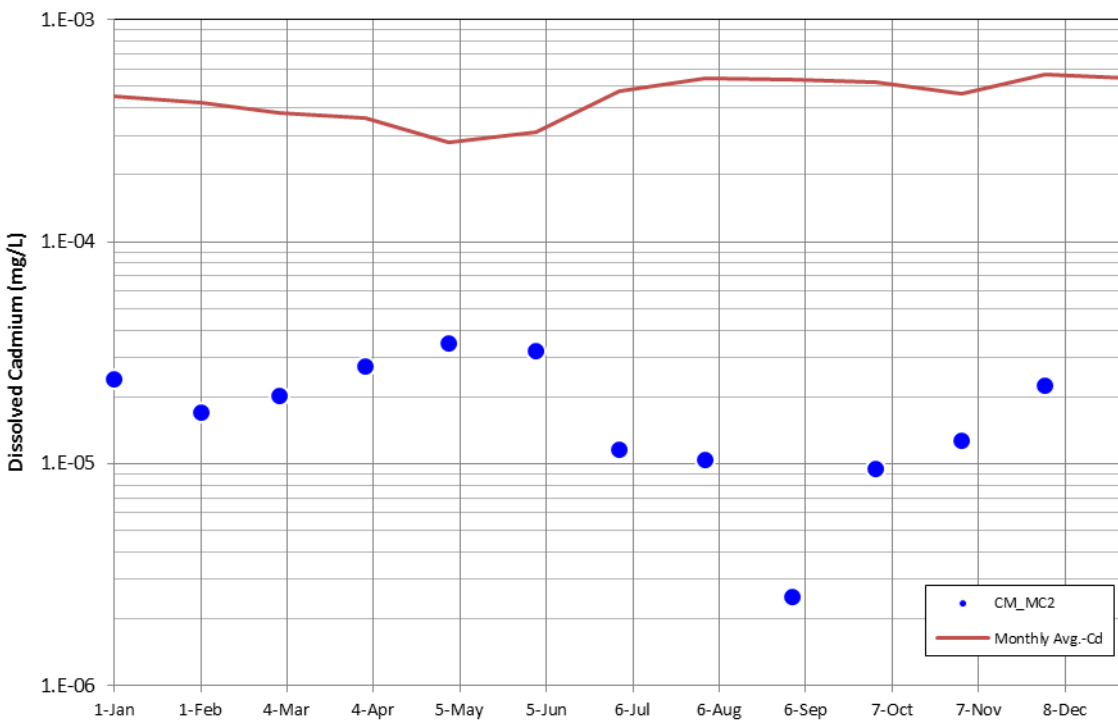
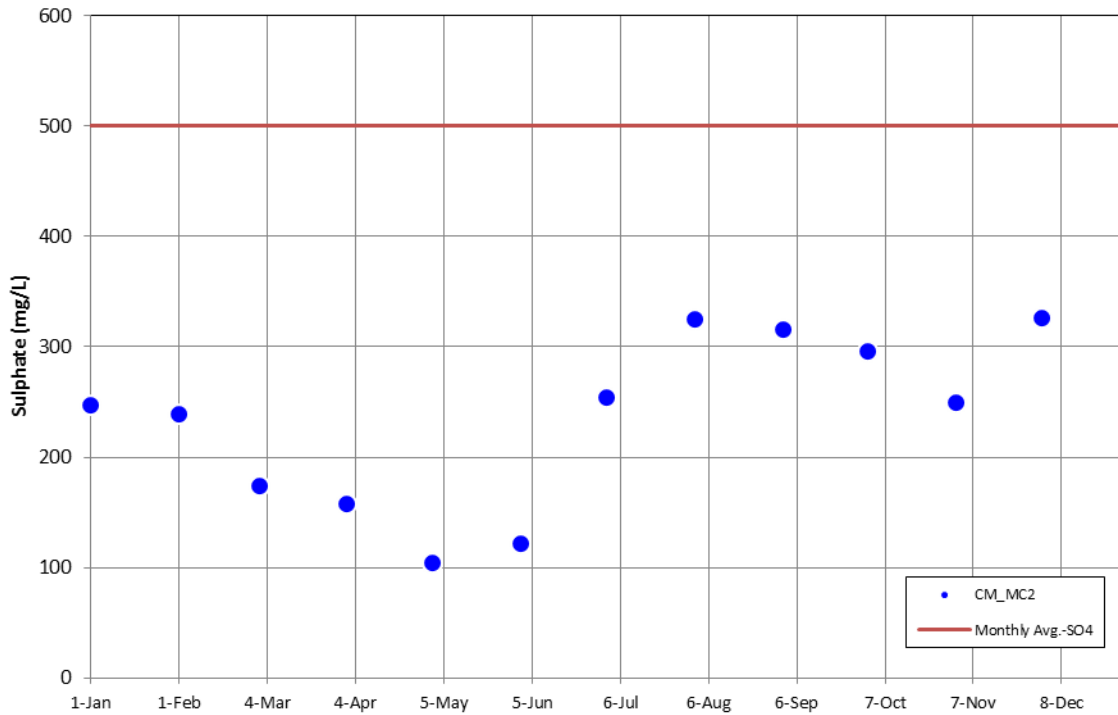


Figure 17. Monthly average total selenium (top panel) and nitrate-N (bottom panel) concentrations recorded at Coal Mountain Operations Compliance Point E258937 (CM\_MC2).



**Figure 18. Monthly average sulphate (top panel) and cadmium (bottom panel) concentrations recorded at Coal Mountain Operations Compliance Point E258937 (CM\_MC2).**

**Note: The cadmium SPO is hardness dependent and as such, reflects temporal variation in water hardness. Cadmium concentrations are on a logarithmic scale. Compliance limits are illustrated by the horizontal line.**

## 2.2 Site Performance Objectives – Order Stations

As noted in Section 1.1.2, seven Order Stations have been designated to monitor water quality in the Elk Valley (i.e., the Designated Area), and ultimately the implementation success of the ABMP. To aid in this evaluation, timeframes of short-, medium-, and long-term SPOs have been established at each Order Station. It is expected that SPOs are attained by the outlined timeframes. A summary of the seven Order Stations and their respective short-term SPOs are presented in Table 10 below.

**Table 10. Short-term site performance objectives established at order stations within the Elk Valley.**

EMS ID	Site ID	Constituent	Monthly Average SPO	Timeframe
0200378	GH_FR1	Total Selenium	63 µg/L	December 31, 2019
		Nitrate-N	20 mg/L as N	Immediately
		Sulphate	429 mg/L	Immediately
		Dissolved Cadmium	0.39 µg/L	Immediately
0200028	LC_LC5	Total Selenium	51 µg/L	December 31, 2019
		Nitrate-N	18 mg/L as N	Immediately
		Sulphate	429 mg/L	Immediately
		Dissolved Cadmium	0.39 µg/L	Immediately
E206661	GH_ER1	Total Selenium	19 µg/L	Immediately
		Nitrate-N	3 mg/L as N	Immediately
		Sulphate	309 mg/L	Immediately
		Dissolved Cadmium	0.24 µg/L	Immediately
0200027	EV_ER4	Total Selenium	23 µg/L	Immediately
		Nitrate-N	4 mg/L as N	December 31, 2019
		Sulphate	429 mg/L	Immediately
		Dissolved Cadmium	0.24 µg/L	Immediately
0200393	EV_ER1	Total Selenium	19 µg/L	Immediately
		Nitrate-N	3 mg/L as N	December 31, 2019
		Sulphate	429 mg/L	Immediately
		Dissolved Cadmium	0.24 µg/L	Immediately
E294312	RG_ELKORES	Total Selenium	19 µg/L	Immediately
		Nitrate-N	3 mg/L as N	December 31, 2019
		Sulphate	429 mg/L	Immediately
		Dissolved Cadmium	0.24 µg/L	Immediately
E300230	RG_DSELK	Total Selenium	2 µg/L	Immediately
		Nitrate-N	3 mg/L as N	Immediately
		Sulphate	308 mg/L	Immediately
		Dissolved Cadmium	0.19 µg/L	Immediately

- Notes:
- Environmental Monitoring Site (EMS) identification numbers (IDs) correspond to those listed in the Ministry's monitoring data repository.
  - As was the case for effluent limits developed for compliance points, SPOs for cadmium are hardness dependent and for purposes herein have been set at 360 mg/L as CaCO<sub>3</sub> (sites 0200378, 0200028, and E206661), 200 mg/L as CaCO<sub>3</sub> (sites 0200027, 0200393, and E294312), and 150 mg/L as CaCO<sub>3</sub> (site E300230), respectively.
  - Long-term nitrate-N SPOs at sites 0200378 and 0200028 are hardness dependent per the following relationship:  

$$\text{Nitrate-SPO} = 10^{1.0003 \log_{10}(\text{hardness}) - 1.52}$$
Short- and medium-term nitrate-N SPOs are not hardness dependent.

A summary of 2015 water quality data recorded at Order Stations relative to short-term SPOs are presented in Figure 19 (0200378; GH\_FR1), Figure 20 (0200028; LC\_LC5), Figure 21 (E206661; GH\_ER1), Figure 22 (0200027; EV\_ER4), Figure 23 (0200393; EV\_ER1), Figure 24 (E294312; RG\_ELKORES), and Figure 25 (E300230; RG\_DSELK).

All of the above-mentioned figures have been set-up and presented in a consistent format. Specifically, each figure is divided into four quadrants (panels) with nitrate-N concentrations appearing in quadrant 1 (top right panel), total selenium in quadrant 2 (top left panel), sulphate in quadrant 3 (bottom left panel), and dissolved cadmium in quadrant 4 (bottom right panel). Based on 2015 collected data and as illustrated within Figures 19 through 25, short-term SPOs were attained.

Order Station 0200378 (GH\_FR1)

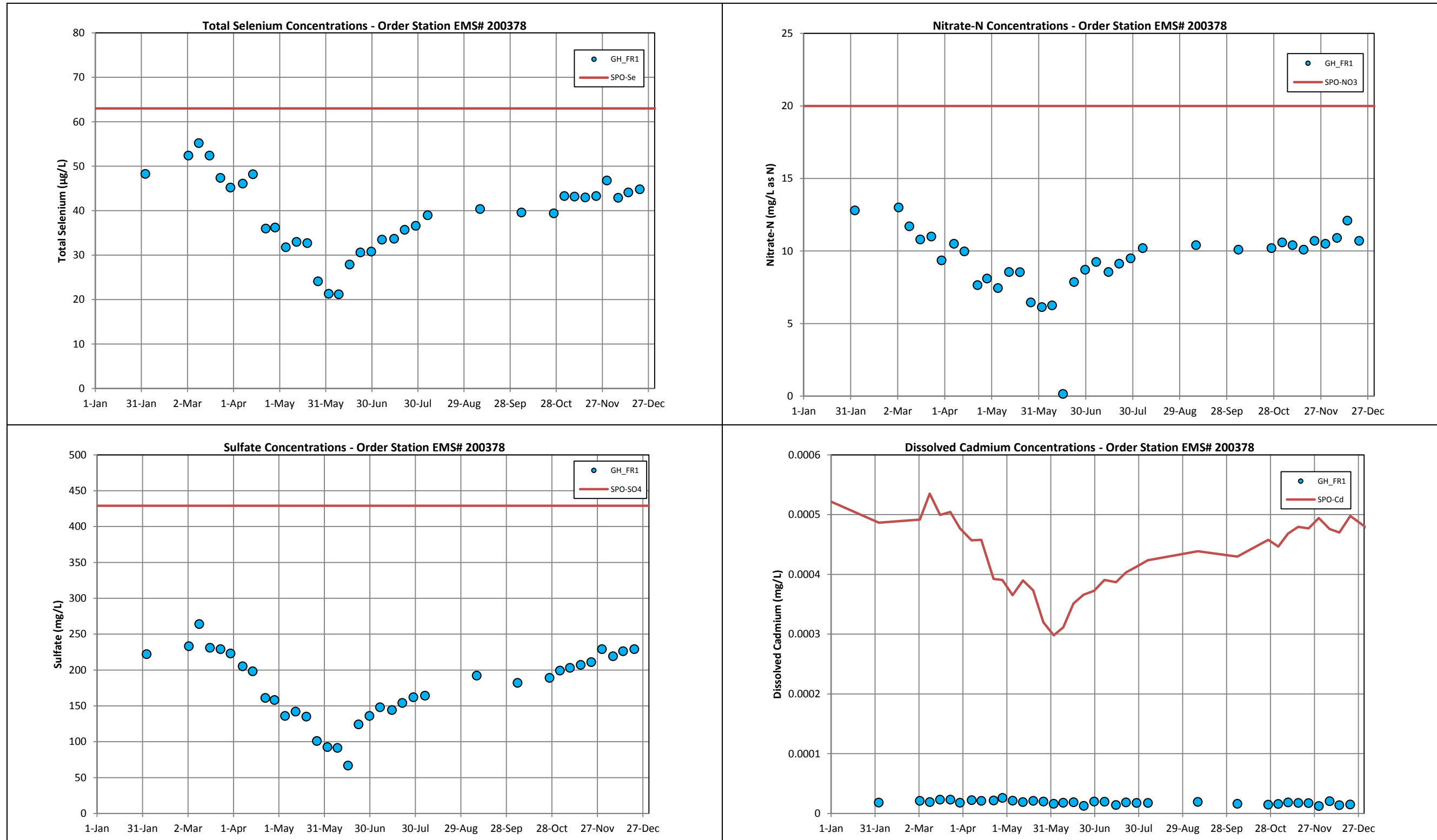


Figure 19. Plot of total selenium, nitrate-N, sulphate, and dissolved cadmium concentrations relative to site performance objectives recorded at Order Station 0200378 (GH\_FR1). Individual data points are illustrated.

Order Station 0200028 (LC\_LC5)

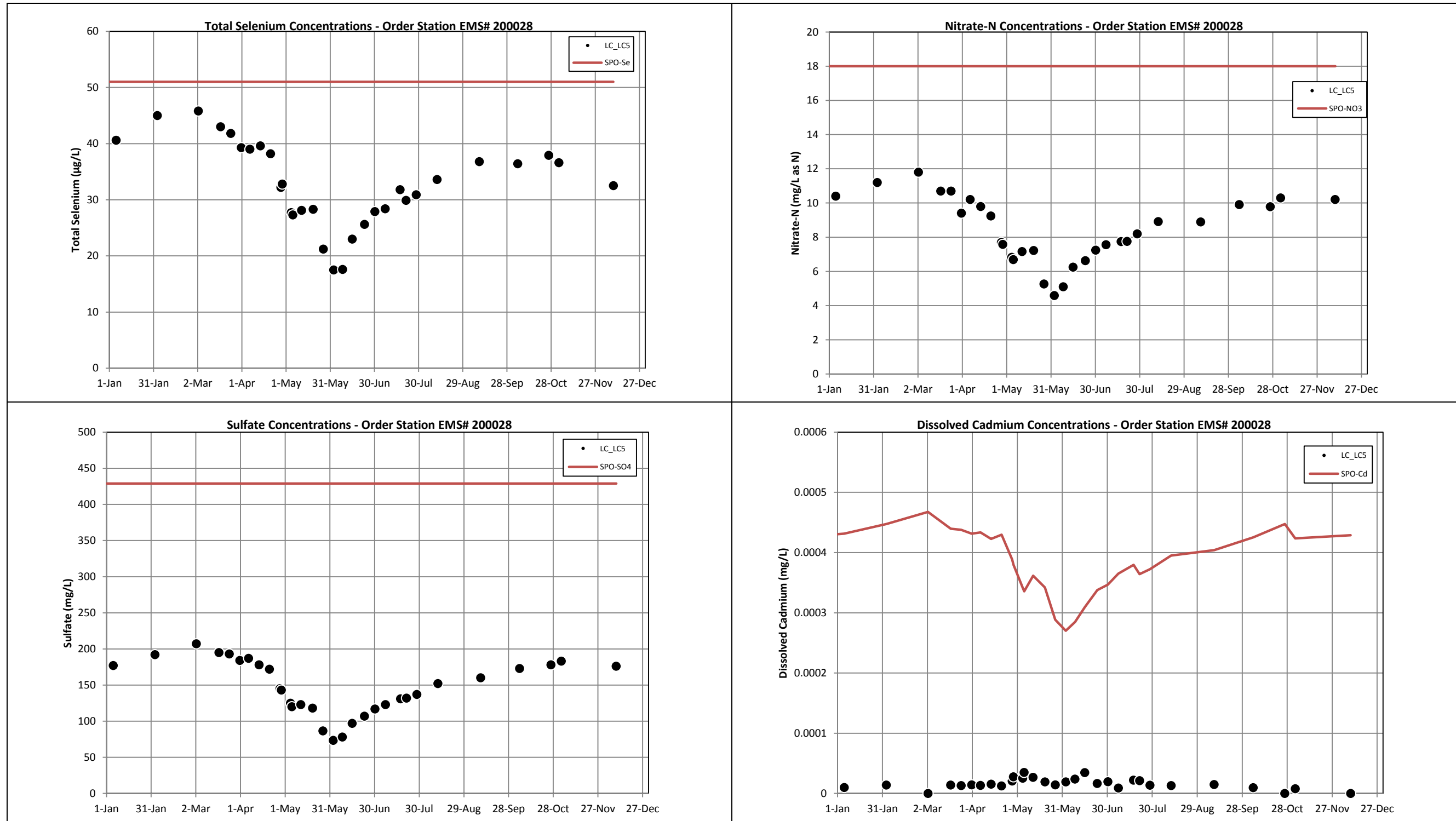


Figure 20. Plot of total selenium, nitrate-N, sulphate, and dissolved cadmium concentrations relative to site performance objectives recorded at Order Station 0200028 (LC\_LC5). Individual data points are illustrated.



Order Station 0206661 (GH\_ER1)

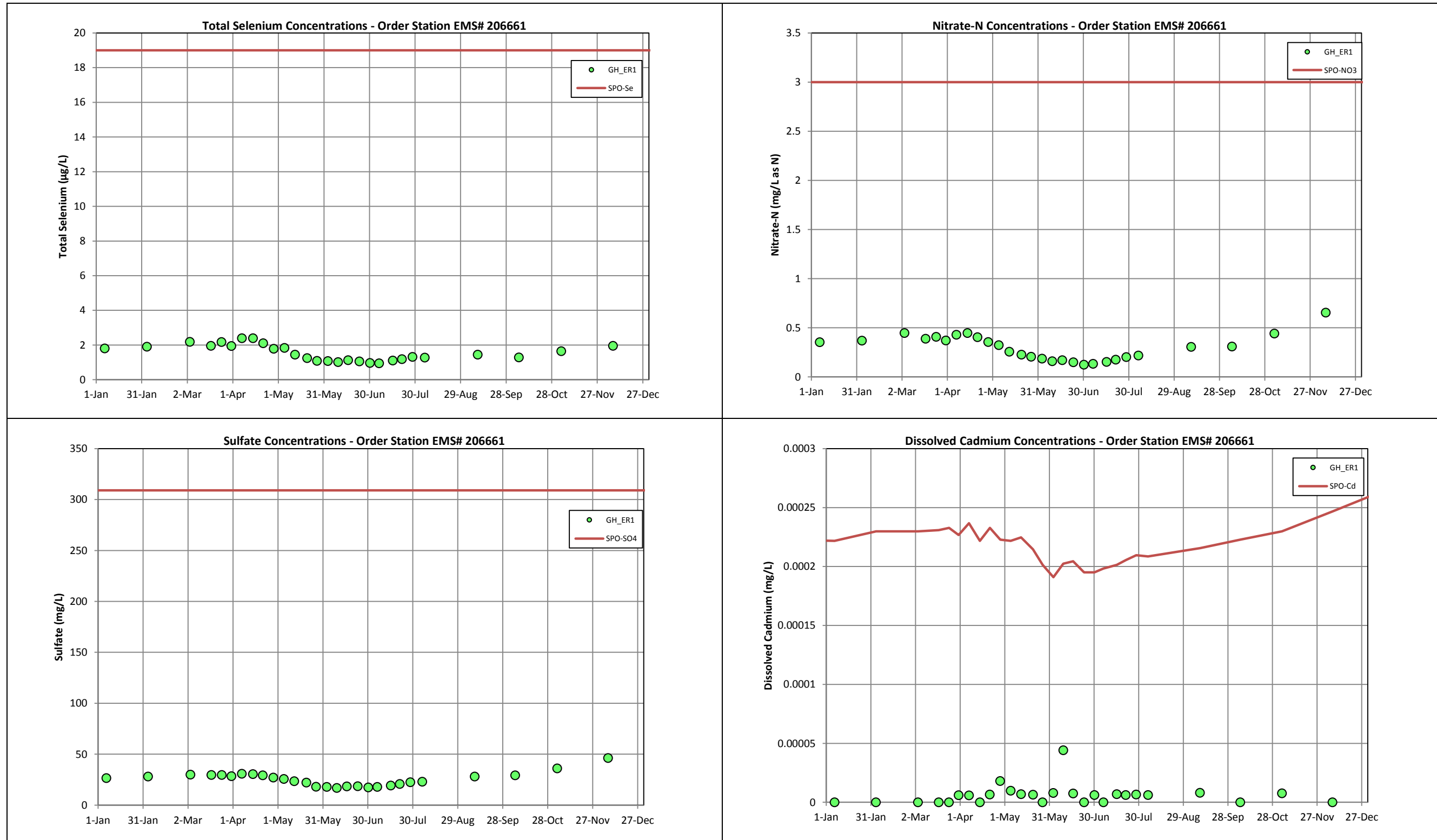


Figure 21. Plot of total selenium, nitrate-N, sulphate, and dissolved cadmium concentrations relative to site performance objectives recorded at Order Station 0206661 (GH\_ER1). Individual data points are illustrated.

Order Station 0200027 (EV\_ER4)

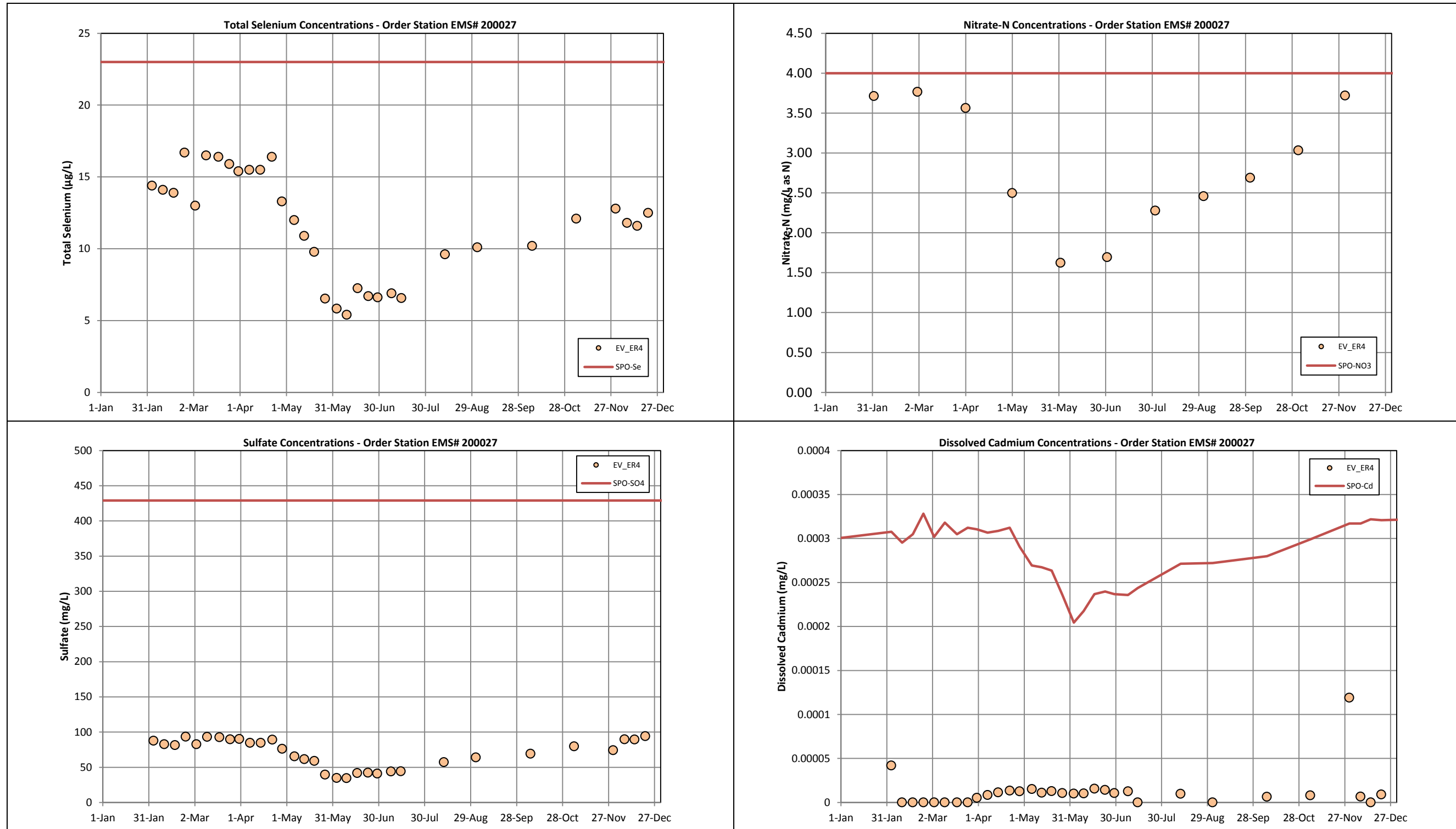


Figure 22. Plot of total selenium, nitrate-N, sulphate, and dissolved cadmium concentrations relative to site performance objectives recorded at Order Station 0200027 (EV\_ER4). Individual data points are illustrated for constituents of interest with the exception of nitrate-N where the monthly average has been illustrated.

Order Station 0200393 (EV\_ER1)

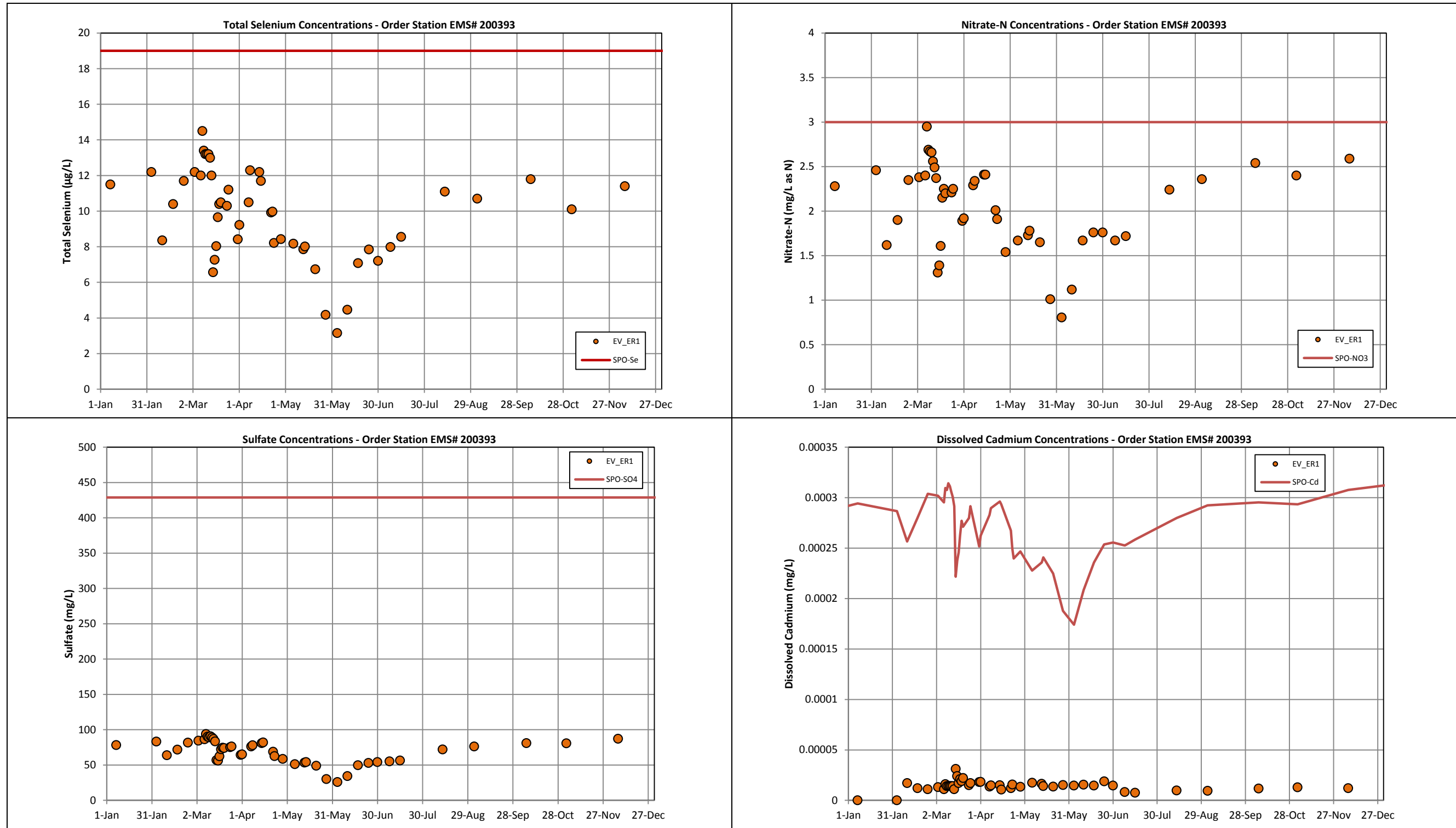


Figure 23. Plot of total selenium, nitrate-N, sulphate, and dissolved cadmium concentrations relative to site performance objectives recorded at Order Station 0200393 (EV\_ER1). Individual data points are illustrated.

Order Station E294312 (RG\_ELKORES)

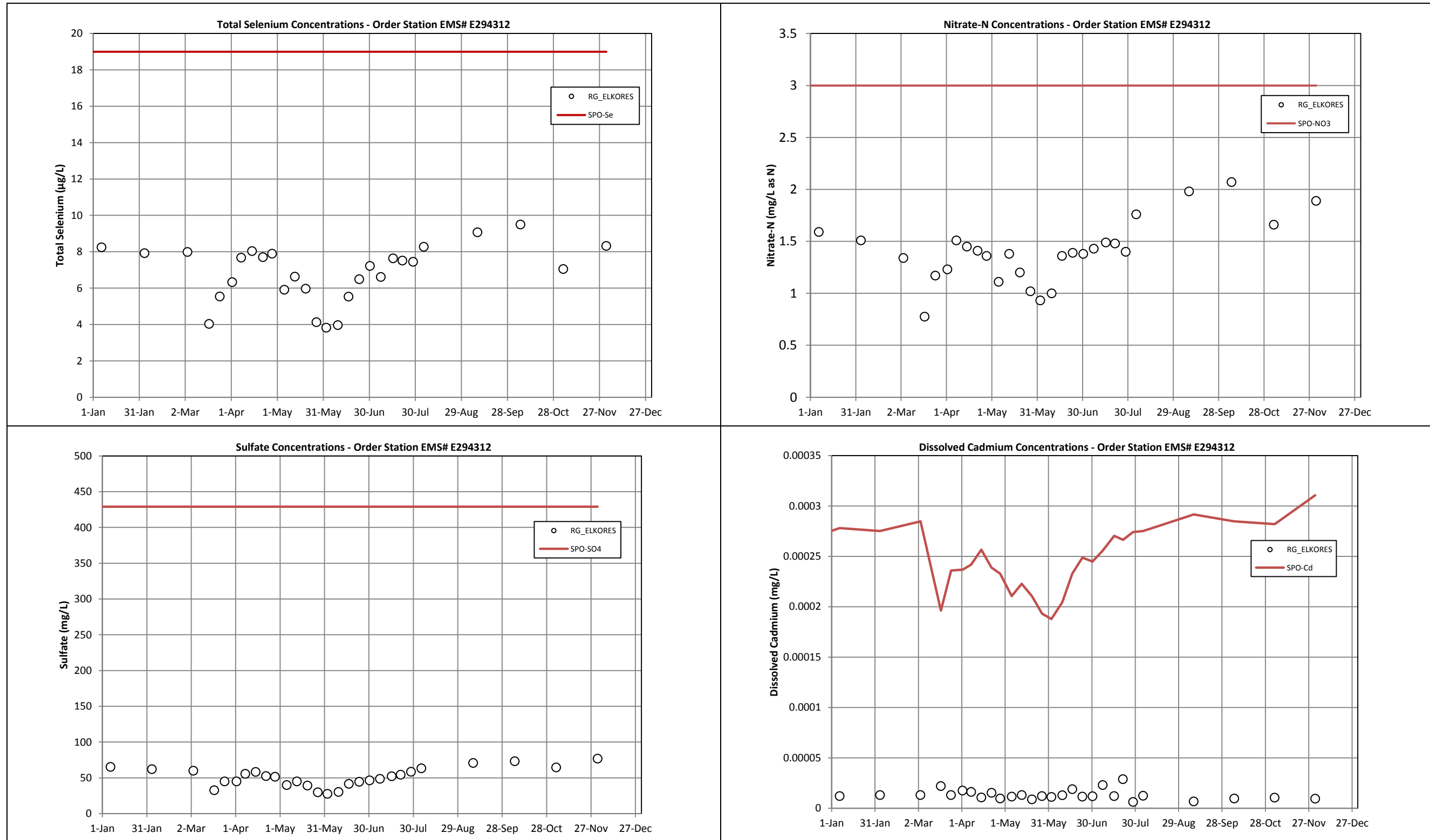


Figure 24. Plot of total selenium, nitrate-N, sulphate, and dissolved cadmium concentrations relative to site performance objectives recorded at Order Station E294312 (RG\_ELKORES). Individual data points are illustrated.

Order Station E300230 (RG\_DSELK)

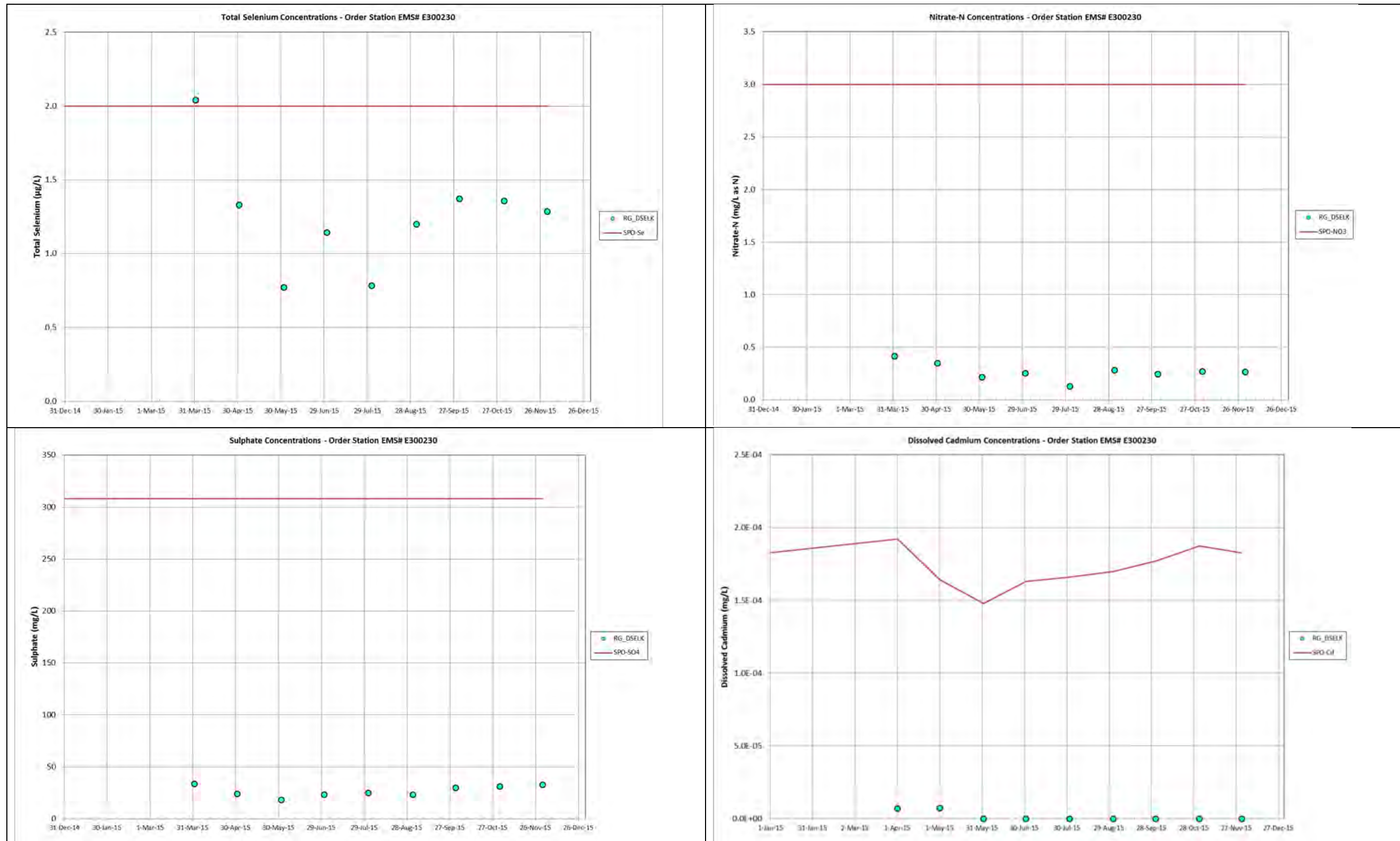


Figure 25. Plot of monthly average total selenium, nitrate-N, sulphate, and dissolved cadmium concentrations relative to site performance objectives recorded at Order Station E300230 (RG\_DSELK).

## 2.3 Non-Compliances

Non-compliances as documented via MoE inspection reports and one warning letter dated November 4, 2015 from Ms. Leslie Payette, Compliance Operations Manager, can be grouped into one of four categories: 1) permit level exceedances, 2) missed sample collection, 3) late reporting of non-compliance, and 4) failure to follow standard protocols (i.e., sampling procedures and laboratory analyses). A summary of inspection reports, the aforementioned warning letter, and associated findings are presented in Table 11.

**Table 11. Summary of 2015 non-compliances issued and documented via inspection report or warning letter.**

Inspection No.	Date	EMS ID (SITE ID)	Incident Categories
20285	February 3, 19, & 26 March 2 & 11	E300071 (FR_FRCP1)	Permit Level Exceedance - Exceeded Compliance Limit
	February 2	E297110 (LC_LCDSSLCC)	Permit Level Exceedance - Exceeded Compliance Limit Late Reporting of Non-Compliance
	April 24	E102481 (FR_CC1)	Missed Sample
	May 19	E261897 (FR_SP1)	Missed Sample (See Note 1)
	May 23	E300096 (FR_HC3)	Missed Sample (See Note 1)
	June 1	E102709 (GH_GH1)	Missed Sample
23085 / November 4 <sup>th</sup> Warning Letter	January 12	E261897 (FR_SP1)	Failure to Follow Standard Protocols Late Reporting of Non-Compliance
	March 1	E287433 (GH_WADE)	Failure to Follow Standard Protocols Late Reporting of Non-Compliance
	June 1 July 27	0200384 (GH_CC1)	Permit Level Exceedance - Failed Acute Toxicity Test
23845	July 20	0200203 (EV_MC3); 0200027 (EV_ER4); 0200393 (EV_ER1)	Missed Samples
	July 27	0200203 (EV_MC3); E300091 (EV_MC2); 0200027 (EV_ER4); E102682 (EV_HC1); 0200393 (EV_ER1)	Missed Samples
	September 2	0200203 (EV_MC3); E296311 (EV_SP1); E208057 (EV_MG1); E206231 (EV_GT1);	Failure to Follow Standard Protocols
23845	September 2	E102685 (EV_BC1); E298594 (EV_SPR2); E300091 (EV_MC2); 0200097 (EV_EC1); 0200393 (EV_ER1)	Failure to Follow Standard Protocols
24207	November 2 & 10	E105061 (GH_SC2)	Permit Level Exceedance - Failed Acute Toxicity Test
24208	December 17	0200251 (FR_FR1); E221329 (GH_SC1)	Missed Samples

Notes: 1. Missed sample non-compliances identified for E261897 (FR\_SP1) and E300096 (FR\_HC3) were incorrectly identified on Inspection Report 20285 as non-compliances for Permit 107517. The aforementioned non-compliances are applicable to Permit 424 where weekly samples are required. Permit 107517 requires monthly samples (refer to Appendix 2, Tables 12 and 13 of Permit 107517). Consistent with Permit 107517, monthly sampling requirements were wholly fulfilled with samples collected on May 4 and 11 at E261897 (FR\_SP1); and on May 4 at E300096 (FR\_HC3). In Inspection Report 20285, a non-compliance on February 18<sup>th</sup> for Selenium at E300071 (FR\_FRCP1) was incorrectly identified as exceeding the daily permit level (155 ug/L) where the sample was actually below the daily limit at 147 ug/L, and therefore has not been included in this inspection report summary table.

Permit level exceedances were also recorded at Compliance Points E300071 (FR\_FRCP1) and E297110 (LC\_LCDSSLCC), see Table 12.

**Table 12. Summary of 2015 exceedances of authorized discharge compliance limits.**

EMS ID	Site ID	Permitted Constituent and Limit	Recorded Concentrations	Date of Exceedance
E300071	FR_FRCP1	Daily Maximum – Total Selenium (Se) = 155 µg/L	286 µg/L	February 3
		Daily Maximum – Se = 155 µg/L	350 µg/L	February 19
		Daily Maximum – Se = 155 µg/L	459 µg/L	February 26
		Daily Maximum – Se = 155 µg/L	497 µg/L	March 2
		Daily Maximum – Se = 155 µg/L	218 µg/L	March 11
		Daily Maximum – Se = 155 µg/L	305 µg/L	November 30
E300071	FR_FRCP1	Monthly Average - Se = 130 µg/L	311 µg/L	February
		Monthly Average - Se = 130 µg/L	229 µg/L	March
		Monthly Average - Se = 130 µg/L	136.7 µg/L	November
		Monthly Average - Sulphate (SO <sub>4</sub> <sup>2-</sup> ) = 580 mg/L	983 mg/L	February
		Monthly Average - SO <sub>4</sub> <sup>2-</sup> = 580 mg/L	731 mg/L	March
E297110	LC_LCDSSLCC	Monthly Average - Nitrate (NO <sub>3</sub> <sup>-</sup> ) = 14 mg/L as N	14.4 mg/L as N	February
		Monthly Average - NO <sub>3</sub> <sup>-</sup> = 14 mg/L as N	15.2 mg/L as N	December

Notes: 1. Environmental Monitoring Site (EMS) identification numbers (IDs) correspond to those listed in the Ministry's monitoring data repository.

Additional detail and summary of the above-mentioned non-compliances, per category (e.g., permit level exceedances, missed sample collection etc.), are presented below.

### Permit Level Exceedances (Category 1)

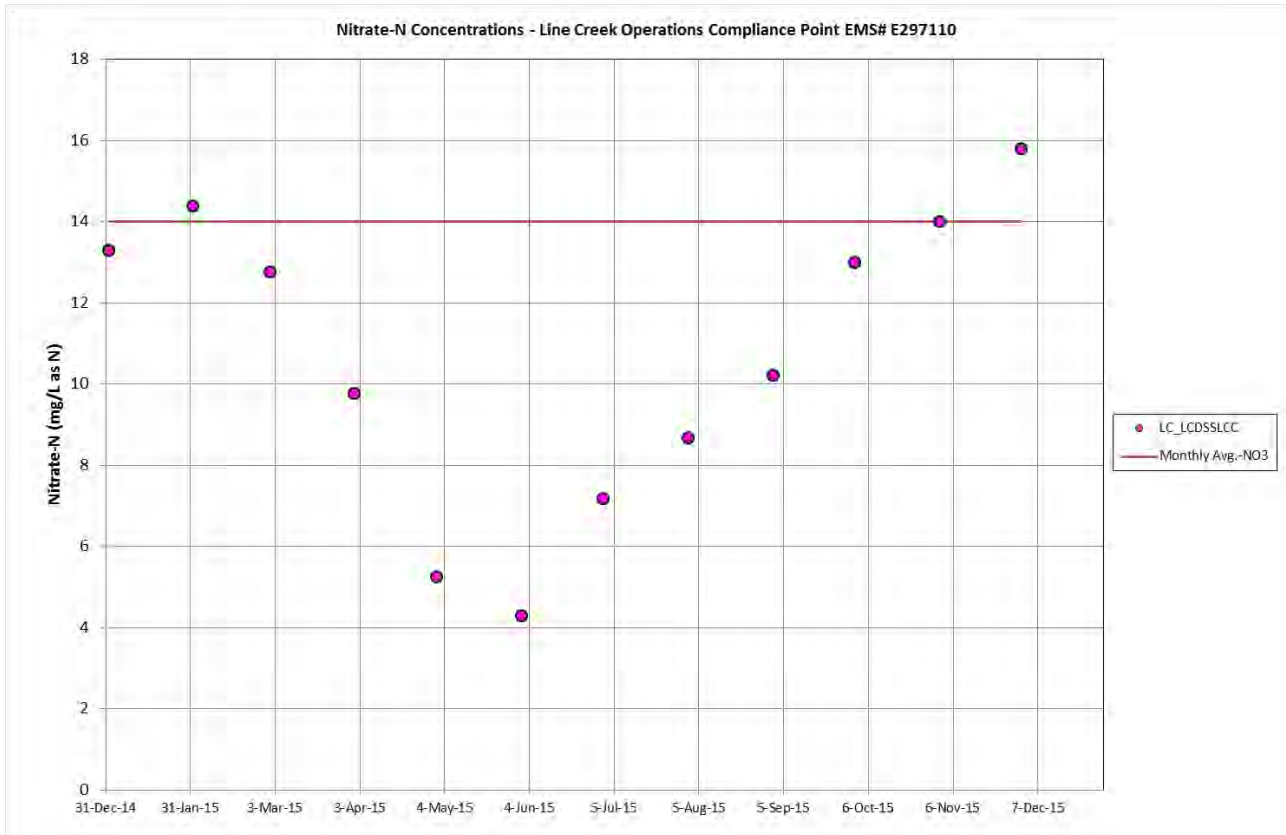
Permit level exceedances in 2015 were the result of either exceeding compliance limits, or failed acute toxicity tests (i.e., *Daphnia magna*). As outlined within Tables 11 and 12, a total of 17 permit level exceedances were recorded; of which 13 (77 percent) were the result of exceeding compliance limits. By far, the greatest proportion of these non-compliances (11 of the 13 exceedances) was associated with EMS E300071 (FR\_FRCP1). It has become increasingly evident to Teck and to MoE personnel that the FRO Compliance Point is not an appropriate location for compliance monitoring for FRO. As recognized by MoE's Regional Hydrologist (October 28, 2015 correspondence to Ms. L. Payette) "the information provided, coupled with my own site observations, supports the conclusion that when the Fording River upstream of compliance E300071 is dewatered during low flow conditions, the flow recorded at E300071 is largely comprised of runoff from Cataract Creek."

As outlined within Permit No. 107517, compliance points are intended to monitor all or most of the point and non-point discharges from the mine operation. The FRO Compliance Point instead measures isolated surface water that is predominantly mine-influenced water from one creek. The result of this is that 11 of the 13 compliance limit exceedances reported in 2015 were associated with this compliance point.



Teck is committed to improving water quality within the Elk Valley, and as outlined in the Elk Valley Water Quality Plan and Permit 107517, significant improvements are targeted with proposed water treatment mitigation at Fording River. However, the location of the FRO Compliance Point will continue to be a challenge until that time given that it does not meet the primary intent which is to monitor accumulative discharges from FRO. An alternative location for a compliance point that meets the intent of Section 2 of the Permit should be considered, and Teck welcomes continued discussion on this topic with MoE.

Sampling site E297110 (LC\_LCDSSLCC) was another compliance point where exceedances in nitrate-N permit limits were recorded in February and December 2015, see Figure 26.



**Figure 26. 2015 Monthly average nitrate-N concentrations recorded at Line Creek Operations Compliance Point E297110 (LC\_LCDSSLCC).**

Line Creek Operations is currently mining three pits with activity primarily in the North Line Creek Extension (NLX) pit. The NLX pit is adjacent to a previously mined pit, Burnt Ridge South (BRS), which has been filling with water since mid-2014. Throughout 2015, LCO has been dewatering BRS to allow for safe mining of the NLX pit while trying to maintain compliance with the nitrate-N monthly average compliance limit. Despite efforts to manage nitrate-N concentrations by modifying pumping rates, there were two monthly average non-compliances in 2015 (February and December). As a result and in consideration of changing compliance limits at this sampling site in 2016, a number of activities have been initiated. They include:



- Active management of pumping where feasible in an effort to achieve compliance during low flow periods
- A nitrate-N source control project
- An assessment of available data to better characterize interactions between surface water and water moving through rock drains
- Additional toxicity testing to evaluate potential effects of nitrate-N
- Ongoing efforts to increase nitrate-N removal by the WLC AWTF.

Additional water management options being assessed by LCO include additional pumping, storage, redirection, and/or a combination thereof.

In addition to non-compliances resulting from water quality concentrations exceeding permitted limits, four non-compliances due to failed *D. magna* acute toxicity tests were recorded in 2015. The first two occurred on June 1 and July 27 at 200384 (GH\_CC1); while the other two occurred on November 2 and 10 at E105061 (GH\_SC2). Based on work completed by Nautilus Environmental Company Inc., the observed effects were attributed to a temperature-dependent mineral precipitate as water samples were warmed to the standard lab method test temperature of 20°C. As a result, the observed effects do not appear to be associated with direct toxicity from a water quality constituent of interest(s); but rather, a physical effect (i.e., encrusting) on the test organism (*D. magna*) driven by thermodynamics.

In consideration that laboratory procedures (i.e., heating of the water) were directly influencing chemical reactions within test chambers, which in turn were adversely affecting *D. magna* survival, the interim corrective action is to collect split-samples at sites where we have identified this issue. *D. magna* acute toxicity testing (i.e., single concentration) are evaluated for each split-sample. One split is tested at the standard temperature of 20°C; while the other is tested at 10°C, or the field measured water temperature (whichever is highest). Results of both tests are reported with compliance currently being evaluated against test results conducted at the standard lab method test temperature (i.e., 20°C). Teck has proposed in previous communications with the MoE (correspondence with L. Payette, Compliance Operations Manager) that compliance should be evaluated against the more relevant field temperature. In addition to the above-mentioned, and consistent with recommendations received from MoE's Impact Assessment Biologist Ms. J Tamblyn (October 13, 2015 memorandum to Doug Hill), Teck has requested that all toxicity test reports include findings for hardness, alkalinity, pH, temperature, and formation of precipitate either in the testing vessel or on the organism. Additional discussion on acute toxicity test and formation of mineral precipitates under temperature test conditions is presented within Section 4.3.

In April 2015 the monthly average selenium concentration at Order Station E300230 (RG\_DSELK) was 2.02 µg/L, see Figure 27. As confirmed by Ms. Kellie Leedham on May 20, 2015 11:23 AM, and in consideration of rounding rules, the April 2015 sample result was in compliance. As illustrated within Figure 27, the April sample is seasonally the highest and correlates with the annual spring drawdown within Lake Koocanusa. As a result, although water management activities associated with the reservoir are outside of Teck's control they appear to have a direct effect on water quality at E300230 (RG\_DSELK). Teck remains committed to the

ABMP and will continue to monitor and evaluate water quality within the Canadian portion of the reservoir.

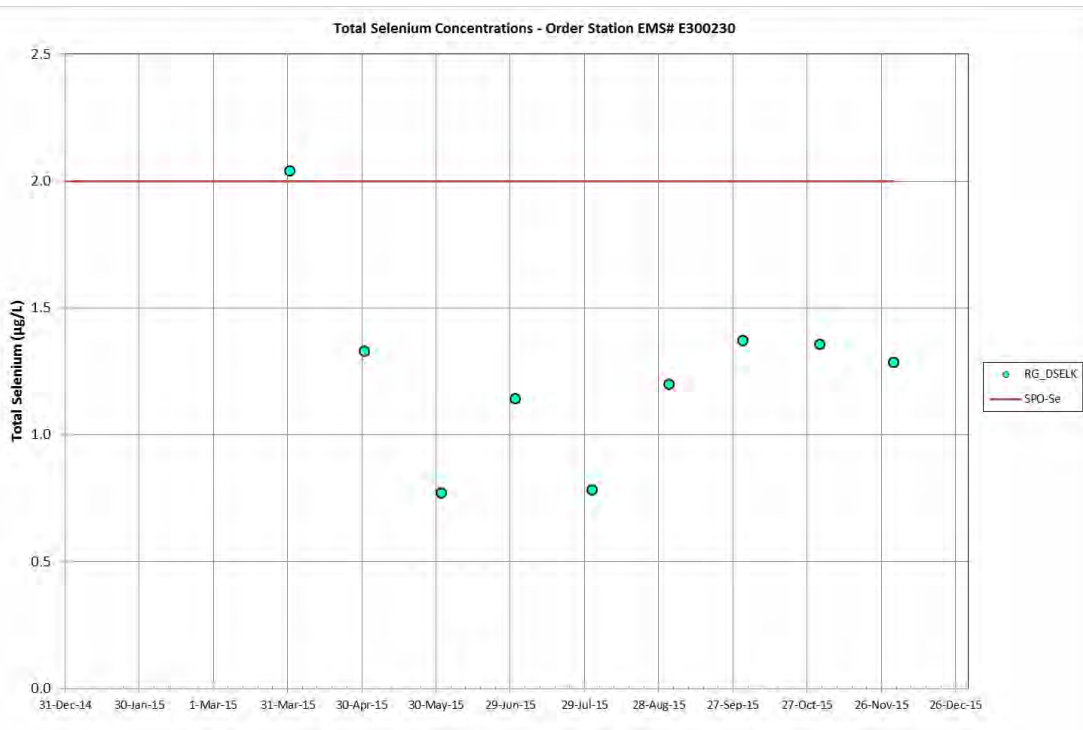


Figure 27. 2015 Monthly average total selenium concentrations recorded at Order Station E300230 (RG\_DSELK).

### Missed Samples (Category 2)

Missed sample non-compliances were the result of either Permit inconsistencies between local and regional Permits (e.g., Permits 425 and 107517) and/or operator error (e.g., miscommunication, shipping delays). A chronological summary of 2015 missed sample non-compliances are provided in Table 13.

Table 13. Summary of 2015 missed sample non-compliances for Permit 107517.

EMS ID	Site ID	Occurrence Date	Cause	Resulting Missing Data
E102481	FR_CC1	January 6 January 14	Operator Error	First Quarter (Q1) Acute Toxicity Tests (i.e., 96-hr. <i>Oncorhynchus mykiss</i> & 48-hr. <i>D. magna</i> )
E102709	GH_GH1	June 1	Operator Error	Q2 Acute Toxicity Tests (i.e., 96-hr. <i>O. mykiss</i> & 48-hr. <i>D. magna</i> )
0200203	EV_MC3	Week of July 20	Permit Inconsistency	Weekly water quality samples for the weeks of July 20 <sup>th</sup> and July 27 <sup>th</sup> were not collected as detailed in Tables 9, 10, 21 and 25 of Appendix 2 (refer to Permit 107517). The W/M abbreviation in Table 25 of Permit 107517 means weekly sampling frequency until July 31st whereas the W/M abbreviation in Table 4 of Permit 425 means weekly sampling frequency until July 15th.
0200027	EV_ER4	Week of July 20	Permit Inconsistency	
0200393	EV_ER1	Week of July 20	Permit Inconsistency	
0200203	EV_MC3	Week of July 27	Permit Inconsistency	
E300091	EV_MC2	Week of July 27	Permit Inconsistency	
0200027	EV_ER4	Week of July 27	Permit Inconsistency	
E102682	EV_HC1	Week of July 27	Permit Inconsistency	
0200393	EV_ER1	Week of July 27	Permit Inconsistency	

In addition to the above-listed and as outlined within inspection number 24208, continuous flow monitoring was not conducted at 0200251 (FR\_FR1) or E221329 (GH\_SC1) in 2015. Consistent with a January 11, 2016 memorandum from Ms. L. Bevan-Griffin to Ms. L. Payette, continuous flow monitoring will not be conducted at either sampling site at this time, but will be further evaluated for consideration as part of the Regional Flow Monitoring Plan to be submitted no later than December 31, 2016.

### Late Reporting of Non-Compliance (Category 3)

Four non-compliances resulting from late reporting were identified in 2015. The first occurred in February when the average monthly nitrate-N concentration at E297110 (LC\_LCDSSLCC) exceeded the compliance limit of 14 mg/L as N (refer to Figure 26 herein). Unfortunately this incident was not reported until April 20, 2015. To mitigate the potential for a similar incident occurring at LCO, the following corrective actions were taken:

- Developed a Standard Practices and Procedures (SP&P) outlining change management process for new and revised effluent permits.
- Developed and implemented a systems tool to facilitate cross-checking of analytical results against permitted discharge limits.
- Developed a SP&P requiring the review of analytical data against compliance limits upon receipt from the laboratory.

The above-listed corrective actions and overall permit compliance process focused on data analysis and timeframes.

As noted within inspection number 23085 and the November 4<sup>th</sup> warning letter from Ms. L. Payette, MoE identified two non-compliances based on the belief that Teck did not notify the Director, or an Officer designated by the Director, of failed acute toxicity tests on the 12<sup>th</sup> of January recorded at E261897 (FR\_SP1), and on the 3<sup>rd</sup> of March<sup>2</sup> for sampling site E287433 (GH\_WADE). As was later confirmed, Teck did notify an Officer designated by the Director in a timely manner for failed toxicity tests recorded at E261897 (FR\_SP1), and as such, was in compliance with Permit 107517.

Specifically and in relation to the January 12 failed toxicity tests (i.e., E261897 (FR\_SP1)), Mr. G. Sword left a voice mail message and emailed Ms. J. Carmody-Fallows of preliminary results on January 12, 2015 5:06 PM, and forwarded final results upon receipt on January 15, 2015 10:52 AM. Similarly, for toxicity test results associated with E287433 (GH\_WADE), results were electronically reported to MoE (i.e., Ms. J. Carmody-Fallows and Mr. D. Oldfield) within 24 hours of Teck receiving notification by the testing laboratory.

Regardless of being in compliance in relation to the above-mentioned incidents, Teck continually strives to improve its performance and that of its suppliers including analytical consultants and contractors (e.g., laboratories). As a result, and to ensure that Teck continues to promptly inform MoE of non-compliances, Teck had directed the biological testing laboratory to update Teck on

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<sup>2</sup> Within inspection report 23805 the sampling date for acute toxicity tests to be performed at E287433 (GH\_WADE) was incorrectly identified as March 1, 2015. Samples were actually collected March 3.

any observed mortalities in acute toxicity tests. The update is to be provided to Teck at the conclusion of the test, or if a test ends during the course of a weekend, immediately on Monday morning unless an alternate communication plan is indicated. In the event that significant mortalities are observed by the biological testing laboratory (i.e., 60-100 percent mortality) within the first 24-hours of testing, Teck is to be notified on the first business day. It is anticipated that these measures will help ensure that Teck is able to provide timely updates and reports to MoE.

#### **Failure to Follow Standard Protocols (Category 4)**

Protocols associated with acute toxicity tests for *D. magna* were not followed on samples collected on January 12 and March 3 from E261897 (FR\_SP1) and E287433 (GH\_WADE), respectively. Specifically, apparent *D. magna* mortalities were not confirmed via a dissecting microscope by the biological testing laboratory. As such, there is uncertainty if the reported mortalities were accurate, or if test organisms were simply demonstrating signs of immobility. As a result of this departure from standard protocol, toxicity test results for the aforementioned sampling sites are not useable. To ensure that such data usability issues and uncertainties are avoided in the future, confirmation has been obtained from our biological testing laboratories that they are always required to follow the existing standard protocol, which includes confirming *D. magna* mortalities using a dissecting microscope.

In addition to the above-mentioned failure to follow standard protocols, some parameter hold times were exceeded and are summarized in Appendix D. Teck will continue to stay focused on meeting hold times with the lab.

## **2.4 Unattainable Samples - Missed Data**

During the course of the calendar year there are a number of circumstances that prevent the collection of water samples from authorized discharges and/or receiving environment sampling sites. Such circumstances are generally out of Teck's control and include, but are not necessarily limited to, unsafe sampling conditions for personnel, no flow due to frozen conditions, or cessation of discharge activities. Although such circumstances prevent Teck from collecting water samples at specified EMS sites and/or at the frequencies outlined in Tables 9 through 24 of Appendix 2 in Permit 107517, these unattained samples do not result in non-compliances; but rather, are recorded as missed data. In 2015, a total of 414 samples could not be attained, resulting in missed data. A summary of all unattained samples is presented in Appendix A.

### 3 Water Monitoring Program

As outlined in Permit No. 107517, water samples are regularly collected from authorized discharges and receiving environment sampling sites. In addition to evaluating compliance as discussed in Section 2, water sampling sites and associated data are used to evaluate overall water quality at point source discharges and within the receiving environment. The following section summarizes water quality/quantity monitoring requirements, methodologies employed in data collection, and quality assurance/quality control (QA/QC) activities.

#### 3.1 Surface Water Monitoring Program

Surface water sampling activities are carried-out over a wide range of frequencies throughout the calendar year (e.g., weekly, monthly, quarterly etc.), with samples analyzed for a number of water quality parameters such as, but not limited:

- Conventional parameters (i.e., specific conductance, total dissolved solids, total suspended solids, hardness, alkalinity, dissolved organic carbon, total organic carbon, and turbidity).
- Major ions (i.e., bromide, fluoride, calcium, chloride, magnesium, potassium, sodium, and sulphate).
- Metals, dissolved and total fractions (i.e., aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, chromium, cobalt, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, and zinc).

In addition, surface water flows and toxicity tests (acute and chronic) are routinely conducted at a number of sampling sites. A summary of the surface water monitoring program is presented in Appendix B.

In addition to surface water monitoring, two groundwater monitoring wells (i.e., E298595 (EV\_WF\_NW) and E298596 (EV\_WF\_SW)) are identified as a component of the monitoring program. Unfortunately E298595 (EV\_WF\_NW) has been permanently damaged and is not operational. As outlined within the Groundwater Monitoring Plan (submitted under separate cover), it is recommended that E298595 (EV\_WF\_NW) not be replaced as its chemistry is indistinguishable from E298596 (EV\_WF\_SW); and that groundwater be wholly addressed under the groundwater monitoring program. As such, sampling protocols and associated data associated with E298596 (EV\_WF\_SW) are addressed under separate cover.

#### 3.2 Quality Assurance/Quality Control Program

A QA/QC program has been established to promote consistency in field protocols and methodologies, and the collection of high quality environmental data. Sampling activities are not only carried out to meet the requirements of the monitoring program, in terms of location and frequency; but to collect representative samples, and minimize the potential for deterioration and/or contamination prior to laboratory analysis. The overall quality objective for the QA/QC program is to develop and implement procedures that ensure the collection of representative data of acceptable quality. Data quality indicators such as precision, accuracy and bias,

representativeness, comparability, and analytical sensitivity are routinely used to assess data quality; and are further discussed below.

Precision reflects the reproducibility between individual measurements of the same property. Precision is evaluated using results of laboratory duplicates and field splits, and is expressed in terms of the Relative Percent Difference (RPD) for two measurements. The following equation is used to calculate the RPD:

$$RPD = \frac{|C_1 - C_2|}{(C_1 + C_2)/2} \times 100$$

Where: RPD = Relative percent difference  
C<sub>1</sub> = First measurement  
C<sub>2</sub> = Second measurement

For three or more measurements, the Relative Standard Deviation (RSD) is used. The RSD is calculated as the ratio of the standard deviation of three or more measurements to the average of the measurements, expressed as a percentage.

Accuracy and bias represent the degree to which a measured concentration conforms to a reference value. Results for matrix spikes, laboratory control samples, field blanks, and method blanks are reviewed to evaluate accuracy and bias. Percent recovery for a laboratory control sample or reference material is calculated as follows:

$$\%R = \frac{M}{C} \times 100$$

Where: % R = Percent recovery  
M = Measured concentration in spiked sample  
C = Concentration of added spike

Quality control samples and procedures specified in analytical method protocols are completed by respective analytical laboratories and include the following (as applicable to each analysis):

- Initial calibration
- Initial calibration verification
- Continuing calibration
- Calibration or instrument blanks
- Method blanks
- Laboratory control samples
- Internal standards (including certified reference material)
- Serial dilutions
- Matrix spikes
- Laboratory duplicates

The analytical laboratory determines a Method Detection Limit (MDL) for each analyte. MDLs are statistically derived and reflect the concentration at which an analyte can be detected in a clean



matrix with 99 percent confidence that a false positive result has not been reported. The analytical laboratory establishes Method Reporting Limits (MRLs) at levels above the MDLs for respective analytes. These values are based on the laboratory's experience analyzing environmental samples and reflect the typical sensitivity obtained by the analytical system; they represent the level of analyte above which concentrations are accurately quantified.

The laboratory quantifies analytes at concentrations above the MRL. Analytes detected at concentrations between the MDL and MRL are flagged with a "J" qualifier to indicate that the value is an estimate (i.e., the analyte concentration is greater than or equal to the MDL and less than the MRL). Analytes that are not detected are reported as the MDL, and are flagged with a "U" qualifier. MDLs can be adjusted by the laboratory to reflect sample dilution and/or matrix interference.

Representativeness is the degree to which data represent a characteristic of an environmental condition. In the field, representativeness is addressed by collecting samples at the designated water sampling sites and adhering to sample collection procedures. In the laboratory, representativeness is ensured by the proper handling and storage of samples, the use of standard performance-based methods, and initiation of analyses within hold times.

Comparability is the qualitative similarity of one data set to another (i.e., the extent to which different data sets can be combined for use). Comparability is addressed through the use of field and laboratory methods that are consistent standardized procedures.

To ensure that field activities are conducted in a manner that meets the overall data quality objective of the QA/QC program, sampling activities are conducted in accordance with the 2013 Edition of the British Columbia Field Sampling Manual (Clark, M.J.R. (editor). 2002<sup>3</sup>). Environmental personal are trained using on-site SP&P's as detailed in the "Teck Field Sampling Manual". Example QC measures detailed in SP&P's and implemented as part of the monitoring program include, but are not limited to:

- Labeling of samples with their unique identifier, and the date of sampling.
- Record details relevant to the sampling in a field note book (e.g., unusual conditions and variations from usual sampling techniques)
- Ensuring that instruments and equipment are maintained and calibrated, and recorded in dedicated maintenance logs
- Practicing clean sampling techniques (e.g., clean-hands dirty-hands)
- Collect replicate samples to evaluate potential field contamination (i.e., field and trip blanks) and sample variance (i.e., duplicate or replicate samples)
- Develop and maintain a database for monitoring results (i.e., analytical data). Sampling data are stored and managed using EarthSoft's Environmental Quality Information System (EQulS).

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<sup>3</sup> Clark, M.J.R. (editor). 2002. British Columbia Field Sampling Manual. Water, Air and Climate Change Branch, Ministry of Water, Land and Air Protection, Victoria, BC, Canada. 312 pp.

Field and trip blanks, and duplicate sampling were conducted throughout the year in accordance with procedures established in “BC Field Sampling Manual for Continuous Monitoring Plus the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples,” or by suitable alternative procedures as authorized by the Director.

Despite the considerable level of effort and management system tools employed to ensure water data are of high quality, there are instances where data quality is adversely affected. A summary of instances and associated issues are discussed in Section 3.3 below.

A summary of the QA/QC program associated with water quantity (i.e., flows) measurements is presented in Appendix C.

### 3.3 QA/QC Issues

Data quality issues encountered in 2015 were largely the result of hold time exceedances for time-sensitive water quality parameters such as nitrate-N, nitrite-N, turbidity, and ortho-phosphate. Other related data quality issues were associated with samples being out of optimal temperature range (i.e.,  $>4^{\circ}\text{C}$ ) upon receipt by the analytical laboratory; damaged sample bottles during transport, and elevated MDLs due to matrix interference. A summary of data quality per analyte affected is listed below, with a detailed summary per water sampling site presented in Appendix D.

- Nitrate-N: 60 data points affected
- Nitrite-N: 64 data points affected
- Turbidity: 116 data points affected
- Ortho-Phosphate: 41 data points affected
- Alkalinity: 1 data point affected
- Temperature: 27 data points affected
- Metals: 10 data points affected

In addition to the above-listed and the data quality issues identified in Appendix D, field and trip blank samples were evaluated to determine possible contaminants in primary samples. Issues were identified were as follows:

- E219411 (LC\_LC8): May 5<sup>th</sup> field blank sample was recorded as having a total selenium concentration of 0.052  $\mu\text{g/L}$ . Typical total selenium concentrations at this location generally remain above detection therefore, the data quality is not anticipated to have been adversely affected
- The May 5<sup>th</sup> and May 11<sup>th</sup> trip blanks, provided by the lab, identified Total Kjeldahl Nitrogen (TKN) concentrations above the MDL, indicating possible contamination by the lab or transportation of the samples
- 0200044 (LC\_LC4): Field blank samples collected on the 26<sup>th</sup> of May identified concentrations of Total Organic Carbon, and as such these data should be considered as unreliable.
- 0200044 (LC\_LC4): Field blank samples collected on the 17<sup>th</sup> of July were above MRL.



Method detection limits for mercury, and to a lesser extent beryllium, were routinely above the British Columbia approved and/or working water quality guidelines at all receiving environment monitoring sites. As a result, data usability in terms of analysis and interpretation for these two water quality parameters is adversely affected. Biological monitoring programs within the Valley such as the Regional Aquatic Effects Monitoring Program (RAEMP) evaluate mercury in fish tissue. Given that mercury is persistent within the environment and a bioaccumulative, the lack of useable water quality data is not anticipated to present a limitation in relation to evaluating potential effects. Furthermore and in consideration of the many challenges associated with collecting useable aqueous mercury data, and that other monitoring programs (i.e., RAEMP) evaluate mercury in more biologically meaningful medium (e.g., tissues), Teck proposes that collecting aqueous mercury data be removed from the permitted routine water quality parameters as it provides little added value.

Despite the above-mentioned limitations, data collected in 2015 were predominantly of high quality and met requirements of the monitoring program, not only in terms of location and frequency; but also in terms of representativeness.

### 3.4 Toxicity Testing Program

Toxicity testing (acute and chronic) of waterborne exposure is carried-out at a number of sampling sites on a quarterly basis; and in the case of early life-stage testing at compliance sites using rainbow trout (*Oncorhynchus mykiss*) for instance, twice a year. Refer to Appendix B for a summary of the toxicity testing program including test species, assessment endpoints, water sampling sites, and associated testing frequency.

Biological test methods routinely employed include:

- Acute Lethality Test using Rainbow Trout; universal method: EPS 1/RM/9
- Acute Lethality Test using *Daphnia* spp.; universal method: EPS 1/RM/11
- Toxicity Tests using Early Life Stages of Salmonid Fish (Rainbow Trout); universal method EPS 1/RM/28-1E)
- Growth Inhibition Test using a Freshwater Alga; report EPS 1/RM/25
- Test of Reproduction and Survival using the cladoceran *Ceriodaphnia dubia*; report EPS 1/RM21
- Fathead Minnow, *Pimephales promelas*, Larval Survival and Growth Test U.S. Environmental Protection Agency (EPA) Method 1000.0

In addition to the above-listed standard methods, a modified 28-day water-only test with the amphipod, *Hyalella azteca* is also completed. This test is not a standard test but rather has been modified from “Methods for measuring the toxicity and bioaccumulation of sediment-associated contaminants with freshwater invertebrates (second edition)”, EPA/600/R-99/064.

Biological tests and associated QA/QC measures are completed in accordance with the above-listed methods by the biological testing laboratory; and are detailed in biological testing reports (discussed in Section 4.3).

## 4 Monitoring Results

Water sampling results are not only used to evaluate compliance (refer to Section 2) but are also used to evaluate, water quality relative to authorized discharge limits at point source discharges, and key receiving environment sampling sites in relation to SPOs and/or approved/working water quality guidelines. These data in turn are ultimately used to evaluate the overall effectiveness of the ABMP and its implementation. The following section summarizes receiving environment monitoring results in relation to approved/ working water quality guidelines. In addition and as outlined in Section 10.2.4 of Permit 107517, the following section evaluates trends for Order-defined constituents of interest (i.e., selenium, nitrate-N, sulphate, and dissolved cadmium) at significant source sites (i.e., dormant and active waste rock dumps), and key receiving environment sites (i.e., Order stations). Because selenium, nitrate-N, sulphate, and cadmium have permitted limits (refer to Section 2), they are not compared to the British Columbia approved/working freshwater aquatic life water quality guidelines. A summary of surface water quantity monitoring results is provided In Appendix C.

### 4.1 Surface Water Quality – Receiving Environment

In 2015 a total of 208,667 analyses were completed on water samples as required under the monitoring program; excluding analytes with specified permit limits or SPOs (i.e., selenium, nitrate-N, sulphate, and dissolved cadmium). Of those 1,347 (<1 percent) were identified as having exceeded a British Columbia approved/working freshwater aquatic life water quality guideline (BC FAL WQG<sup>4</sup>); or had MDLs above the BC FAL WQG. Specifically, 87 percent of the aforementioned 1,347 analyses were identified as having MDLs above the BC FAL WQG (i.e., mercury and beryllium), of which mercury represented the majority (i.e., 1,172 analyses). As a result, there are uncertainties associated with actual concentrations and if the guideline was exceeded.

Despite the uncertainty associated with aqueous mercury concentrations, other monitoring programs within the Valley such as the RAEMP, evaluate mercury in more meaningful media (i.e., tissues). Therefore any uncertainties associated with aqueous mercury concentrations are not anticipated to affect the overall monitoring program for the Valley. Furthermore and in consideration of the many challenges associated with collecting useable aqueous mercury data in general, and that other monitoring programs (i.e., RAEMP) evaluate mercury in more biologically meaningful medium (e.g., tissues), Teck proposes that collecting aqueous mercury data be removed from the permitted routine water quality parameters as it provides little added value.

A summary of analytes and associated sampling sites in which a detected analytical concentration was identified as exceeding an approved or working water quality guideline is

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<sup>4</sup> For purposes herein, instantaneous measurements are evaluated relative to long-term rather than short-term exposure guidelines. As a result, an exceedance from an instantaneous measurement would not be expected to result in an adverse effect or unacceptable conditions within the receiving environment.

presented in Table 14, with a detailed list (includes samples with elevated MDLs) presented in Appendix E.

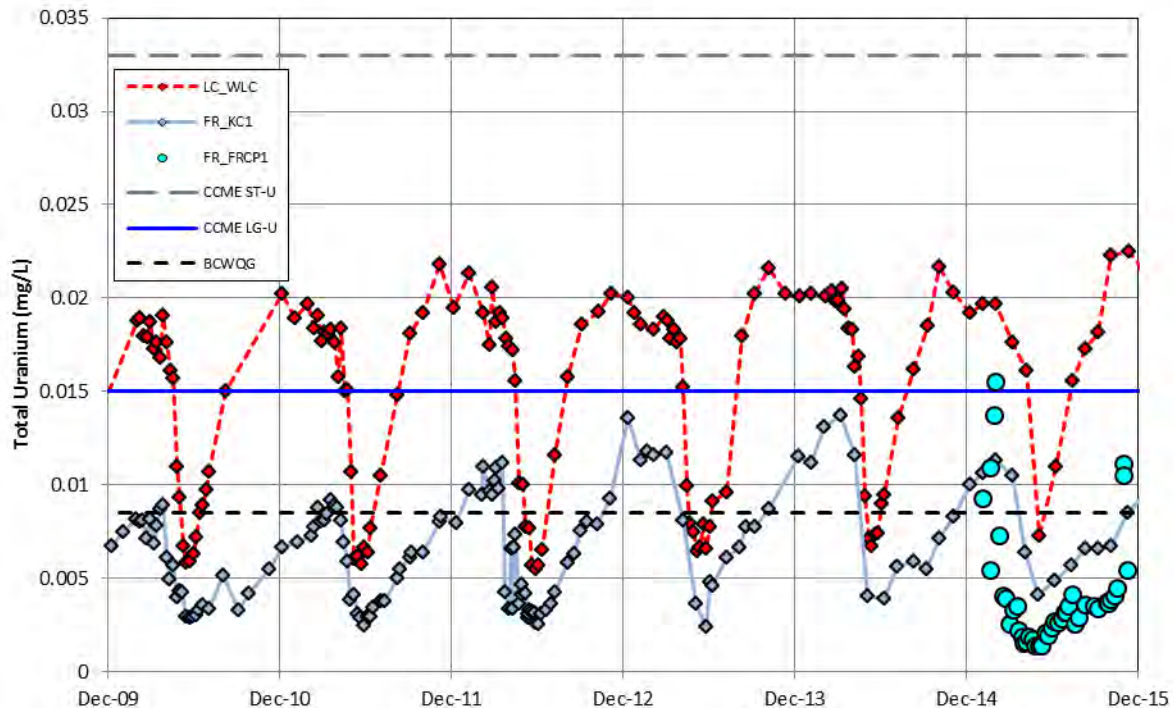
**Table 14. Summary of water sampling sites where an exceedance in a British Columbia Approved or Working Freshwater Aquatic Life Water Quality Guideline was recorded in 2015.**

EMS ID	Site ID	Analyte(s)	Number of Samples Exceeding Guideline
E300071	FR_FRCP1	Uranium (U)	U = 6
0200389	GH_ER2	Aluminum (Al)	Al = 1
E300090	GH_ERC	Iron (Fe)	Fe = 1
0206661	GH_ER1	Aluminum (Al), Iron (Fe)	Al = 3, Fe = 1
E288273	LC_DC3	Beryllium (Be), Iron (Fe), Mercury (Hg)	Be = 1, Fe = 1, Hg = 2
E216142	LC_LC1	Mercury (Hg)	Hg = 1
0200335	LC_LC2	Iron (Fe)	Fe = 1
E261958	LC_WLC	Uranium (U)	U = 12
0200337	LC_LC3	Mercury (Hg)	Hg = 2
0200044	LC_LC4	Iron (Fe), Mercury (Hg), Sulfide (S <sup>2-</sup> )	Fe = 1, Hg = 1, S <sup>2-</sup> = 1
E297110	LC_LCDSSLCC	Iron (Fe)	Fe = 1
0200028	LC_LC5	Mercury (Hg)	Hg = 1
0200203	EV_MC3	Iron (Fe), Mercury (Hg)	Fe = 2, Hg = 1
0200027	EV_ER4	Iron (Fe), Mercury (Hg)	Fe = 1, Hg = 1
E298596	EV_WF_SW	Cobalt (Co), Iron (Fe)	Co = 1, Fe = 5
E298592	EV_BLM2	Beryllium (Be), Iron (Fe), Mercury (Hg)	Be = 1, Fe = 1, Hg = 6
E298591	EV_FC1	Iron (Fe), Mercury (Hg)	Fe = 2, Hg = 5
0200111	EV_ER2	Iron (Fe)	Fe = 1
E300091	EV_MC2	Iron (Fe), Mercury (Hg)	Fe = 4, Hg = 1
E102682	EV_HC1	Iron (Fe), Mercury (Hg)	Fe = 1, Hg = 1
0200393	EV_ER1	Iron (Fe), Mercury (Hg)	Fe = 3, Hg = 1
E258175	CM_MC1	Iron (Fe), Mercury (Hg)	Fe = 1, Hg = 1
0200209	CM_CC1	Nitrite-N (NO <sub>2</sub> <sup>-</sup> )	NO <sub>2</sub> <sup>-</sup> = 4
E258937	CM_MC2	Beryllium (Be), Iron (Fe), Mercury (Hg)	Be = 1, Fe = 2, Hg = 4
E294312	RG_ELKORES	Aluminum (Al), Iron (Fe)	Al = 2, Fe = 2
E300230	RG_DSELK	Aluminum (Al)	Al = 1
E300092	RG_GRASMERE	Iron (Fe)	Fe = 1

As seen within Table 14, a majority of the observed exceedances was limited to one or two samples and as such, would not be expected to represent or result in unacceptable conditions within the receiving environment. Uranium and iron were observed as having the greatest number of exceedances, with 18 and 33, respectively recorded. Aqueous mercury data should be cautiously considered given sampling and analytical challenges encountered for this constituent; and only secondarily to more biologically relevant media (i.e., tissues) that are monitored under the RAEMP and submitted under separate cover.

Of the 18 observed exceedances for uranium, 12 (55 percent) were recorded at E261958 (LC\_WLC) with the remaining 6 (45 percent) recorded at E300071 (FR\_FRCP1). The BC FAL WQG for uranium is a working guideline and represents the lower fiducial limit of the Species Sensitivity Distribution developed by the Canadian Council of Ministers of the Environment

(CCME). For additional context and comparative purposes, total uranium concentrations recorded at E261958 (LC\_WLC), 0200252 (FR\_KC1), and E300071 (FR\_FRCP1) are also compared to the short- and long-term CCME FAL guidelines, see Figure 28.



**Figure 28. Total uranium concentrations recorded at water sampling sites E261958 (LC\_WLC), 0200252 (FR\_KC1), and E300071 (FR\_FRCP1).**

**Note:** Total uranium concentrations are plotted in relation to the CCME short-term (0.033 mg/L; grey dashed line) and long-term (0.015 mg/L; solid blue line), and the BC FAL WQG working guideline (0.0085 mg/L; dashed black line).

As illustrated within Figure 28, uranium concentrations at each sampling site follow a similar seasonal pattern with peak concentrations recorded during the winter months (i.e., first and fourth quarters). During this period of time, concentrations routinely exceed the BC working guideline; but in the case of sampling site 0200252 (FR\_KC1), never exceed the CCME long-term guideline. As a result, uranium concentrations observed at 0200252 (FR\_KC1) are not anticipated to represent or result in unacceptable conditions within the receiving environment.

Grab samples collected at E300071 (FR\_FRCP1) are observed to exceed the BC working guideline and in one instance, the CCME long-term guideline, refer to Figure 28. Given that the monthly average concentration (i.e., 0.008 mg/L) is lower than the CCME long-term guideline, and that the grab sample concentration is less than the CCME short-term guideline, it is not anticipated that uranium concentrations recorded at E300071 (FR\_FRCP1) represent or would result in unacceptable conditions within the receiving environment.

Uranium concentrations recorded at E261958 (LC\_WLC) routinely exceed the BC water quality working guideline, and during low-flow periods, the CCME long-term water quality guideline; while

always remaining below the CCME short-term water quality guideline. Despite the fact that uranium concentrations of E261958 (LC\_WLC) are elevated relative to water quality guidelines, these rock drain concentrations do not appear to have adversely affected hydrologically down-gradient receiving environment sampling sites (i.e., 0200337 (LC\_LC3)), see Figure 29. Therefore, it is not anticipated that uranium concentrations at the West Line Creek rock drain (E261958 (LC\_WLC)) are adversely affecting the receiving environment. Additional information associated with this portion of LCO is detailed within the Local Aquatic Effects Monitoring Program for Line Creek submitted under separate cover.

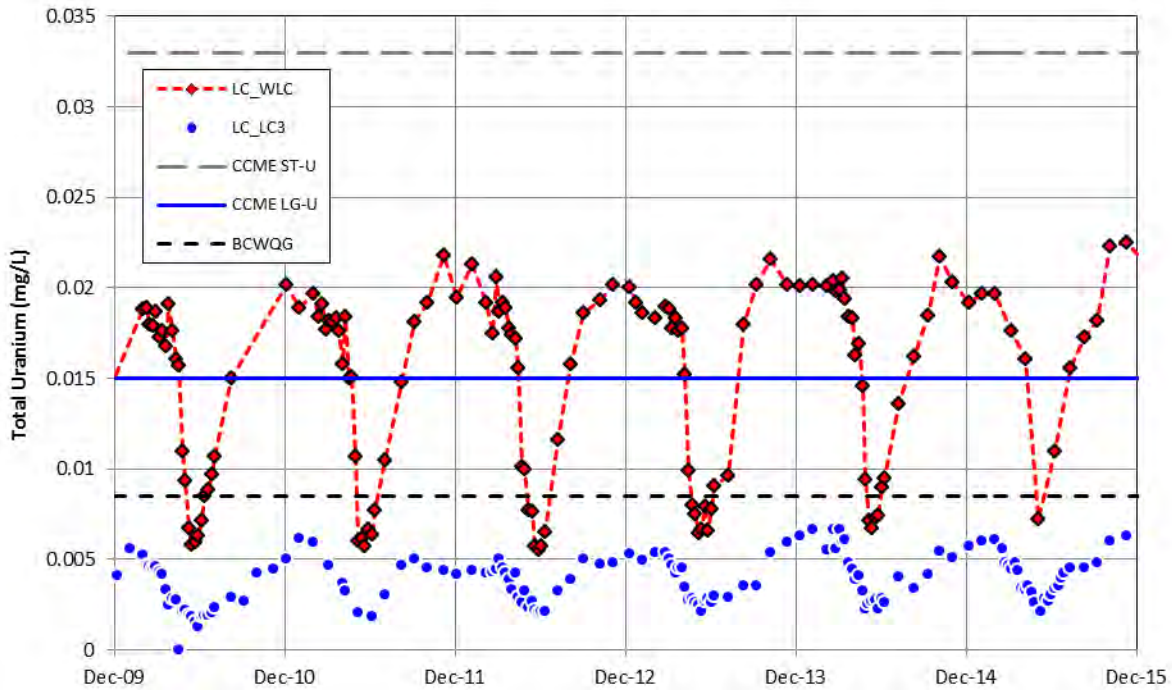


Figure 29. Total uranium concentrations recorded at water sampling sites E261958 (LC\_WLC) and 0200337 (LC\_LC3).

**Note:** Total uranium concentrations are plotted in relation to the CCME short-term (0.033 mg/L; grey dashed line) and long-term (0.015 mg/L; solid blue line), and the BC FAL WQG working guideline (0.0085 mg/L; dashed black line).

With the exception of sampling site E298596 (EV\_WF\_SW) where an exceedance in the total iron BC FAL WQG (i.e., 1.0 mg/L) was recorded in five samples, iron exceedances were largely limited to one or two samples. As such and consistent with other analytes where only one or two samples exceeded the guideline, it is not anticipated that such limited exceedances would represent or result in unacceptable conditions within the receiving environment. Samples associated with E298596 (EV\_WF\_SW) are groundwater, not surface water, samples. As such, the recorded exceedances are not expected to have an adverse effect on freshwater aquatic life. Groundwater conditions will be discussed under the Groundwater Monitoring Program and submitted under separate cover.

In addition to the above-mentioned and as outlined within Appendix E, there were recorded exceedances for field based parameters (i.e., pH, temperature, and dissolved oxygen). With the



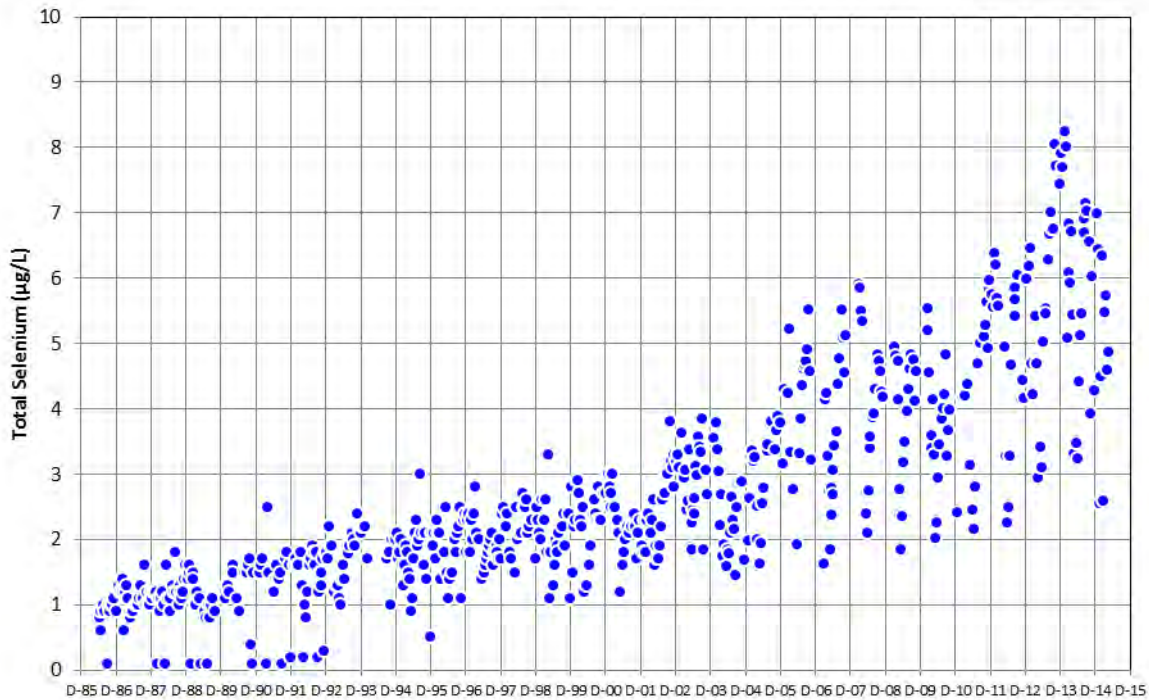
exception of temperature, field measurements are susceptible to equipment calibration issues. As noted in Section 3.3, there were a number of calibration issues associated with field measurements and as such, pH measurements identified as being outside the guideline range should be considered qualitatively. This is supported by the fact that all laboratory determined pH values were within the BC FAL WQG range (6.5 – 9.0 standard units). As a result, it is not anticipated that field-based pH readings represent an unacceptable condition within the receiving environment. Similarly, although instantaneous measurements of dissolved oxygen were recorded to be less than the long-term BC FAL WQG (8.0 mg/L), they were consistently above the instantaneous minimum BC FAL WQG value of 5.0 mg/L; and as such, would not be expected to represent unacceptable conditions. Elevated water temperatures are associated with ambient conditions (i.e., seasonality) and simply reflect the range of water temperatures recorded within the Valley (i.e., reference and mine-influenced), not mine related activities.

## 4.2 Order-Defined Constituents of Interest

Permit 107517 takes an area based approach to authorizing and managing water quality constituents of interest, specifically selenium, nitrate, sulphate, and cadmium (i.e., the Order-constituents). The following section discusses the aforementioned Order-constituents in relation to key receiving environment sampling sites (i.e., Order stations) and source sites (i.e., waste rock dumps). Unlike Section 2.2, the following section does not evaluate compliance. Similarly, given that Order-constituents are evaluated relative to SPOs, the focus is not if BC FAL WQGs are exceeded. Rather, the focus is on temporal patterns observed and how upstream source sites (i.e., waste rock dumps) may affect downstream water quality. As part of this evaluation, a distinction is made relative to waste rock dump status (i.e., active versus dormant). For purposes herein, a dormant waste rock dump is defined as not having any new waste deposited for a period of  $\geq 1$  year; while an active waste rock dump is defined as receiving or having received waste rock within the past year (i.e.,  $< 1$  year).

### 4.2.1 Selenium

Total selenium concentrations within the Valley have been increasing since the 1990's and based on data collected by Environment Canada and its partners at long-term water quality surveillance monitoring station BC08NK0003 in the Elk River (at Highway 93 bridge South of Elko, BC), have been observed to exceed the BC FAL WQG (2  $\mu\text{g/L}$ ) since approximately 1993, see Figure 30. Selenium concentrations at BC08NK0003 steadily increased reaching a peak concentration ( $\sim 8.2$   $\mu\text{g/L}$ ) in approximately late-2013/early-2014. Similar temporal patterns can be seen at upstream Order Stations, particularly where data have been collected since 2000 (i.e., 0200378 (GH\_FR1) and 0200028 (LC\_LC5)), see Figure 31.



**Figure 30. Total selenium concentrations recorded at water quality surveillance monitoring station BC08NK0003 in the Elk River.**

**Note:** Data were accessed from <http://www.ec.gc.ca/eaudouce-freshwater/default.asp?lang=En&n=EFDA57C6-1> on March 8, 2016 and at the time of writing, include data up to May 2015. Labels along the x-axis represent a year and are labelled with the twelve month of that year. Therefore and as an example, December 1996 is represented as “D-96” along the x-axis, with the illustrated range being December 1985 (“D-85”) to December 2015 (“D-15”).

Based on data collected to date, selenium concentrations at 0200378 (GH\_FR1) and 0200028 (LC\_LC5) attained a peak concentration in 2013-2014, see Figure 31. Similar patterns are less discernable at downstream Order stations (e.g., 0200027 (EV\_ER4), 200393 (EV\_ER1)) as total selenium concentrations are lower to begin with and/or simply do not have as much data to discern appreciable trends/patterns (e.g., E294312 (RG\_ELKORES), E300230 (RG\_DELK)).

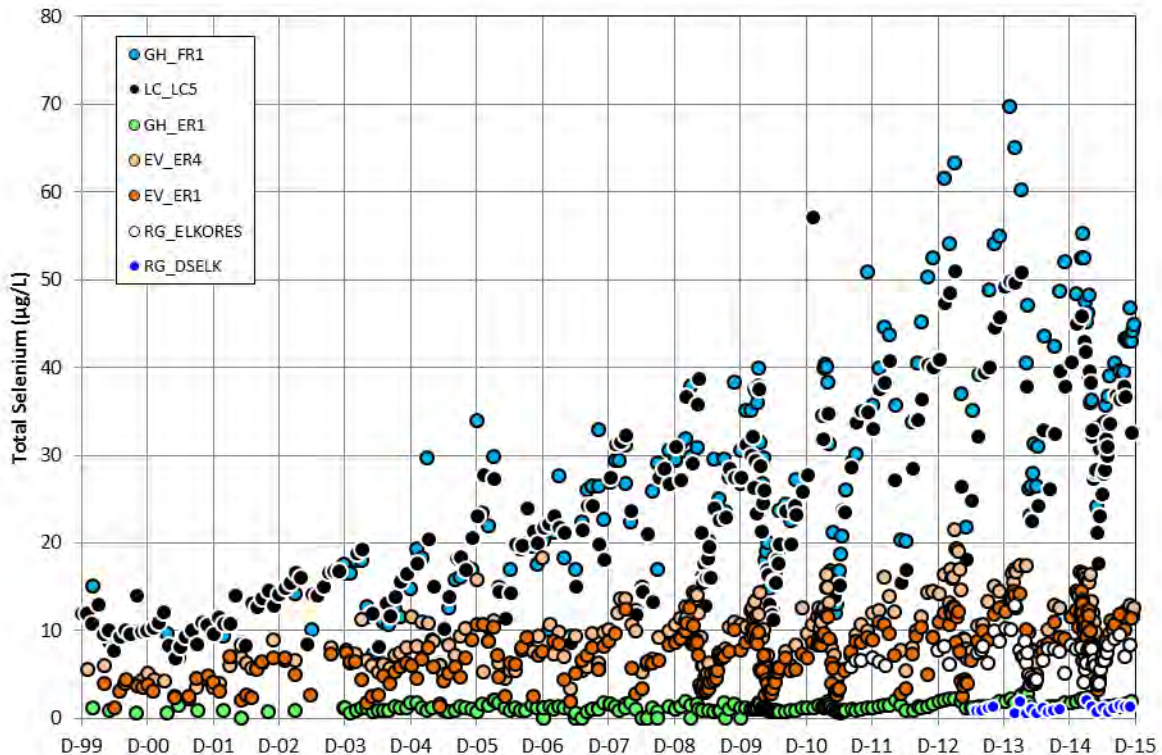


Figure 31. Total selenium concentrations recorded at order stations.

**Note:** Labels along the x-axis represent a year and are labelled with the twelve month of that year. Therefore and as an example, December 2002 is represented as “D-02” along the x-axis. Order stations include: 0200378 (GH\_FR1), 0200028 (LC\_LC5), E206661 (GH\_ER1), 0200027 (EV\_ER4), 200393 (EV\_ER1), E294312 (RG\_ELKORES), and E300230 (RG\_DELK). With the exception of E300230 (RG\_DELK) where the monthly average concentration is plotted, data plotted herein represent instantaneous grab samples.

Selenium temporal patterns expressed at Order Stations in the Fording River are likely associated with similar patterns observed at water sampling sites associated with waste rock dumps (i.e., sources). Specifically, key waste rock dumps and their respective status (active versus dormant), include the following (upstream to downstream):

- E102480 (FR\_EC1) – Dormant
- 0200252 (FR\_KC1) – Active
- E105061 (GH\_SC2) – Active
- 0200384 (GH\_CC1) – Active
- E102709 (GH\_GH1) – Dormant
- E261958 (LC\_WLC) – Dormant.

Figure 32 illustrates total selenium concentrations recorded at water sampling sites associated with the above-listed waste rock dumps (primary y-axis), in relation to Order Stations 0200378 (GH\_FR1) and 0200028 (LC\_LC5); (secondary y-axis). For purposes of illustration, active waste rock dumps have been illustrated using a triangle, dormant waste rock dumps using a square, and Order Stations a circle.



Although absolute concentrations recorded at downstream Order Stations are significantly less (e.g., maximum = 69.7 µg/L @ 0200378 (GH\_FR1); 03-Feb-2014) than those recorded at source sites (e.g., maximum = 853 µg/L @ E105061 (GH\_SC2); 08-Jan-2014), temporal patterns expressed are very similar.

Based on data collected to date and the significant overlap in observed concentrations (refer to Figure 32), it does not appear that waste rock dump status directly influences selenium concentrations. Based on data collected to date, it does not yet appear that waste rock dump status directly influences surface water selenium concentrations. However and as illustrated within Figure 32, selenium concentrations from key upstream sources (E105061 (GH\_SC2) and 0200384 (GH\_CC1)) have a direct effect on downstream receiving environments.

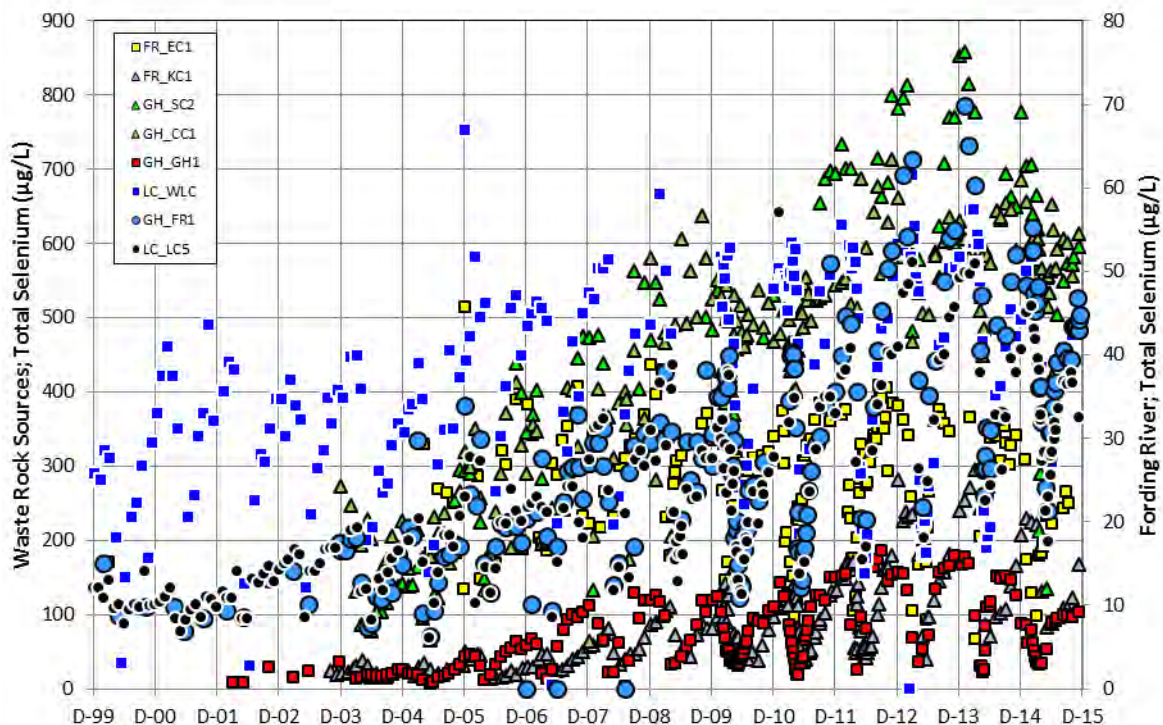


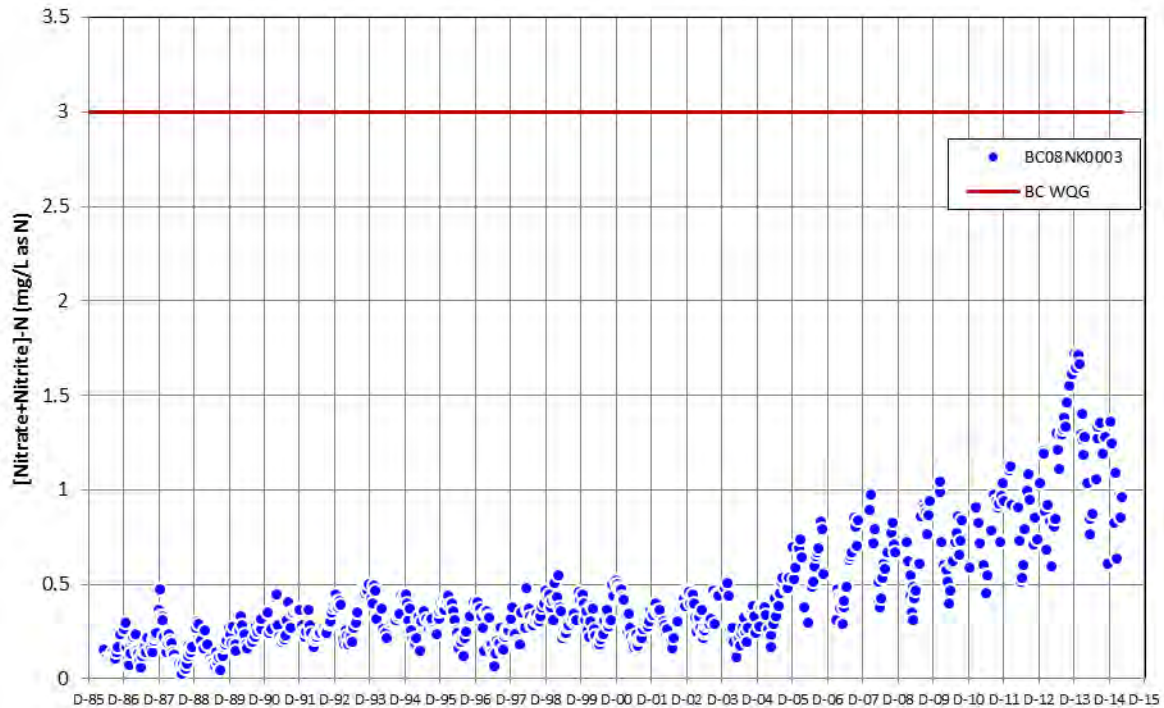
Figure 32. Total selenium concentrations at key source sites (primary Y-axis) relative to downstream order stations (secondary Y-axis).

**Note:** Active waste rock dumps are depicted using triangles, dormant waste rock dumps with squares, and Order Stations within the Fording River with circles. Note the difference in scales for the primary and secondary y-axes.

#### 4.2.2 Nitrate-N

Similar to selenium, nitrate-N concentrations have increased within the Valley. Based on data collected by Environment Canada and its partners at long-term water quality surveillance monitoring station BC08NK0003, nitrate concentrations (see Figure 33), follow a similar pattern observed for selenium at this station (refer to Figure 30). Nitrate-N data collected and presented for monitoring station BC08NK0003 is for [nitrate + nitrite]-N; and as such, slightly

over-estimates actual nitrate concentrations. However, for purposes of illustrating the overall trend to date it represents the oldest and most consistent data set.



**Figure 33. [Nitrate + Nitrite] Concentrations recorded at water quality surveillance monitoring station BC08NK0003 in the Elk River.**

**Note:** Data were accessed from <http://www.ec.gc.ca/eaudouce-freshwater/default.asp?lang=En&n=EFDA57C6-1> on March 8, 2016 and at the time of writing, include data up to May 2015. Labels along the x-axis represent a year and are labelled with the twelve month of that year. Therefore and as an example, December 1996 is represented as “D-96” along the x-axis, with the illustrated range being December 1985 (“D-85”) to December 2015 (“D-15”). The BC FAL WQG for nitrate-N is for illustration purposes only as the data plotted are [nitrate + nitrite]-N.

Temporal variability observed in nitrate + nitrite data at BC08NK0003 tracks very closely to that observed in the selenium data. Similar temporal patterns can also be seen at upstream Order Stations.

Based on data collected to date, nitrate-N concentrations at 0200378 (GH\_FR1) and 0200028 (LC\_LC5) the highest concentration was measured in 2014, see Figure 34. Similar patterns are less distinct at downstream Order stations (e.g., 200393 (EV\_ER1)) for nitrate-N concentrations are lower to begin with, and/or simply do not have as much data to discern appreciable trends/patterns (e.g., E294312 (RG\_ELKORES), E300230 (RG\_DELK)).

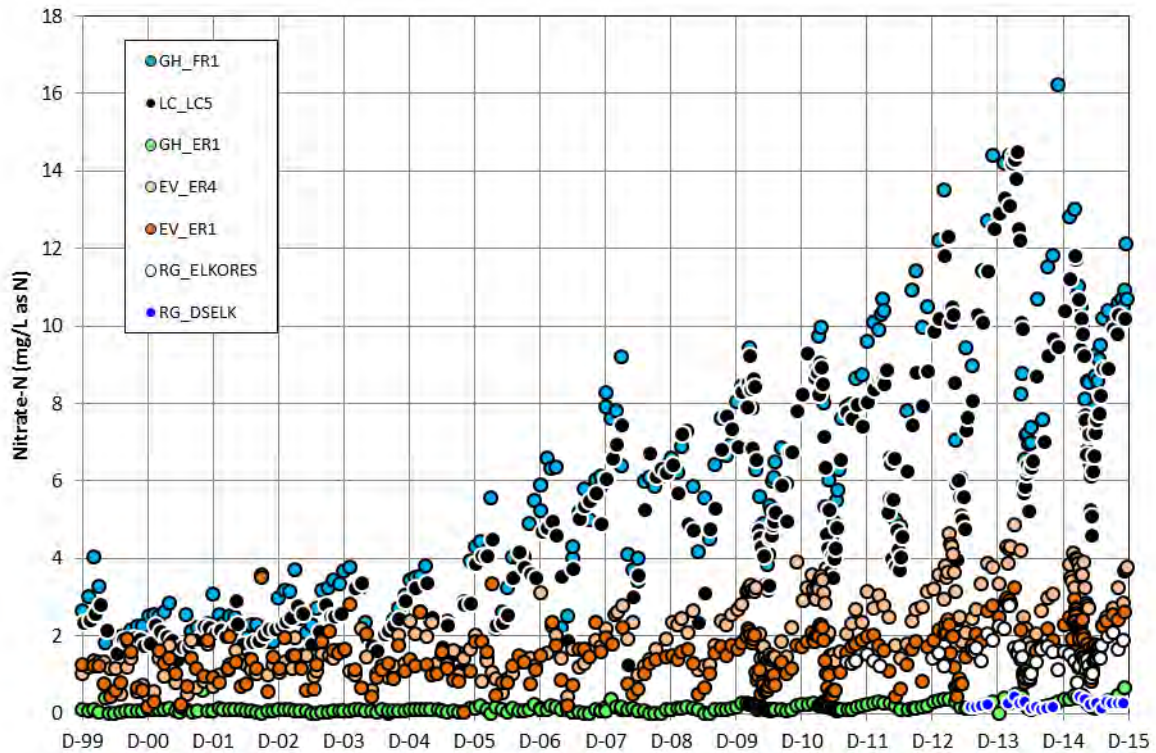


Figure 34. Nitrate-N concentrations recorded at order stations.

**Note:** Labels along the x-axis represent a year and are labelled with the twelve month of that year. Therefore and as an example, December 2002 is represented as “D-02” along the x-axis. Order stations include: 0200378 (GH\_FR1), 0200028 (LC\_LC5), E206661 (GH\_ER1), 0200027 (EV\_ER4), 200393 (EV\_ER1), E294312 (RG\_ELKORES), and E300230 (RG\_DELK). With the exception of E300230 (RG\_DELK) where the monthly average concentration is plotted, data plotted herein represent instantaneous grab samples.

Like selenium, nitrate temporal patterns expressed at Fording River Order Stations are associated with concentrations observed at key waste rock dumps (refer to Section 4.2.1), see Figure 35 (top panel). Consistent with selenium data plots, active waste rock dumps are depicted using triangles, dormant waste rock dumps with squares, and Order Stations with circles. Note the difference in scales for the primary (waste rock dumps) and secondary y-axes (Order Stations).

Unlike selenium where temporal patterns at downstream Order stations were a reflection of a number of key sources, nitrate concentrations appear largely to be driven by one source (i.e., 0200252 (FR\_KC1)). Another difference is that nitrate concentrations associated with dormant waste rock dumps appear to have been declining since approximately 2008 to 2010, or have remained fairly constant. To better illustrate these trends, nitrate concentrations for dormant waste rock dumps E102480 (FR\_EC1), E102709 (GH\_GH1), and E261958 (LC\_WLC) are illustrated in the bottom panel of Figure 35.



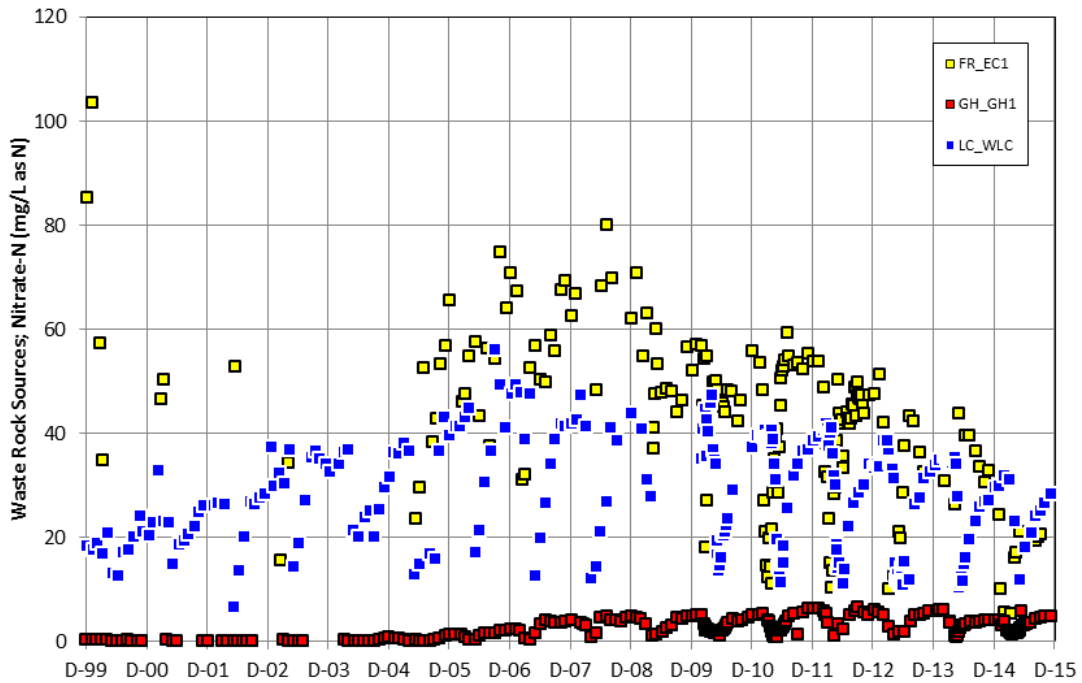
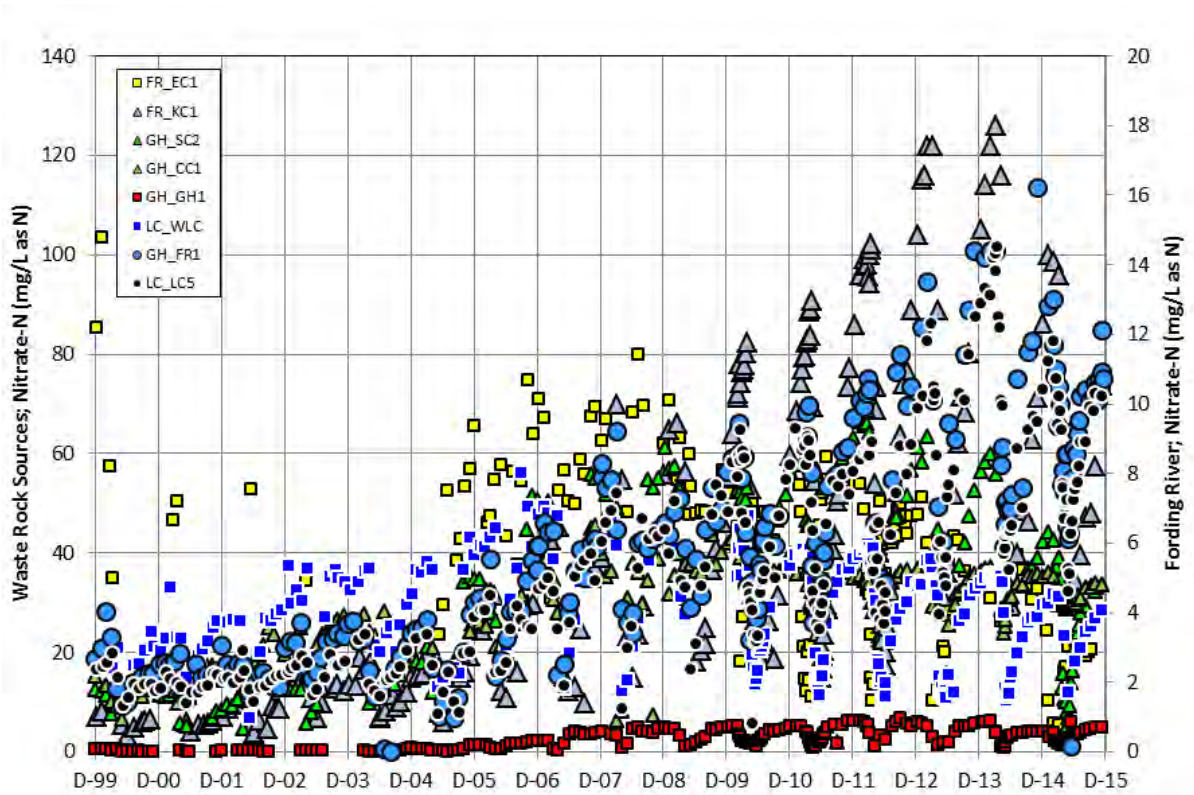
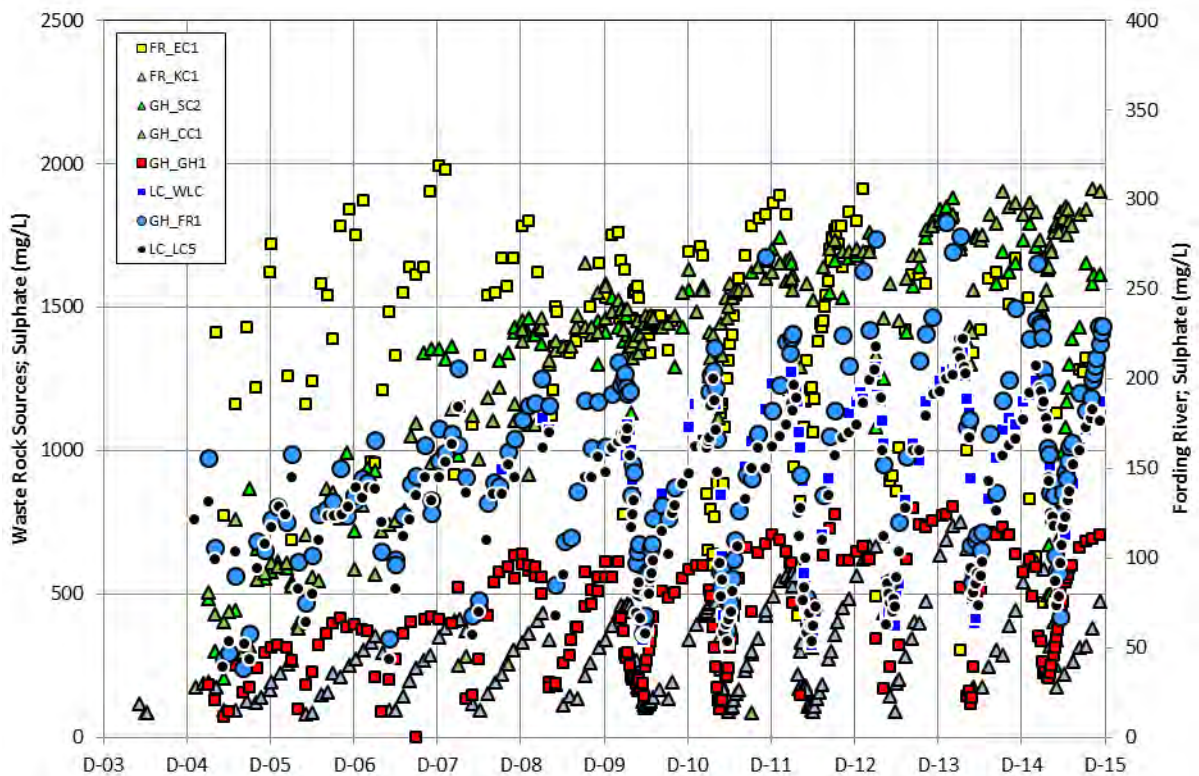


Figure 35. Top panel: nitrate-N concentrations at key source sites (primary Y-axis) relative to downstream order stations (secondary Y-axis); bottom panel: nitrate-N concentrations from dormant waste rock dumps in the Fording River watershed.

### 4.2.3 Sulphate and Cadmium

Unlike selenium and nitrate, sulphate and cadmium data are comparatively limited, especially for cadmium. Despite these limitations there are spatial and temporal patterns observed in sulphate data that mirror those of selenium; and likely reflect the oxidation of sulfur-bearing minerals within the waste rock dumps (e.g., pyrite). As a result and based on data collected to date, sulphate concentrations recorded at key source sites are seen to increase to a maximum concentration of approximately  $\leq 2000$  mg/L and then maintaining a fairly constant seasonal pattern, see Figure 36. Like selenium, sulphate temporal patterns expressed at Fording River Order Stations are associated with concentrations observed at key waste rock dumps.



**Figure 36. Sulphate concentrations at key source sites (primary Y-axis) relative to downstream order stations (secondary Y-axis).**

**Note: Active waste rock dumps are depicted using triangles, dormant waste rock dumps with squares, and Order Stations within the Fording River with circles. Note the difference in scales for the primary and secondary y-axes.**

Unlike other Order-defined constituents of interest, cadmium data and associated temporal trends and relationships between source sites and the receiving environment are less apparent, see Figure 37. Rather and as noted in the ABMP, seasonal cadmium concentrations within the receiving environment appear associated with background conditions. Continued surface water monitoring for this constituent will help improve clarity and ability to discern relationships and patterns.

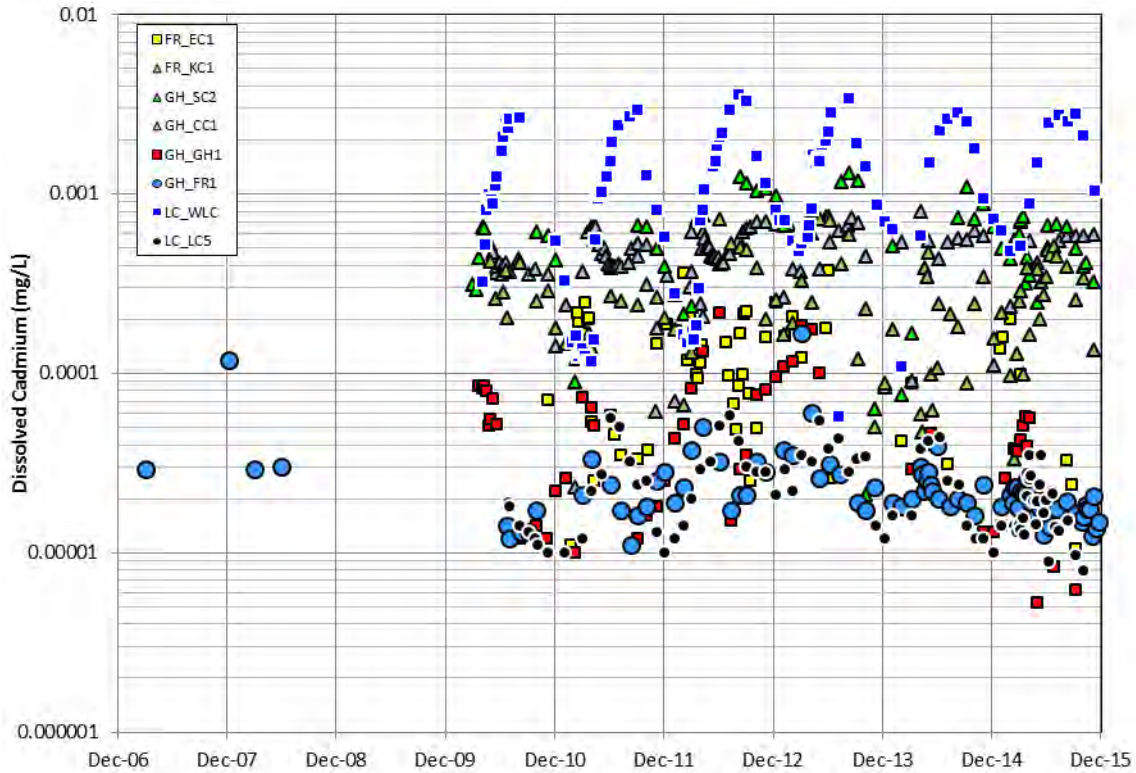


Figure 37. Dissolved cadmium concentrations at key source sites relative to downstream order stations.

Note: Active waste rock dumps are depicted using triangles, dormant waste rock dumps with squares, and Order Stations within the Fording River with circles. Note the y-axis is on a logarithmic scale.

### 4.3 Toxicity

#### 4.3.1 Acute Toxicity

In 2015, the West Line Creek Active Water Treatment Facility remained in a commissioning phase. As a result, and consistent with Section 4.1 of Permit 107517, was required to discharge non-acutely toxic effluent. A total of 30 acute toxicity tests were performed and all passed during the 2015 commissioning phase for sampling site E291569 (LC\_WTF\_OUT). A summary of test results is presented in Table 15, with detailed biological test reports provided in Appendix F.

**Table 15. Summary of acute toxicity test results during commissioning of the West Line Creek Active Water Treatment Facility - E291569 (LC\_WTF\_OUT).**

Date	Percent Survival <i>D. magna</i>	Percent Survival <i>O. mykiss</i>
20-Oct-15	100	100
21-Oct-15	100	100
24-Oct-15	100	100
26-Oct-15	100	90
31-Oct-15	100	100
2-Nov-15	100	100
9-Nov-15	100	100
16-Nov-15	100	100
23-Nov-15	90	100
1-Dec-15	100	100
7-Dec-15	100	100
11-Dec-15	100	100
14-Dec-15	100	100
21-Dec-15	100	100
28-Dec-15	100	100

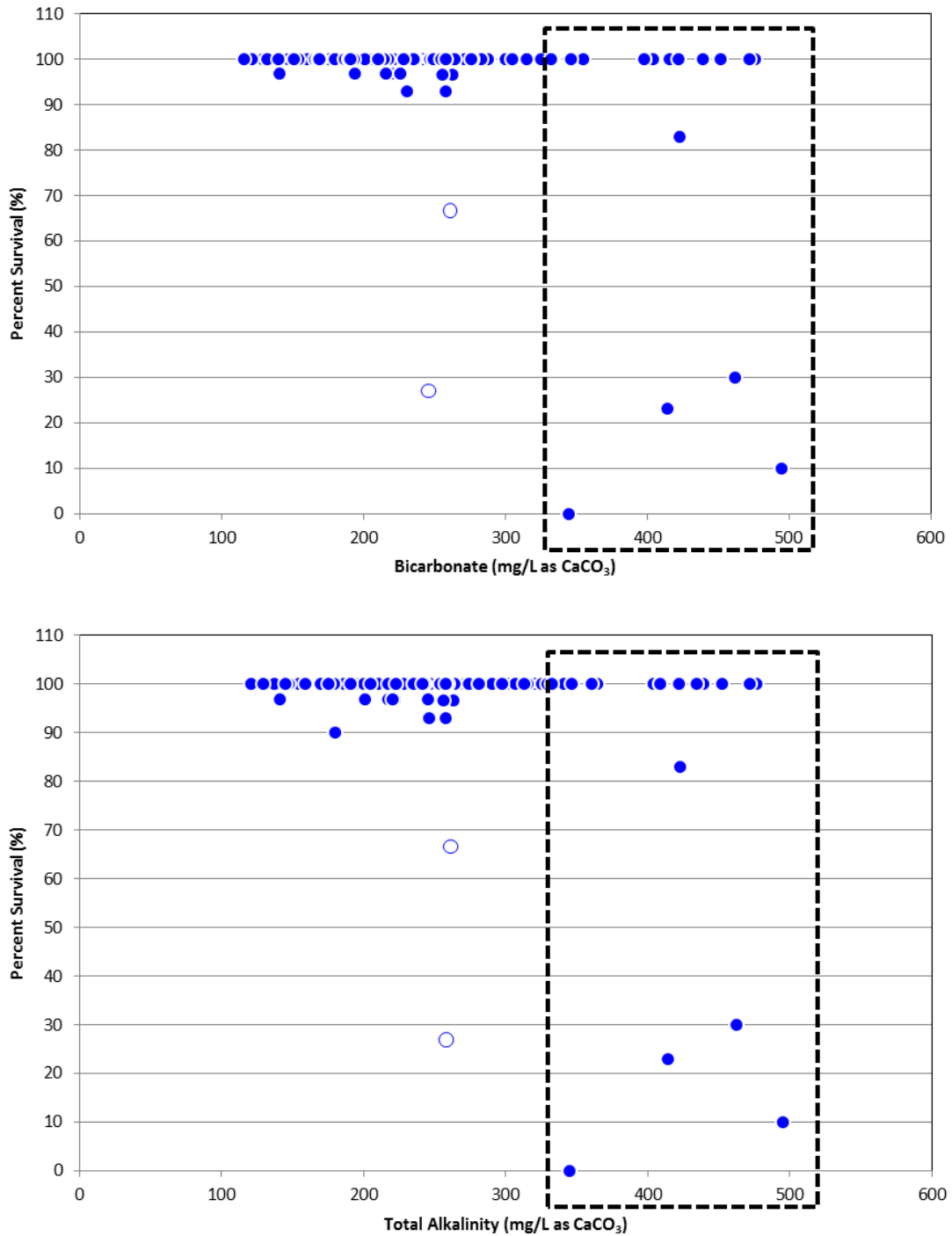
In addition to the above-listed acute toxicity tests and as outlined within Appendix B, acute toxicity tests are also required as part of the surface water monitoring program.

Two hundred twenty (220) acute toxicity tests were completed as part of the surface water monitoring program in 2015. Of those, four (<2 percent) *D. magna* tests were recorded as having <50 percent survival and as such failed tests. A summary of test results in association with the detailed biological test reports is provided in Appendix G.

As discussed in Section 2.3, the above-mentioned failed *D. magna* tests were attributed to a temperature-dependent mineral precipitation reaction which in turn encrusted test organisms. Based on Toxicity Identification Evaluation (TIE) testing, it was suggested that the mineral precipitate forming was calcite ( $\text{CaCO}_3$ ). Note that mineral precipitation observations recorded during testing are not exclusive to calcite (i.e., many reactions are thermodynamically affected) and as such, the resulting conclusions should be considered preliminary. To further evaluate the hypothesis of calcite precipitating during testing, water chemistry and associated saturation indices were calculated for *D. magna* toxicity tests.

In terms of relative acute toxicity for major cations and anions, bicarbonate ( $\text{HCO}_3^-$ ) can be quite toxic to *D. magna* (SETAC Technical Issue Paper 2004); represents approximately  $\geq 98$  percent of total alkalinity in Valley waters; and is the limiting factor in the formation of calcite. Calcium on the other hand is less toxic and is not limiting. As a result, to evaluate the potential that bicarbonate (i.e., alkalinity) played a role in the observed failed test, *D. magna* toxicity data (i.e., percent survival) were evaluated in relation to bicarbonate alkalinity (top panel, Figure 38) and total alkalinity (bottom panel, Figure 38).



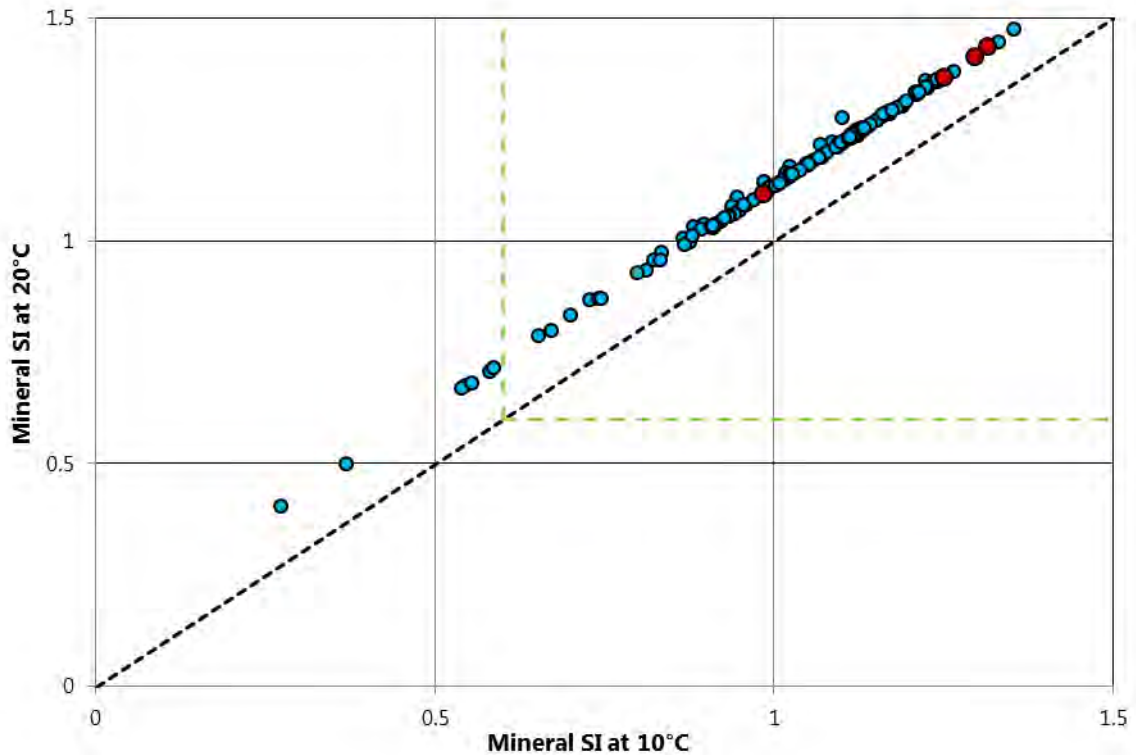


**Figure 38. Percent survival *D. magna* as a function of bicarbonate alkalinity (top panel) and total alkalinity (bottom panel).**

**Note:** The two data points identified with a hollow symbol are uncertain as potential mortalities were not confirmed with a dissecting microscope. As a result, it is uncertain if test organisms were acutely affected or were simply immobile. For completeness these results, although uncertain, have been included for illustration purposes. Data presented are inclusive of all *D. magna* tests performed to date. The dashed rectangle reflects the range in alkalinity concentrations tests failed.



The range in bicarbonate and total alkalinity where failed *D. magna* tests were recorded overlap the range where 100 percent survival was also recorded. This is illustrated using the dashed rectangle within Figure 38. Based on data collected to date, there is no clear distinction in *D. magna* test results associated with alkalinity. To evaluate if calcite could have precipitated under test conditions, saturation indices were calculated for all *D. magna* tests. In consideration that laboratory tests conducted to date identified a temperature-dependent relationship, saturation indices were calculated at 10°C (x-axis of Figure 39) and 20°C (y-axis of Figure 39).



**Figure 39. Calculated calcite saturation indices for *D. magna* acute toxicity tests at two water temperatures.**

**Note:** Saturation indices presented are inclusive of all *D. magna* tests performed to date and were calculated by Stephen Day of SRK Consulting (March 11, 2015). The dashed green lines reflect the range in saturation indices where calcite would be predicted to precipitate. The saturation index is at +0.6 because there is experience that calcite does not actually precipitate in the Valley until it exceeds this value due to a kinetic barrier (S. Day, personal communication). The dashed black line represents the 1:1 line. The red dots reflect samples where percent survival for *D. magna* was less than 50 percent (i.e., a failed test result).

With very few exceptions, calcite would be expected to precipitate under all conditions and as illustrated within Figure 39, samples where *D. magna* survival was less than 50 percent (red dots) do not distinguish themselves from the population data set. As a result, it is uncertain if mineral precipitates observed during testing were calcite or potentially some other mineral. To

identify potential precipitates, saturation indices for a wide range of minerals were calculated, see Figure 40.

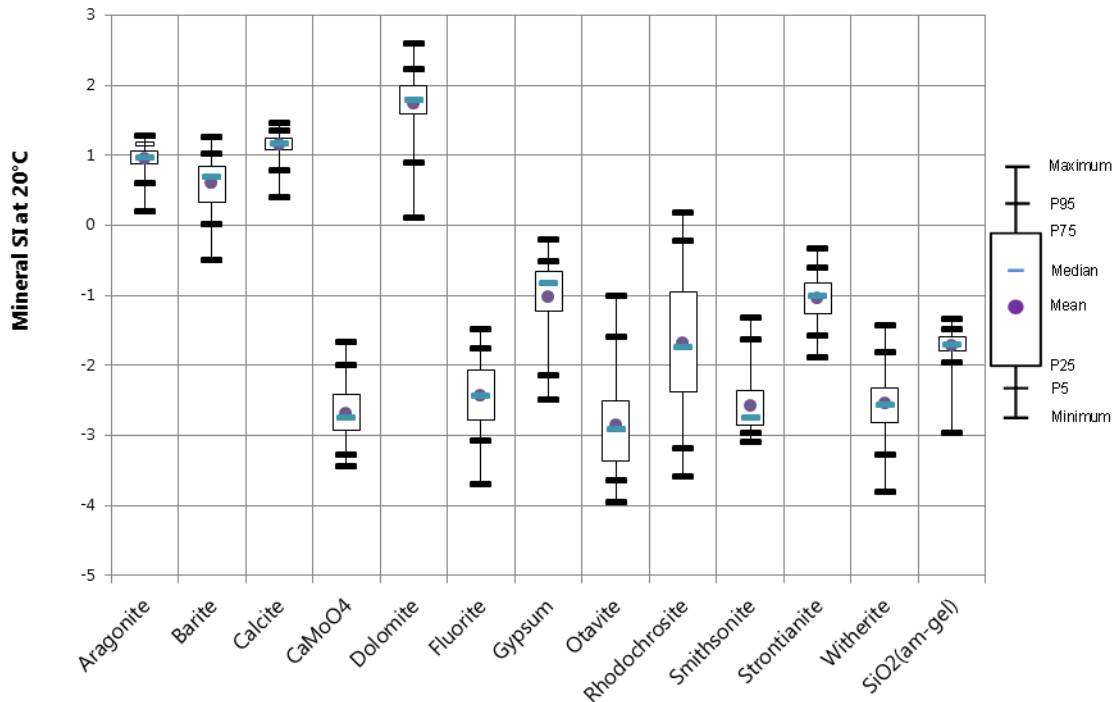
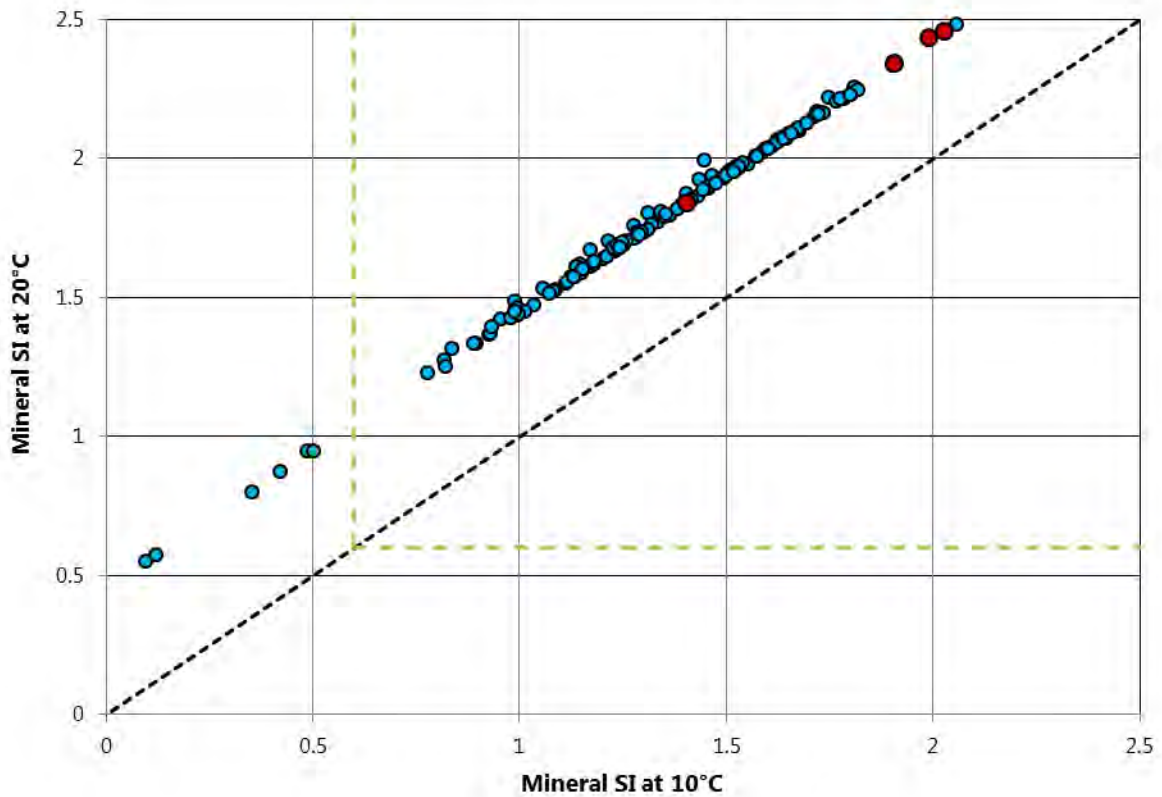


Figure 40. Calculated saturation indices at 20°C for a wide range of minerals.

**Note:** Saturation indices presented are inclusive of all D. magna tests performed to date and were calculated by Stephen Day of SRK Consulting (March 11, 2015). Minerals with saturation indices below zero would not be expected to precipitate.

Dolomite ( $\text{CaMg}(\text{CO}_3)_2$ ) was identified as having the highest saturation index. To evaluate if dolomite could be responsible for the observed toxicity test failures, calculated saturation indices were plotted in relation to observed biological test results at 10°C (x-axis of Figure 41) and 20°C (y-axis of Figure 41).



**Figure 41. Calculated dolomite saturation indices for *D. magna* acute toxicity tests at two water temperatures.**

**Note:** Saturation indices presented are inclusive of all *D. magna* tests performed to date and were calculated by Stephen Day of SRK Consulting (March 11, 2015). The dashed green lines reflect the range in saturation indices where dolomite could be predicted to precipitate. The dashed black line represents the 1:1 line. The red dots reflect samples where percent survival for *D. magna* was less than 50 percent (i.e., a failed test result).

Similar to results observed for calcite, samples where *D. magna* survival was less than 50 percent (red dots) do not distinguish themselves from the population data set. As a result, it is uncertain if dolomite is associated with the observed mortalities. Similar analyses were performed for barite ( $BaSO_4$ ) and aragonite ( $CaCO_3$ ), both of which do not explain the observed toxicity test failures and associated mineral precipitates, refer to Figure 43.

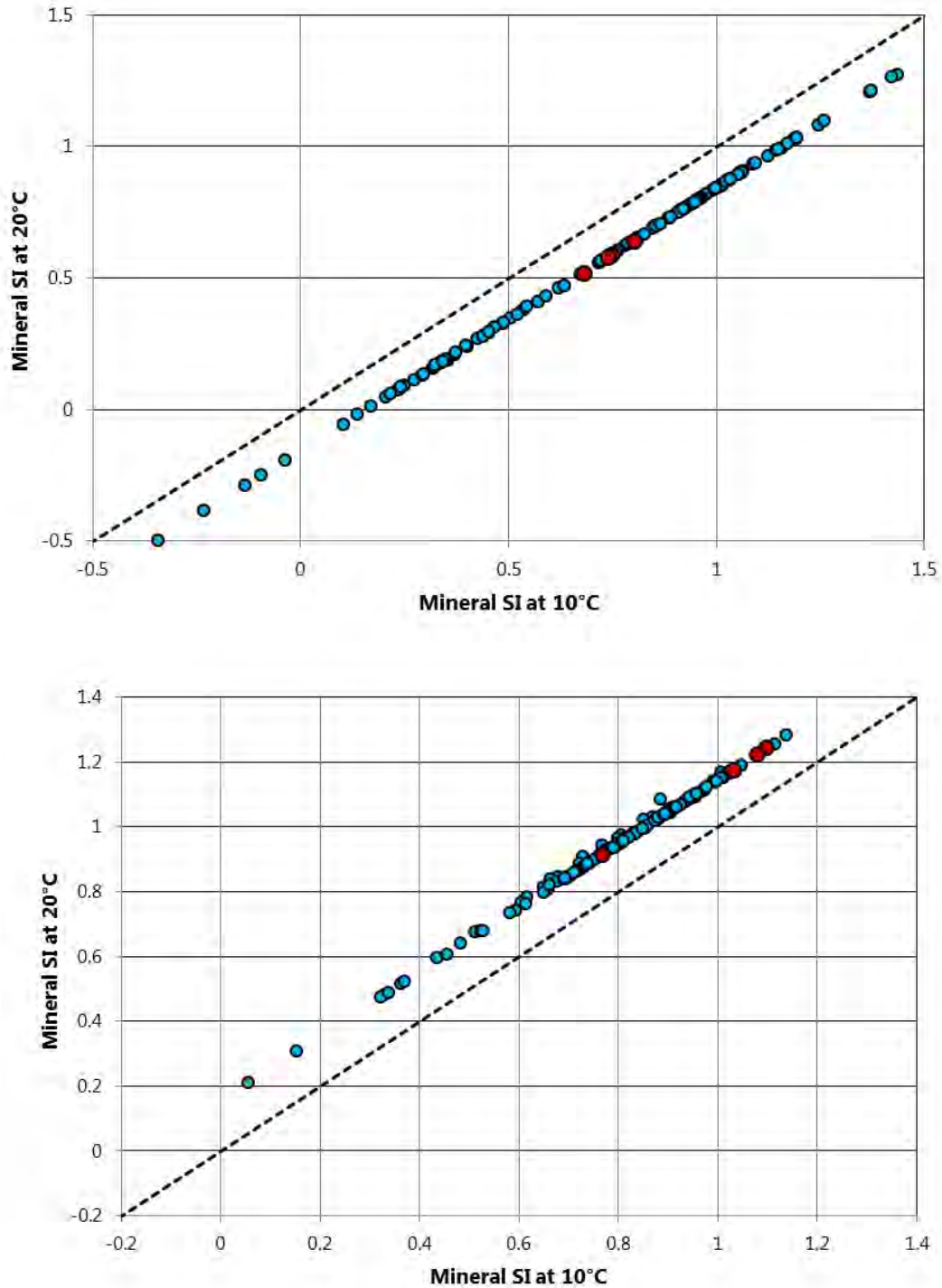


Figure 42. Calculated barite (top panel) and argonite (bottom panel) saturation indices for *D. magna* acute toxicity tests at two water temperatures.

Note: Saturation indices presented are inclusive of all *D. magna* tests performed to date and were calculated by Stephen Day of SRK Consulting (March 11, 2015). The red dots reflect samples where percent survival for *D. magna* was less than 50 percent (i.e., a failed test result).

At this time and in consideration of the above information, it cannot be conclusively stated that calcite was responsible for the effects recorded on *D. magna* toxicity tests completed to date. It is anticipated that the mitigative measures outlined in Section 2.3 will help inform additional acute toxicity tests.

#### **4.3.2 Chronic Toxicity**

One hundred eighteen (118) chronic toxicity tests were completed as part of the surface water monitoring program in 2015. Chronic toxicity testing of waterborne exposure was carried-out at a number of sampling sites and using invertebrate, algal, and fish species; refer to Section 3.4. A detailed summary of test results and associated biological test reports has been prepared and is submitted under separate cover.

## 5 Discussion

Permit 107517 is unique in that it takes an area based approach to authorizing and managing water quality constituents of interest originating from current and historical mining activities in the Elk Valley. To do so requires an extensive surface water monitoring program from 95 authorized discharges and receiving environment sampling sites, that are used to evaluate compliance, and overall effectiveness of the Area Based Management Plan.

In 2015 non-compliances were the result of either: 1) permit limit exceedances, 2) missed sample collection, 3) late reporting, or 4) failure to follow standard protocols (i.e., sampling procedures and laboratory analyses). A portion of permit limit exceedances recorded in 2015 were associated with conditions outside of Teck's control. Specifically, hydrologic challenges associated with Fording River Operations' compliance point E300071 (FR\_FRCP1) have resulted in compliance issues. It has become increasingly evident that Compliance Point E300071 (FR\_FRCP1) is not a representative location for compliance monitoring. As outlined within Permit No. 107517, compliance points are intended to monitor all or most of the point and non-point discharges from the mine operation. The Fording River Operations Compliance Point instead measures isolated surface water that is predominantly mine-influenced water from one creek during low flow winter conditions. Teck is committed to improving water quality within the Elk Valley, and as outlined in the Area Based Management Plan, significant improvements are targeted with proposed water treatment mitigation at Fording River that will include treatment of water from Cataract Creek. An alternative location for a compliance point that meets the intent of the Permit should be considered. Teck looks forward to continued engagement with MoE on this matter.

Line Creek Operations is currently mining three pits with activity primarily in the North Line Creek Extension pit. The North Line Creek Extension pit is adjacent to Burnt Ridge South. Throughout 2015, LCO has been dewatering Burnt Ridge South to allow for safe mining of the North Line Creek Extension pit while trying to maintain compliance with the nitrate-N monthly average permit limit at sampling site E297110 (LC\_LCDSSLCC). Despite efforts to manage nitrate concentrations by modifying pumping rates, there were two monthly average non-compliances in 2015 (February and December). As a result and in consideration of changing compliance limits at this sampling site in 2016, a number of mitigative activities have been initiated including: active management of pumping, nitrate source control efforts, additional toxicity testing to evaluate potential effects of nitrate and ongoing nitrate removal through operation of the West Line Creek Active Water Treatment Facility. Additional water management options being assessed by LCO include additional pumping, storage, redirection, and/or a combination thereof.

Surface water quality at E300230 (RG\_DSELK) appears to be adversely affected by water management activities (i.e., spring drawdown) within Lake Kocanusa. Based on 2015 data, despite concentrations for Order constituents being lower than 2014 concentrations at upstream monitoring sites (e.g., water quality surveillance monitoring station BC08NK0003), total selenium concentrations, although meeting SPOs were comparatively elevated during the spring drawdown as compared to other sampling periods. Future annual reports will, as data become publically available, summarize reservoir water elevations and to the extent possible, resulting effects on surface water quality. Despite these hydrologic challenges, it is anticipated that implementation of

remedial activities outlined within the ABMP will continue to improve water quality within the Valley.

In relation to *D. magna* acute toxicity testing, work completed to date suggests that laboratory procedures (i.e., heating of the water) are directly influencing chemical reactions within test chambers, which in turn are adversely affecting *D. magna* survival. As a result, the interim corrective action is to collect split-samples. *D. magna* acute toxicity testing (i.e., single concentration) are evaluated for each split-sample. One split is tested at the standard temperature of 20°C; while the other is tested at 10°C, or the field measured water temperature (whichever is highest). Results of both tests are reported with compliance currently being evaluated against test results conducted at the standard lab method test temperature (i.e., 20°C). Teck has proposed in previous communication with the MoE that compliance should be evaluated against the field temperature. In addition, all toxicity test reports include findings for hardness, alkalinity, pH, temperature, and formation of precipitate either in the testing vessel or on the organism.

Other non-compliances encountered in 2015 were largely the result of operator error. Therefore improvements in planning (e.g., scheduling of sample collection/shipping around statutory holidays), internal and external communications (e.g., timely reporting), and following standard protocols are anticipated to mitigate non-compliances encountered in 2015.

In consideration of the extensive surface water monitoring program required under Permit 107517, in conjunction with all other active monitoring programs, it is not anticipated that any additional monitoring is required at this time. However, aqueous mercury data required under the surface water monitoring program should be removed as a routine water quality parameter as it is believed to add little value in relation to assessing environmental conditions. Further, mercury is actively monitored under other programs such as the Regional Aquatic Effects Monitoring Program which evaluates mercury in more biologically meaningful media (e.g., tissues).



## Appendix A – Summary of Unattained Samples

## Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
0200209	CM_CC1	Jan 01 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 02 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 03 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 04 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 05 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 06 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 07 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 08 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 09 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 10 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 11 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 12 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 13 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 14 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 15 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 16 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 17 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 28 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 29 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Jan 30 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Feb 02 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
0200209	CM_CC1	Feb 03 2015	Continuous Flow	Unstable Water Levels due to Ice or Sediment Build-Up; Spikes in Raw Data Caused by Purge Cycle Kicking In
E258175	CM_MC1	Feb 03 2015	Flow	Equipment / Instrument Malfunction
E258175	CM_MC1	Apr 29 2015	Flow	Unsafe Field Conditions - High Water/Flow Conditions
E258937	CM_MC2	Jan 06 2015	Flow	Frozen - No Flow
E258937	CM_MC2	Mar 03 2015	Flow	Frozen - No Flow
E258937	CM_MC2	Apr 29 2015	Flow	Unsafe Field Conditions - High Water/Flow Conditions
E258937	CM_MC2	May 06 2015	Flow	Unsafe Field Conditions - High Water/Flow Conditions
E258937	CM_MC2	May 26 2015	Flow	Unsafe Field Conditions - High Water/Flow Conditions
E258937	CM_MC2	Jun 03 2015	Flow	Unsafe Field Conditions - High Water/Flow Conditions

## Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
E258937	CM_MC2	Jun 10 2015	Flow	Unsafe Field Conditions - High Water/Flow Conditions
E258937	CM_MC2	Jun 30 2015	Flow	Unsafe Field Conditions - High Water/Flow Conditions
E298733	CM_PC2	Jun 30 2015	Flow	Not Flowing into Culvert
E298733	CM_PC2	Jul 15 2015	All	No Flow - Creek Channel was Dry
E298733	CM_PC2	Jul 21 2015	All	No Flow - Creek Channel was Dry
E298733	CM_PC2	Jul 27 2015	All	No Flow - Creek Channel was Dry
E298733	CM_PC2	Aug 05 2015	All	No Flow - Creek Channel was Dry
E298733	CM_PC2	Sep 02 2015	All	No Flow - Creek Channel was Dry
E298734	CM_SOW	Dec 02 2015	All	Unsafe Field Conditions - Sump Surface was Frozen
E210369	EV_AQ1	Jan 06 2015	All	Frozen - No Flow
E210369	EV_AQ1	Feb 04 2015	All	Frozen - No Flow
E210369	EV_AQ1	Mar 04 2015	All	Frozen - No Flow
E210369	EV_AQ1	Aug 12 2015	Flow	No Active Discharge (Not Decanting)
E210369	EV_AQ1	Sep 02 2015	All	No Flow due to Construction of Pollution-Control Works
E102685	EV_BC1	Jan 06 2015	All	Frozen - No Flow
E102685	EV_BC1	Feb 04 2015	All	Frozen - No Flow
E102685	EV_BC1	Mar 04 2015	All	Frozen - No Flow
E298592	EV_BLM2	Jan 07 2015	All	Frozen - No Flow
E298592	EV_BLM2	Feb 03 2015	Flow	Unsafe Field Conditions - Ice Cover
E298592	EV_BLM2	Mar 03 2015	Flow	Frozen - No Flow
E298590	EV_DC1	Jan 07 2015	Flow	Frozen - No Flow
E298590	EV_DC1	Mar 03 2015	Flow	Frozen - No Flow
E298590	EV_DC1	Dec 07 2015	Flow	Channel/Staff Gauge were Frozen for Measurement; Water Quality Parameters Collected
0200111	EV_ER2	Jan 07 2015	All	Frozen - No Flow
0200027	EV_ER4	Jan 07 2015	All	Unsafe field conditions-inaccessable due to ice shelf
E298591	EV_FC1	Jan 07 2015	All	Frozen - No Flow
E298591	EV_FC1	Feb 03 2015	All	Frozen - No Flow
E298591	EV_FC1	Mar 03 2015	All	Frozen - No Flow
E298591	EV_FC1	Sep 01 2015	Flow	Insufficient Flow for Measurement
E298591	EV_FC1	Oct 07 2015	Flow	Insufficient Water Volume to Capture Accurate/Representative Measurement

## Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
E206231	EV_GT1	Jan 06 2015	All	Frozen - No Flow
E206231	EV_GT1	Feb 04 2015	All	Frozen - No Flow
E102682	EV_HC1	Jan 07 2015	Flow	Frozen - No Flow
E102682	EV_HC1	Mar 03 2015	All	Frozen - No Flow
E258135	EV_LC1	Jan 07 2015	Flow	Frozen - Insufficient Flow for Manual Measurement
E258135	EV_LC1	Feb 03 2015	Flow	Frozen - Insufficient Flow for Manual Measurement
E258135	EV_LC1	May 05 2015	Flow	Flow Rate was Too Low for Accurate Measurements
E258135	EV_LC1	May 19 2015	Flow	Flow Rate was Too Low for Accurate Measurements
E258135	EV_LC1	Jun 09 2015	Flow	Flow Rate was Too Low for Accurate Measurements
E258135	EV_LC1	Jun 16 2015	Flow	Flow Rate was Too Low for Accurate Measurements
E258135	EV_LC1	Jun 23 2015	Flow	Flow Rate was Too Low for Accurate Measurements
E258135	EV_LC1	Jun 29 2015	Flow	Flow Rate was Too Low for Accurate Measurements
E258135	EV_LC1	Jul 07 2015	Flow	No Active Discharge (Not Decanting)
E258135	EV_LC1	Aug 11 2015	Flow	No Active Discharge (Not Decanting)
E258135	EV_LC1	Sep 01 2015	Flow	No Active Discharge (Not Decanting)
E258135	EV_LC1	Dec 09 2015	Flow	Insufficient Flow for Measurement; Other Water Quality Parameters Collected
E300091	EV_MC2	Jan 06 2015	Field Parameters	Unsafe Field Conditions - Ice Cover Restricted Access for YSI Readings, Samples Collected using a Long-Reach Pole
E300091	EV_MC2	Feb 04 2015	Flow	Staff Gauge Buried in Ice
E300091	EV_MC2	Mar 03 2015	Flow	Staff Gauge Buried in Ice
E208057	EV_MG1	Jan 06 2015	All	Frozen - No Flow
E208057	EV_MG1	Feb 04 2015	All	Frozen - No Flow
E102679	EV_OC1	Jul 07 2015	Flow	Insufficient Flow for Measurement
E102679	EV_OC1	Aug 11 2015	Flow	Insufficient Flow for Measurement
E102681	EV_SM1	Jan 07 2015	Flow	Frozen - Insufficient Flow for Manual Measurement
E102681	EV_SM1	Feb 03 2015	Flow	Frozen - Insufficient Flow for Manual Measurement
E102681	EV_SM1	Mar 03 2015	Flow	Frozen - No Flow
E102681	EV_SM1	Mar 17 2015	Flow	Frozen - Insufficient Flow for Manual Measurement
E102681	EV_SM1	Mar 24 2015	Flow	Frozen - Insufficient Flow for Manual Measurement
E102681	EV_SM1	Mar 31 2015	Flow	Frozen - Insufficient Flow for Manual Measurement
E296311	EV_SP1	Jan 06 2015	Flow	Frozen - No Flow

## Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
E296311	EV_SP1	Mar 03 2015	Flow	Frozen - No Flow
E298593	EV_TC1	Jan 06 2015	All	Frozen - No Flow
E298593	EV_TC1	Feb 04 2015	All	Frozen - No Flow
E298593	EV_TC1	Mar 04 2015	All	Frozen - No Flow
E298593	EV_TC1	Jul 07 2015	All	Dry - No Flow
E298593	EV_TC1	Jul 15 2015	All	Dry - No Flow
E298593	EV_TC1	Aug 12 2015	All	Dry - No Flow
E298593	EV_TC1	Sep 02 2015	All	No Flow
E298595	EV_WF_NW	May 14 2015	All	See Note Below
E217403	FR_3PIT	Jan 31 2015	All	No Active Discharge
E217403	FR_3PIT	Feb 28 2015	All	No Active Discharge
E217403	FR_3PIT	Mar 31 2015	All	No Active Discharge
E217403	FR_3PIT	Apr 30 2015	All	No Active Discharge
E217403	FR_3PIT	May 31 2015	All	No Active Discharge
E217403	FR_3PIT	Jun 30 2015	All	No Active Discharge
E217403	FR_3PIT	Jul 31 2015	All	No Active Discharge
E217403	FR_3PIT	Aug 31 2015	All	No Active Discharge
E217403	FR_3PIT	Sep 30 2015	All	No Active Discharge
E217403	FR_3PIT	Oct 31 2015	All	No Active Discharge
E217403	FR_3PIT	Nov 30 2015	All	No Active Discharge
E217403	FR_3PIT	Dec 31 2015	All	No Active Discharge
E102480	FR_EC1	Jun 29 2015	All	No Active Discharge (Not Decanting)
E102480	FR_EC1	Jul 06 2015	All	No Active Discharge (Not Decanting)
E102480	FR_EC1	Jul 14 2015	All	No Active Discharge (Not Decanting)
E102480	FR_EC1	Aug 11 2015	All	No Active Discharge (Not Decanting)
E102480	FR_EC1	Nov 03 2015	All	No Active Discharge (Not Decanting)
E102480	FR_EC1	Dec 08 2015	All	No Active Discharge (Not Decanting)
0200251	FR_FR1	Jan 05 2015	All	Frozen - No Flow
0200251	FR_FR1	Feb 02 2015	All	Frozen - No Flow
0200251	FR_FR1	Mar 02 2015	All	Frozen - No Flow

## Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
0200251	FR_FR1	Mar 16 2015	Flow	Partially Frozen / Accurate Flow Unattainable
0200251	FR_FR1	Mar 23 2015	Flow	Partially Frozen / Accurate Flow Unattainable
0200251	FR_FR1	Dec 08 2015	All	Frozen - No Flow
200201	FR_FR2	Jan 05 2015	Flow	Partially Frozen / Accurate Flow Unattainable
200201	FR_FR2	Feb 02 2015	Flow	Partially Frozen / Accurate Flow Unattainable
200201	FR_FR2	Mar 02 2015	Flow	Partially Frozen / Accurate Flow Unattainable
0200311	FR_FR4	Jan 05 2015	All	Frozen - No Flow
0200311	FR_FR4	Feb 05 2015	All	Frozen - No Flow
E300071	FR_FRCP1	Jan 07 2015	All	Frozen - No Flow
E300071	FR_FRCP1	Feb 03 2015	Flow	Frozen / Accurate Flow Unattainable
E300071	FR_FRCP1	Jun 02 2015	Flow	Unsafe Field Conditions - High Water/Flow Conditions
E300071	FR_FRCP1	Dec 07 2015	Flow	Flow Unattainable due to Ice Cover
E300097	FR_FRRD	Jan 20 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E300097	FR_FRRD	Feb 03 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E300097	FR_FRRD	Jun 03 2015	Flow	Unsafe Field Conditions - High Water/Flow Conditions
E216779	FR_HC2	Jan 05 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E216779	FR_HC2	Feb 02 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E216779	FR_HC2	Mar 02 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E216779	FR_HC2	Mar 16 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E216779	FR_HC2	Mar 23 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E216779	FR_HC2	Mar 30 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E300096	FR_HC3	Jan 05 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E300096	FR_HC3	Feb 02 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E300096	FR_HC3	Mar 02 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E300096	FR_HC3	Dec 09 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E216781	FR_HP1	Jan 01 2015	All	No Active Discharge
E216781	FR_HP1	Feb 01 2015	All	No Active Discharge
E216781	FR_HP1	Mar 01 2015	All	No Active Discharge
E216781	FR_HP1	Mar 16 2015	All	No Active Discharge
E216781	FR_HP1	Mar 23 2015	All	No Active Discharge

### Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
E216781	FR_HP1	Mar 30 2015	All	No Active Discharge
E216781	FR_HP1	Apr 06 2015	All	No Active Discharge
E216781	FR_HP1	Apr 13 2015	All	No Active Discharge
E216781	FR_HP1	Apr 20 2015	All	No Active Discharge
E216781	FR_HP1	Apr 27 2015	All	No Active Discharge
E216781	FR_HP1	May 04 2015	All	No Active Discharge
E216781	FR_HP1	May 11 2015	All	No Active Discharge
E216781	FR_HP1	May 18 2015	All	No Active Discharge
E216781	FR_HP1	May 25 2015	All	No Active Discharge
E216781	FR_HP1	Jun 01 2015	All	No Active Discharge
E216781	FR_HP1	Jun 08 2015	All	No Active Discharge
E216781	FR_HP1	Jun 15 2015	All	No Active Discharge
E216781	FR_HP1	Jun 22 2015	All	No Active Discharge
E216781	FR_HP1	Jun 29 2015	All	No Active Discharge
E216781	FR_HP1	Jul 06 2015	All	No Active Discharge
E216781	FR_HP1	Jul 14 2015	All	No Active Discharge
E216781	FR_HP1	Aug 11 2015	All	No Active Discharge
E216781	FR_HP1	Sep 08 2015	All	No Active Discharge
E216781	FR_HP1	Oct 06 2015	All	No Active Discharge
E216781	FR_HP1	Nov 03 2015	All	No Active Discharge
E216781	FR_HP1	Dec 07 2015	All	No Active Discharge
E102478	FR_MS1	Jan 05 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Feb 03 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Mar 02 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Mar 16 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Mar 23 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Mar 30 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Apr 07 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Apr 13 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Apr 20 2015	All	No Active Discharge (Not Decanting)



## Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
E102478	FR_MS1	Apr 27 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	May 04 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	May 11 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	May 19 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	May 25 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Jun 01 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Jun 08 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Jun 15 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Jun 22 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Jun 29 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Jul 06 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Jul 14 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Aug 11 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Sep 08 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Oct 06 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Nov 03 2015	All	No Active Discharge (Not Decanting)
E102478	FR_MS1	Dec 07 2015	All	No Active Discharge (Not Decanting)
E105060	FR_NGD1	Jan 05 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E105060	FR_NGD1	Feb 04 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E105060	FR_NGD1	Mar 03 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E105060	FR_NGD1	Mar 16 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E105060	FR_NGD1	Mar 23 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E105060	FR_NGD1	Dec 09 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E102476	FR_NL1	Jan 05 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Feb 03 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Mar 02 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Mar 16 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Mar 23 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Mar 30 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Apr 07 2015	All	No Active Discharge (Not Decanting)

## Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
E102476	FR_NL1	Apr 13 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Apr 20 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Apr 27 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	May 04 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	May 11 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	May 19 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	May 25 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Jun 01 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Jun 08 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Jun 15 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Jun 22 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Jun 29 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Jul 06 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Jul 14 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Aug 11 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Sep 08 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Oct 06 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Nov 03 2015	All	No Active Discharge (Not Decanting)
E102476	FR_NL1	Dec 07 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Jan 05 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Feb 03 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Mar 02 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Mar 16 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Mar 23 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Mar 30 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Apr 07 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Apr 14 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Jun 01 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Jun 08 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Jun 15 2015	All	No Active Discharge (Not Decanting)

## Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
E208394	FR_SKP1	Jun 22 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Jun 29 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Jul 06 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Jul 14 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Sep 08 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Oct 06 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Nov 03 2015	All	No Active Discharge (Not Decanting)
E208394	FR_SKP1	Dec 07 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Jan 05 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Feb 03 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Mar 02 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Mar 16 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Mar 23 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Mar 30 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Apr 07 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Apr 14 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Apr 20 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Apr 27 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	May 04 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	May 11 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	May 19 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	May 25 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Jun 22 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Jun 29 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Jul 06 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Jul 14 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Aug 11 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Sep 08 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Oct 06 2015	All	No Active Discharge (Not Decanting)
E208395	FR_SKP2	Nov 03 2015	All	No Active Discharge (Not Decanting)

## Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
E208395	FR_SKP2	Dec 07 2015	All	No Active Discharge (Not Decanting)
E261897	FR_SP1	Jul 06 2015	All	No Active Discharge (Not Decanting)
E102475	FR_TP1	Jan 31 2015	All	No Active Discharge
E102475	FR_TP1	Feb 28 2015	All	No Active Discharge
E102475	FR_TP1	Mar 31 2015	All	No Active Discharge
E102475	FR_TP1	Apr 30 2015	All	No Active Discharge
E102475	FR_TP1	May 28 2015	All	No Active Discharge
E102475	FR_TP1	Jun 30 2015	All	No Active Discharge
E102475	FR_TP1	Jul 31 2015	All	No Active Discharge
E102475	FR_TP1	Aug 31 2015	All	No Active Discharge
E102475	FR_TP1	Sep 28 2015	All	No Active Discharge
E102475	FR_TP1	Oct 31 2015	All	No Active Discharge
E102475	FR_TP1	Nov 30 2015	All	No Active Discharge
E102475	FR_TP1	Dec 31 2015	All	No Active Discharge
E216777	FR_UFR1	Jan 05 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E216777	FR_UFR1	Feb 02 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E216777	FR_UFR1	Mar 02 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E216777	FR_UFR1	Mar 18 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E216777	FR_UFR1	Mar 25 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E216777	FR_UFR1	Apr 08 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E216777	FR_UFR1	Dec 09 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E287437	GH_BR_F	Jan 06 2015	All	Frozen - No Flow
E287437	GH_BR_F	Feb 03 2015	All	Frozen - No Flow
E287437	GH_BR_F	Mar 03 2015	All	Frozen - No Flow
E287437	GH_BR_F	May 26 2015	All	Dry - No Flow
E287437	GH_BR_F	May 26 2015	All	Dry - No Flow
E287437	GH_BR_F	Jun 02 2015	All	Dry - No Flow
E287437	GH_BR_F	Jun 02 2015	All	Dry - No Flow
E287437	GH_BR_F	Jun 09 2015	All	Dry - No Flow
E287437	GH_BR_F	Jun 09 2015	All	Dry - No Flow

## Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
E287437	GH_BR_F	Jun 16 2015	All	Dry - No Flow
E287437	GH_BR_F	Jun 16 2015	All	Dry - No Flow
E287437	GH_BR_F	Jun 23 2015	All	Dry - No Flow
E287437	GH_BR_F	Jun 23 2015	All	Dry - No Flow
E287437	GH_BR_F	Jun 30 2015	All	Dry - No Flow
E287437	GH_BR_F	Jun 30 2015	All	Dry - No Flow
E287437	GH_BR_F	Jul 06 2015	All	Dry - No Flow
E287437	GH_BR_F	Jul 15 2015	All	Dry - No Flow
E287437	GH_BR_F	Aug 05 2015	All	Dry - No Flow
E287437	GH_BR_F	Sep 09 2015	All	Dry - No Flow
0200384	GH_CC1	Sep 08 2015	Flow	Equipment / Instrument Malfunction
E287432	GH_COUGAR	Jan 06 2015	All	Frozen - No Flow
E287432	GH_COUGAR	Mar 03 2015	All	Frozen - No Flow
E287432	GH_COUGAR	Jul 06 2015	All	Dry - No Flow
E287432	GH_COUGAR	Jul 15 2015	All	Dry - No Flow
E287432	GH_COUGAR	Aug 05 2015	All	Dry - No Flow
E287432	GH_COUGAR	Sep 09 2015	All	Dry - No Flow
0200378	GH_FR1	Jan 06 2015	All	Frozen - No Flow
E102709	GH_GH1	Aug 04 2015	Flow	Equipment / Instrument Malfunction
E257796	GH_LC1	Jan 06 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Feb 03 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Mar 03 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Mar 17 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Mar 24 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Mar 31 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Apr 14 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Apr 14 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Apr 21 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Apr 21 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Apr 28 2015	All	No Active Discharge (Not Decanting)

## Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
E257796	GH_LC1	Apr 28 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	May 05 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	May 05 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	May 12 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	May 12 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	May 20 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	May 20 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	May 26 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	May 26 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Jun 02 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Jun 02 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Jun 09 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Jun 09 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Jun 16 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Jun 16 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Jun 23 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Jun 23 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Jun 30 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Jun 30 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Jul 06 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Jul 15 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Aug 05 2015	All	No Active Discharge (Not Decanting)
E257796	GH_LC1	Sep 09 2015	All	No Active Discharge (Not Decanting)
0200388	GH_MC1	Jan 06 2015	All	Frozen - No Flow
E207437	GH_RLP	Jun 15 2015	All	No Active Discharge (Not Decanting)
E207437	GH_RLP	Jun 15 2015	All	No Active Discharge (Not Decanting)
E207437	GH_RLP	Jun 30 2015	All	No Active Discharge (Not Decanting)
E207437	GH_RLP	Jun 30 2015	All	No Active Discharge (Not Decanting)
E221329	GH_SC1	Jan 05 2015	All	Bypassing E221329 (GH_SC1)
E221329	GH_SC1	Feb 02 2015	All	Bypassing E221329 (GH_SC1)

## Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
E221329	GH_SC1	Mar 02 2015	All	Bypassing E221329 (GH_SC1)
E221329	GH_SC1	Mar 16 2015	All	Bypassing E221329 (GH_SC1)
E221329	GH_SC1	Mar 23 2015	All	Bypassing E221329 (GH_SC1)
E221329	GH_SC1	Mar 30 2015	All	Bypassing E221329 (GH_SC1)
E221329	GH_SC1	May 19 2015	All	No Active Discharge (Not Decanting)
E221329	GH_SC1	May 19 2015	All	No Active Discharge (Not Decanting)
E221329	GH_SC1	May 25 2015	All	No Active Discharge (Not Decanting)
E221329	GH_SC1	May 25 2015	All	No Active Discharge (Not Decanting)
E221329	GH_SC1	Jun 01 2015	All	No Active Discharge (Not Decanting)
E221329	GH_SC1	Jun 01 2015	All	No Active Discharge (Not Decanting)
E221329	GH_SC1	Jun 08 2015	All	No Active Discharge (Not Decanting)
E221329	GH_SC1	Jun 08 2015	All	No Active Discharge (Not Decanting)
E221329	GH_SC1	Jun 22 2015	All	No Active Discharge (Not Decanting)
E221329	GH_SC1	Jun 22 2015	All	No Active Discharge (Not Decanting)
E221329	GH_SC1	Jun 29 2015	All	No Active Discharge (Not Decanting)
E221329	GH_SC1	Jun 29 2015	All	No Active Discharge (Not Decanting)
E221329	GH_SC1	Jul 06 2015	All	Sampled at E105061 (GH_SC2)
E221329	GH_SC1	Jul 14 2015	All	Sampled at E105061 (GH_SC2)
E221329	GH_SC1	Aug 04 2015	All	Sampled at E105061 (GH_SC2)
E221329	GH_SC1	Sep 08 2015	All	Sampled at E105061 (GH_SC2)
E105061	GH_SC2	Sep 08 2015	Flow	Equipment / Instrument Malfunction
E207436	GH_TC2	Jan 06 2015	All	No Active Discharge (Not Decanting)
E207436	GH_TC2	Feb 03 2015	All	No Active Discharge (Not Decanting)
E207436	GH_TC2	Mar 03 2015	All	No Active Discharge (Not Decanting)
E207436	GH_TC2	Mar 17 2015	All	No Active Discharge (Not Decanting)
E207436	GH_TC2	Mar 24 2015	All	No Active Discharge (Not Decanting)
E207436	GH_TC2	Mar 31 2015	All	No Active Discharge (Not Decanting)
E207436	GH_TC2	Sep 08 2015	Flow	Equipment / Instrument Malfunction
E287433	GH_WADE	Oct 06 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E287433	GH_WADE	Dec 08 2015	Flow	Thick Ice in Culvert - Unattainable Measurements



## Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
E257795	GH_WC1	Jan 06 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Feb 03 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Mar 03 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Mar 17 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Mar 24 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Mar 31 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Apr 14 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Apr 14 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Apr 21 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Apr 21 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Apr 28 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Apr 28 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	May 05 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	May 05 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	May 12 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	May 12 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	May 20 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	May 20 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	May 26 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	May 26 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Jun 02 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Jun 02 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Jun 09 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Jun 09 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Jun 16 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Jun 16 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Jun 23 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Jun 23 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Jun 30 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Jun 30 2015	All	No Active Discharge (Not Decanting)

### Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
E257795	GH_WC1	Jul 06 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Jul 15 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Aug 05 2015	All	No Active Discharge (Not Decanting)
E257795	GH_WC1	Sep 09 2015	All	No Active Discharge (Not Decanting)
E287434	GH_WILLOW	Jan 06 2015	All	Frozen - No Flow
E287434	GH_WILLOW	Oct 06 2015	Flow	Partially Frozen / Accurate Flow Unattainable
E287435	GH_WILLOW_S	Jan 06 2015	All	Frozen - No Flow
E287435	GH_WILLOW_S	Feb 03 2015	All	Frozen - No Flow
E287435	GH_WILLOW_S	Mar 03 2015	All	Frozen - No Flow
E287435	GH_WILLOW_S	Mar 17 2015	All	No Flow
E287435	GH_WILLOW_S	Jul 06 2015	All	Dry - No Flow
E287435	GH_WILLOW_S	Jul 15 2015	All	Dry - No Flow
E287435	GH_WILLOW_S	Aug 05 2015	All	Dry - No Flow
E287435	GH_WILLOW_S	Sep 09 2015	All	Dry - No Flow
E287436	GH_WOLF	Jan 06 2015	All	Frozen - No Flow
E287436	GH_WOLF	Feb 03 2015	All	Frozen - No Flow
E287436	GH_WOLF	Aug 05 2015	All	Dry - No Flow
E287436	GH_WOLF	Sep 09 2015	All	Dry - No Flow
E216142	LC_LC1	Jan 05 2015	All	Frozen - No Flow
E216142	LC_LC1	Feb 02 2015	All	Frozen - No Flow
E216142	LC_LC1	Mar 03 2015	All	Frozen - No Flow
E216142	LC_LC1	Mar 24 2015	All	Frozen - No Flow
E216142	LC_LC1	Apr 06 2015	All	No Flow
E216142	LC_LC1	Apr 13 2015	All	No Flow
E223240	LC_LC12	Jan 05 2015	All	Frozen - No Flow
E223240	LC_LC12	Feb 02 2015	All	Frozen - No Flow
E223240	LC_LC12	Mar 02 2015	All	Frozen - No Flow
E223240	LC_LC12	Mar 24 2015	All	Frozen - No Flow
E223240	LC_LC12	Apr 06 2015	All	No Flow
E223240	LC_LC12	Apr 13 2015	All	No Flow

## Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
E223240	LC_LC12	Jul 21 2015	All	Insufficient Water Volume to Capture Representative Sample
E223240	LC_LC12	Jul 28 2015	All	No Flow
E223240	LC_LC12	Aug 11 2015	All	No Flow
E223240	LC_LC12	Sep 09 2015	All	No Flow
E219411	LC_LC8	Jan 05 2015	All	Not Open to Treat Water
E219411	LC_LC8	Feb 02 2015	All	Not Open to Treat Water
E219411	LC_LC8	Mar 02 2015	All	Not Open to Treat Water
E219411	LC_LC8	Mar 18 2015	All	Not Open to Treat Water
E219411	LC_LC8	Mar 24 2015	All	Not Open to Treat Water
E219411	LC_LC8	Mar 31 2015	All	Not Open to Treat Water
E219411	LC_LC8	Jul 07 2015	All	No Active Discharge (Not Decanting)
E219411	LC_LC8	Jul 17 2015	All	No Active Discharge (Not Decanting)
E219411	LC_LC8	Jul 21 2015	All	No Active Discharge (Not Decanting)
E219411	LC_LC8	Aug 11 2015	All	No Active Discharge (Not Decanting)
E219411	LC_LC8	Sep 09 2015	All	No Active Discharge (Not Decanting)
E219411	LC_LC8	Q2	All	Not Open to Treat Water
E221268	LC_LC9	Jan 05 2015	Flow	Frozen - No Flow
E221268	LC_LC9	Jan 05 2015	All	Pond is Dry
E221268	LC_LC9	Feb 02 2015	Flow	Frozen - No Flow
E221268	LC_LC9	Feb 02 2015	All	Pond is Dry
E221268	LC_LC9	Feb 02 2015	All	Pond is Dry
E221268	LC_LC9	Mar 02 2015	All	Pond is Dry
E221268	LC_LC9	Mar 24 2015	All	Pond is Dry
E221268	LC_LC9	Jul 07 2015	All	Dry - No Flow
E221268	LC_LC9	Jul 17 2015	All	Dry - No Flow
E221268	LC_LC9	Jul 21 2015	All	Dry - No Flow
E221268	LC_LC9	Jul 28 2015	All	Dry - No Flow
E221268	LC_LC9	Aug 11 2015	All	No Active Discharge (Not Decanting)
E221268	LC_LC9	Sep 09 2015	All	No Active Discharge (Not Decanting)
E221268	LC_LC9	Q2	All	Pond is Dry

## Summary of Unattainable Samples - 2015

EMS ID	Site ID	Date	Unattained Parameters	Reason for Unattained Sample
E282149	LC_SLC	Jan 05 2015	Flow	Frozen - No Flow
E282149	LC_SLC	Jun 02 2015	Flow	Unsafe Field Conditions - High Water/Flow Conditions
E300094	RG_BORDER	Jan 06 2015	All	Unsafe Field Conditions - Ice Cover
E300094	RG_BORDER	Feb 03 2015	All	Unsafe Field Conditions - Ice Cover
E300094	RG_BORDER	Mar 03 2015	All	Unsafe Field Conditions - Ice Cover
E300230	RG_DSELK	Jan 06 2015	All	Unsafe Field Conditions - Ice Cover
E300230	RG_DSELK	Feb 03 2015	All	Unsafe Field Conditions - Ice Cover
E300230	RG_DSELK	Mar 03 2015	All	Unsafe Field Conditions - Ice Cover
E300092	RG_GRASMERE	Jan 06 2015	All	Unsafe Field Conditions - Ice Cover
E300092	RG_GRASMERE	Feb 03 2015	All	Unsafe Field Conditions - Ice Cover
E300092	RG_GRASMERE	Mar 03 2015	All	Unsafe Field Conditions - Ice Cover
E300095	RG_KERRRD	Jan 06 2015	All	Unsafe Field Conditions - Ice Cover
E300095	RG_KERRRD	Feb 03 2015	All	Unsafe Field Conditions - Ice Cover
E300095	RG_KERRRD	Mar 03 2015	All	Unsafe Field Conditions - Ice Cover
E300095	RG_KERRRD	Dec 01 2015	All	Unsafe Field Conditions - Ice Cover
E300095	RG_KERRRD	April 7 2015	All	Unsafe Field Conditions - Ice Cover
E300093	RG_USGOLD	Jan 06 2015	All	Unsafe Field Conditions - Ice Cover
E300093	RG_USGOLD	Feb 03 2015	All	Unsafe Field Conditions - Ice Cover
E300093	RG_USGOLD	Mar 03 2015	All	Unsafe Field Conditions - Ice Cover

Note: The West Fork North Monitoring well (E298595) has been permanently damaged and is no longer operational. In the Ground Water Monitoring Plan that AMEC submitted on behalf of Elkview Operations to the Ministry of Environment for approval in March of 2015, it was recommended that the well not need to be replaced as sulphate concentrations and major ion chemistry at both the north and south monitoring wells are essentially identical. Therefore, Elkview Operations proposed that the well be removed from the Permit as it is no longer required, and that the West Fork South Monitoring well (E298596) should also be removed from Permit 107517 as it is included in the ground water monitoring program.

## **Appendix B – Surface Water Monitoring Program Requirements**

Table B-1. Summary of Surface Water Monitoring Program for Fording River Operations

EMS ID	Site ID	Water Quality/Quantity Parameter and Associated Monitoring Frequency							
		Field Parameters <sup>1</sup>	Conventional Parameters <sup>2</sup>	Major Ions <sup>3</sup>	Nutrients <sup>4</sup>	Metals <sup>5</sup>	Flow <sup>6</sup>	96-hr. LT <sub>50</sub> for Rainbow Trout <sup>7</sup>	48-hr. LT <sub>50</sub> for <i>Daphnia magna</i> <sup>7</sup>
<b>Authorized Discharge Sites</b>									
E216781	FR_HP1	M	M	M	M	M	-	Q	Q
E102481	FR_CC1	M	M	M	M	M	-	Q	Q
E105060	FR_NGD1	M	M	M	M	M	-	-	-
E102480	FR_EC1	M	M	M	M	M	-	Q	Q
E102475	FR_TP1	-	SA	SA	SA	SA	-	-	-
E102476	FR_NL1	M	M	M	M	M	-	Q	Q
E206660	FR_TP3	-	SA	SA	SA	SA	-	-	-
E261897	FR_SP1	M	M	M	M	M	-	Q	Q
E208394	FR_SKP1	M	M	M	M	M	-	Q	Q
E208395	FR_SKP2	M	M	M	M	M	-	Q	Q
<b>Receiving Environment Sampling Sites</b>									
E216777	FR_UFR1	M	M	M	M	M	M	-	-
E300096	FR_HC3	M	M	M	M	M	M	-	-
E216779	FR_HC2	M	M	M	M	M	M	-	-
E216778	FR_HC1	W/M	W/M	W/M	W/M	W/M	C	-	-
0200251	FR_FR1	M	M	M	M	M	C	-	-
0200201	FR_FR2	W/M	W/M	W/M	W/M	W/M	W/M	-	-
0200252	FR_KC1	M	M	M	M	M	C	-	-
E300097	FR_FRRD	M	M	M	M	M	M	-	-

Notes: 1. Field parameters include water temperature, specific conductance, dissolved oxygen, and pH.

2. Conventional parameters include specific conductance, total dissolved solids, total suspended solids, hardness, alkalinity, dissolved organic carbon, total organic carbon, and turbidity.

3. Major ions include bromide, fluoride, calcium, chloride, magnesium, potassium, sodium, and sulphate.

4. Nutrients include ammonia, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate, and total phosphorus.

5. Metals (dissolved and total fractions) include aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, chromium, cobalt, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, and zinc.

6. Flow measurements are taken in accordance with the BC Hydrometric RISC standards (2009) and to the satisfaction of the Director, Environmental Protection.

7. Toxicity tests coincide with water quality sampling and are intended to target projected worst-case scenarios such as low flow, during flocculent use, or when discharge quality is expected to be reduced.

8. Abbreviations include: M = Monthly, Q = Quarterly, SA = Semi-Annually (twice per year), C = Continuous, W/M = Weekly from March 15 – July 31, Monthly during other times of year.

**Table B-2. Summary of Surface Water Monitoring Program for Greenhills Operation**

EMS ID	Site ID	Water Quality/Quantity Parameter and Associated Monitoring Frequency							
		Field Parameters <sup>1</sup>	Conventional Parameters <sup>2</sup>	Major Ions <sup>3</sup>	Nutrients <sup>4</sup>	Metals <sup>5</sup>	Flow <sup>6</sup>	96-hr. LT <sub>50</sub> for Rainbow Trout <sup>7</sup>	48-hr. LT <sub>50</sub> for <i>Daphnia magna</i> <sup>7</sup>
<b>Authorized Discharge Sites</b>									
E105061	GH_SC2	Ma	Ma	Ma	Ma	-	C	-	-
E221329	GH_SC1	M	M	M	M	-	C	Q	Q
200384	GH_CC1	M	M	M	M	-	-	Q	Q
200385	GH_PC1	M	M	M	M	-	-	Q	Q
E287438	GH_TPS	-	SA	SA	SA	SA	-	-	-
E102709	GH_GH1	M	M	M	M	-	-	Q	Q
E207437	GH_RLP	M	M	M	M	-	-	-	-
E287437	GH_BR_F	M	M	M	M	-	-	-	-
E287436	GH_WOLF	M	M	M	M	-	-	-	-
E287434	GH_WILLOW	M	M	M	M	-	-	-	-
E287435	GH_WILLOW_S	M	M	M	M	-	-	-	-
E287433	GH_WADE	M	M	M	M	-	-	Q	Q
E287432	GH_COUGAR	M	M	M	M	-	-	Q	Q
0200388	GH_MC1	M	M	M	M	-	-	Q	Q
E257796	GH_LC1	M	M	M	M	-	-	-	-
E257795	GH_WC1	M	M	M	M	-	-	-	-
E207436	GH_TC2	M	M	M	M	-	-	Q	Q
E102714	GH_TC1	M	M	M	M	-	-	Q	Q
<b>Receiving Environment Sampling Sites</b>									
0200389	GH_ER2	M	M	M	M	M	-	-	-

Notes: 1. Field parameters include water temperature, specific conductance, dissolved oxygen, and pH.

2. Conventional parameters include specific conductance, total dissolved solids, total suspended solids, hardness, alkalinity, dissolved organic carbon, total organic carbon, and turbidity.

3. Major ions include bromide, fluoride, calcium, chloride, magnesium, potassium, sodium, and sulphate.

4. Nutrients include ammonia, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate, and total phosphorus.

5. Metals (dissolved and total fractions) include aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, chromium, cobalt, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, and zinc.

6. Flow measurements are taken in accordance with the BC Hydrometric RISC standards (2009) and to the satisfaction of the Director, Environmental Protection.

7. Toxicity tests coincide with water quality sampling and are intended to target projected worst-case scenarios such as low flow, during flocculent use, or when discharge quality is expected to be reduced.

8. Abbreviations include: Ma = Monthly alternative sample (either E221329 or E105061 is sampled, not both), M = Monthly, Q = Quarterly, SA = Semi-Annually (twice per year), C = Continuous, W/M = Weekly from March 15 – July 31, Monthly during other times of year.



**Table B-3. Summary of Surface Water Monitoring Program for Line Creek Operations (excludes West Line Creek Active Water Treatment Facility)**

EMS ID	Site ID	Water Quality/Quantity Parameter and Associated Monitoring Frequency									
		Field Parameters <sup>1</sup>	Conventional Parameters <sup>2</sup>	Major Ions <sup>3</sup>	Nutrients <sup>4</sup>	Metals <sup>5</sup>	Flow <sup>6</sup>	BOD <sup>7</sup>	Sulphide	96-hr. LT <sub>50</sub> for Rainbow Trout <sup>8</sup>	48-hr. LT <sub>50</sub> for <i>Daphnia magna</i> <sup>8</sup>
<b>Authorized Discharge Sites</b>											
E216144	LC_LC7	M	M	M	M	M	-	-	-	Q	Q
E221268	LC_LC9	M	M	M	M	M	-	-	-	Q	Q
E219411	LC_LC8	M	M	M	M	M	-	-	-	-	-
<b>Receiving Environment Sampling Sites</b>											
E288273	LC_DC3	W/M	W/M	W/M	W/M	W/M	-	-	-	-	-
E216142	LC_LC1	M	M	M	M	M	-	-	-	-	-
200335	LC_LC2	M	M	M	M	M	C	M	-	-	-
E223240	LC_LC12	M	M	M	M	M	-	-	-	-	-
E293369	LC_LCUSWLC	M	M	M	M	M	-	M	-	-	-
E261958	LC_WLC	M	M	M	M	M	C	-	-	-	-
E282149	LC_SLC	M	M	M	M	M	M	M	-	-	-
0200337	LC_LC3	W/M	W/M	W/M	W/M	W/M <sup>10.</sup>	C	W/M	W/M	-	-
0200044	LC_LC4	W/M	W/M	W/M	W/M	W/M <sup>10.</sup>	C*	-	-	-	-

Notes: 1. Field parameters include water temperature, specific conductance, dissolved oxygen, and pH.

2. Conventional parameters include specific conductance, total dissolved solids, total suspended solids, hardness, alkalinity, dissolved organic carbon, total organic carbon, and turbidity.

3. Major ions include bromide, fluoride, calcium, chloride, magnesium, potassium, sodium, and sulphate.

4. Nutrients include ammonia, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate, and total phosphorus.

5. Metals (dissolved and total fractions) include aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, chromium, cobalt, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, and zinc.

6. Flow measurements are taken in accordance with the BC Hydrometric RISC standards (2009) and to the satisfaction of the Director, Environmental Protection.

7. BOD = Five-Day Biological Oxygen Demand.

8. Toxicity tests coincide with water quality sampling and are intended to target projected worst-case scenarios such as low flow, during flocculent use, or when discharge quality is expected to be reduced.

9. Abbreviations include: M = Monthly, Q = Quarterly, SA = Semi-Annually (twice per year), C = Continuous, W/M = Weekly from March 15 – July 31, Monthly during other times of year.

10. Weekly sampling required for selenium and sulphate on the same temporal schedule as described in W/M.

**Table B-4. Summary of Surface Water Monitoring Program for West Line Creek Active Water Treatment Facility**

EMS ID	Site ID	Water Quality/Quantity Parameter and Associated Monitoring Frequency										
		Field Parameters <sup>1</sup>	Conventional Parameters <sup>2</sup>	Major Ions <sup>3</sup>	Nutrients <sup>4</sup>	Metals <sup>5</sup>	Flow <sup>6</sup>	BOD & Total Selenium <sup>7</sup>	Sulphide	TSS & Turbidity	96-hr. LT <sub>50</sub> for Rainbow Trout	48-hr. LT <sub>50</sub> for <i>Daphnia magna</i>
E293372	LC_WTF_IN	D	M	M	M	M	C	-	-	D	-	-
E291569	LC_WTF_OUT	D	M	M	M	M	C	3X/W	M	D	Q*	Q*

Notes: 1. Field parameters include water temperature, specific conductance, dissolved oxygen, and pH.

2. Conventional parameters include specific conductance, total dissolved solids, total suspended solids, hardness, alkalinity, dissolved organic carbon, total organic carbon, and turbidity.

3. Major ions include bromide, fluoride, calcium, chloride, magnesium, potassium, sodium, and sulphate.

4. Nutrients include ammonia, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate, and total phosphorus.

5. Metals (dissolved and total fractions) include aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, chromium, cobalt, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, and zinc.

6. Flow measurements are taken in accordance with the BC Hydrometric RISC standards (2009) and to the satisfaction of the Director, Environmental Protection.

7. BOD = Five-Day Biological Oxygen Demand.

8. Abbreviations include: D= Daily, M = Monthly, Q\* = Toxicity testing done weekly until one year after commissioning is completed, at which time testing must be done quarterly, C = Continuous, 3X/W = Selenium and nitrate are sampled 3-times a week.

Table B-5. Summary of Surface Water Monitoring Program for Elkview Operations

EMS ID	Site ID	Water Quality/Quantity Parameter and Associated Monitoring Frequency								
		Field Parameters <sup>1</sup>	Conventional Parameters <sup>2</sup>	Major Ions <sup>3</sup>	Nutrients <sup>4</sup>	Dissolved Metals <sup>5</sup>	Total Metals <sup>5</sup>	Flow <sup>6</sup>	96-hr. LT <sub>50</sub> for Rainbow Trout <sup>7</sup>	48-hr. LT <sub>50</sub> for <i>Daphnia magna</i> <sup>7</sup>
<b>Authorized Discharge Sites</b>										
E296311	EV_SP1	M	M	M	M	-	M	-	Q	Q
E208057	EV_MG1	M	M	M	M	-	M	-	Q	Q
E206231	EV_GT1	M	M	M	M	-	M	-	Q	Q
E102685	EV_BC1	M	M	M	M	-	M	-	Q	Q
E210369	EV_AQ1	M	M	M	M	SA	M	-	Q	Q
E298590	EV_DC1	M	M	M	M	-	M	C	Q	Q
E102681	EV_SM1	M	M	M	M	-	M	-	Q	Q
E258135	EV_LC1	M	M	M	M	-	M	-	Q	Q
E296310	EV_GH1	-	SA	SA	SA	SA	-	-	-	-
E208043	EV_GC2	M	M	M	M	-	M	-	Q	Q
E102679	EV_OC1	M	M	M	M	SA	M	-	Q	Q
0200097	EV_EC1	M	M	M	M	SA	M	C	Q	Q
<b>Receiving Environment Sampling Sites</b>										
0200203	EV_MC3	W/M	W/M	W/M	W/M	W/M	W/M	-	-	-
E298593	EV_TC1	M	M	M	M	M	M	M	-	-
E298594	EV_SPR2	M	M	M	M	M	M	M	-	-
0200027	EV_ER4	M	M	M	M	M	M	-	-	-
E298595	EV_WF_NW <sup>9</sup>	SA	SA	SA	SA	SA	-	-	-	-
E298596	EV_WF_SW <sup>9</sup>	SA	SA	SA	SA	SA	-	-	-	-
E298592	EV_BLM2	M	M	M	M	M	M	M	-	-
E298591	EV_FC1	M	M	M	M	M	M	M	-	-
0200111	EV_ER2	M	M	M	M	M	M	-	-	-

Notes: 1. Field parameters include water temperature, specific conductance, dissolved oxygen, and pH.

2. Conventional parameters include specific conductance, total dissolved solids, total suspended solids, hardness, alkalinity, dissolved organic carbon, total organic carbon, and turbidity.

3. Major ions include bromide, fluoride, calcium, chloride, magnesium, potassium, sodium, and sulphate.

4. Nutrients include ammonia, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate, and total phosphorus.

5. Metals (dissolved and total fractions) include aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, chromium, cobalt, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, and zinc.

6. Flow measurements are taken in accordance with the BC Hydrometric RISC standards (2009) and to the satisfaction of the Director, Environmental Protection.

7. Toxicity tests coincide with water quality sampling and are intended to target projected worst-case scenarios such as low flow, during flocculent use, or when discharge quality is expected to be reduced.

8. Abbreviations include: Ma = Monthly alternative sample (either E221329 or E105061 is sampled, not both), M = Monthly, Q = Quarterly, SA = Semi-Annually (twice per year), C = Continuous, W/M = Weekly from March 15 – July 31, Monthly during other times of year.

9. West Fork North Monitoring well (E298595) has been permanently damaged and is no longer operational. In the Ground Water Monitoring Plan submitted for approval in March of 2015, it was recommended that the well not be replaced as sulphate concentrations and major ion chemistry at both the north and south monitoring wells are indistinguishable. Therefore, Elkview Operations has proposed that the well be removed as it is no longer required, and that the West Fork South Monitoring well (E298596) also be removed as a monitoring requirement as it is included in the ground water monitoring program.

**Table B-6. Summary of Surface Water Monitoring Program for Coal Mountain Operations**

EMS ID	Site ID	Water Quality/Quantity Parameter and Associated Monitoring Frequency							
		Field Parameters <sup>1</sup>	Conventional Parameters <sup>2</sup>	Major Ions <sup>3</sup>	Nutrients <sup>4</sup>	Metals <sup>5</sup>	Flow <sup>6</sup>	96-hr. LT <sub>50</sub> for Rainbow Trout <sup>7</sup>	48-hr. LT <sub>50</sub> for <i>Daphnia magna</i> <sup>7</sup>
<b>Authorized Discharge Sites</b>									
E206438	CM_CCPD	M	M	M	M	M	-	Q	Q
E298733	CM_PC2	M	M	M	M	M	-	Q	Q
E298734	CM_SOW	M	M	M	M	M	-	-	-
E102488	CM_SPD	M	M	M	M	M	-	Q	Q
<b>Receiving Environment Sampling Sites</b>									
E258175	CM_MC1	M	M	M	M	M	M	-	-
E200209	CM_CC1	W/M	W/M	W/M	W/M	W/M	C	-	-

Notes: 1. Field parameters include water temperature, specific conductance, dissolved oxygen, and pH.

2. Conventional parameters include specific conductance, total dissolved solids, total suspended solids, hardness, alkalinity, dissolved organic carbon, total organic carbon, and turbidity.

3. Major ions include bromide, fluoride, calcium, chloride, magnesium, potassium, sodium, and sulphate.

4. Nutrients include ammonia, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate, and total phosphorus.

5. Metals (dissolved and total fractions) include aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, chromium, cobalt, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, and zinc.

6. Flow measurements are taken in accordance with the BC Hydrometric RISC standards (2009) and to the satisfaction of the Director, Environmental Protection.

7. Toxicity tests coincide with water quality sampling and are intended to target projected worst-case scenarios such as low flow, during flocculent use, or when discharge quality is expected to be reduced.

8. Abbreviations include: M = Monthly, Q = Quarterly, SA = Semi-Annually (twice per year), C = Continuous, W/M = Weekly from March 15 – July 31, Monthly during other times of year.

**Table B-7. Summary of Surface Water Monitoring Program for Compliance Stations**

EMS ID	Site ID	Water Quality/Quantity Parameter and Associated Monitoring Frequency													
		Field Parameters <sup>1</sup>	Conventional Parameters <sup>2</sup>	Major Ions <sup>3</sup>	Nutrients <sup>4</sup>	Metals <sup>5</sup>	BOD	Flow <sup>6</sup>	Chlorophyll-a	Total Phosphorus	7-Day <i>Ceriodaphnia dubia</i> Chronic Toxicity Test <sup>7</sup>	72-hr. <i>Pseudokichneriella subcapitata</i> Toxicity Test <sup>8</sup>	30-Day Early Life-Stage Rainbow Trout Test <sup>9</sup>	30-Day Early Life-Stage Fathead Minnow Test <sup>10</sup>	28-Day Water Exposure <i>Hyalella azteca</i> Toxicity Test <sup>11</sup>
E300071	FR_FRCP1	W/M	W/M	W/M	W/M	W/M	-	W/M	-	-	Q	Q	See Note 15.	Q	Q
0200378	GH_FR1	W/M	W/M	W/M	W/M	W/M	-	W/M	-	-	Q	Q	See Note 15.	Q	Q
E300090	GH_ERC	W/M	W/M	W/M	W/M	W/M	-	W/M	-	-	Q	Q	See Note 15.	-	-
E297110	LC_LCDSSLCC	W/M	W/M	W/M	W/M	W/M	M	See Note 12.	See Note 13.	See Note 14.	Q	Q	See Note 15.	-	-
E300091	EV_MC2	W/M	W/M	W/M	W/M	W/M	-	C	-	-	Q	Q	See Note 15.	-	-
E102682	EV_HC1	W/M	W/M	W/M	W/M	W/M	-	W/M	-	-	Q	Q	See Note 15.	-	-
E258937	CM_MC2	W/M	W/M	W/M	W/M	W/M	-	W/M	-	-	Q	Q	See Note 15.	-	-

- Notes: 1. Field parameters include water temperature, specific conductance, dissolved oxygen, and pH.  
 2. Conventional parameters include specific conductance, total dissolved solids, total suspended solids, hardness, alkalinity, dissolved organic carbon, total organic carbon, and turbidity.  
 3. Major ions include bromide, fluoride, calcium, chloride, magnesium, potassium, sodium, and sulphate.  
 4. Nutrients include ammonia, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate, and total phosphorus.  
 5. Metals (dissolved and total fractions) include aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, chromium, cobalt, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, and zinc.  
 6. Flow measurements are taken in accordance with the BC Hydrometric RISC standards (2009) and to the satisfaction of the Director, Environmental Protection.  
 7. Seven-Day *Ceriodaphnia dubia* Chronic Toxicity Test are conducted per EPS1/RM/21. Assessment endpoints include survival and reproduction.  
 8. 72-hour *Pseudokichneriella subcapitata* Toxicity Test are conducted per EPS1/RM/25. Assessment endpoints include growth and inhibition.  
 9. 30-Day Early Life-Stage Rainbow Trout (*Oncorhynchus mykiss*) Tests are conducted per EPS1/RM/28, using <24-hour Post-Fertilization Eggs. Assessment endpoints include: survival, hatching, growth, deformity, and behavior.  
 10. 30-Day Early Life-Stage Fathead Minnow (*Pimphales promelas*) Tests are conducted per USEPA (2000), using <24-hour Post-Fertilization Eggs. Assessment endpoints include: survival, hatching, growth, and deformity.  
 11. Abbreviations include: M = Monthly, Q = Quarterly, SA = Semi-Annually (twice per year), C = Continuous, W/M = Weekly from March 15 – July 31, Monthly during other times of year.  
 12. Flows for E297110 are determined by calculation.  
 13. At Least one time between August 15 through September 30, annually.  
 14. Every two weeks beginning June 15 through September 30, annually.  
 15. Two times per year – once in Spring and once in Fall.

**Table B-8. Summary of Surface Water Monitoring Program for Order Stations**

EMS ID	Site ID	Water Quality/Quantity Parameter and Associated Monitoring Frequency						
		Field Parameters <sup>1</sup>	Conventional Parameters <sup>2</sup>	Major Ions <sup>3</sup>	Nutrients <sup>4</sup>	Metals <sup>5</sup>	Flow <sup>6</sup>	Secchi Depth and Chlorophyll-a
0200378	GH_FR1	W/M	W/M	W/M	W/M	W/M	W/M	-
0200028	LC_LC5	W/M	W/M	W/M	W/M	W/M	W/M	-
E206661	GH_ER1	W/M	W/M	W/M	W/M	W/M	W/M	-
0200027	EV_ER4	W/M	W/M	W/M	W/M	W/M	W/M	-
0200393	EV_ER1	W/M	W/M	W/M	W/M	W/M	W/M	-
E294312	RG_ELKORES	W/M	W/M	W/M	W/M	W/M	-	-
E300230	RG_DSELK	M	M/EH	M/EH	M/EH	M/EH	-	M

Notes: 1. Field parameters include water temperature, specific conductance, dissolved oxygen, and pH.

2. Conventional parameters include specific conductance, total dissolved solids, total suspended solids, hardness, alkalinity, dissolved organic carbon, total organic carbon, and turbidity.

3. Major ions include bromide, fluoride, calcium, chloride, magnesium, potassium, sodium, and sulphate.

4. Nutrients include ammonia, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate, and total phosphorus.

5. Metals (dissolved and total fractions) include aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, chromium, cobalt, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, and zinc.

6. Flow measurements are taken in accordance with the BC Hydrometric RISC standards (2009) and to the satisfaction of the Director, Environmental Protection.

7. Toxicity tests coincide with water quality sampling and are intended to target projected worst-case scenarios such as low flow, during flocculent use, or when discharge quality is expected to be reduced.

8. Abbreviations include: M = Monthly, Q = Quarterly, SA = Semi-Annually (twice per year), C = Continuous, W/M = Weekly from March 15 – July 31, Monthly during other times of year, M/EH = Monthly frequency of one epilimnetic composite of water sampled from three depths (e.g., 1 m, 5 m, and 10 m) and another hypolimnetic composite of water sampled from three depths (e.g., 20 m, 32 m, and 45 m).

**Table B-9. Summary of Surface Water Monitoring Program for Lake Kocanusa (wholly located on Canadian Lands and Water)**

EMS ID	Site ID	Water Quality/Quantity Parameter and Associated Monitoring Frequency					
		Field Parameters <sup>1</sup>	Conventional Parameters <sup>2</sup>	Major Ions <sup>3</sup>	Nutrients <sup>4</sup>	Metals <sup>5</sup>	Secchi Depth and Chlorophyll-a
E300095	RG_KERRRD	M	M/EH	M/EH	M/EH	M/EH	M
E300092	RG_GRASMERE	M	M/EH	M/EH	M/EH	M/EH	M
E300093	RG_USGOLD	M	M/EH	M/EH	M/EH	M/EH	M
E300094	RG_BORDER	M	M	M	M	M	M

Notes: 1. Field parameters include water temperature, specific conductance, dissolved oxygen, and pH.

2. Conventional parameters include specific conductance, total dissolved solids, total suspended solids, hardness, alkalinity, dissolved organic carbon, total organic carbon, and turbidity.

3. Major ions include bromide, fluoride, calcium, chloride, magnesium, potassium, sodium, and sulphate.

4. Nutrients include ammonia, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate, and total phosphorus.

5. Metals (dissolved and total fractions) include aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, chromium, cobalt, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, and zinc.

6. Abbreviations include: M = Monthly, M/EH = Monthly frequency of one epilimnetic composite of water sampled from three depths (e.g., 1 m, 5 m, and 10 m) and another hypolimnetic composite of water sampled from three depths (e.g., 20 m, 32 m, and 45 m).



## **Appendix C – Surface Water Quantity Monitoring Program 2015 Summary**

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## 1 Introduction

Permit 107517 requires the collection of flow information from 36 monitoring locations. This appendix provides an analysis of the 2015 flow year compared to long term flow records at two Water Survey of Canada maintained hydrometric stations and summarizes instantaneous, continuous and calculated flow data compiled in 2015 to fulfill Permit 107517 requirements.

## 2 2015 Flow Year Summary

It is useful to understand the 2015 flow year in the context of long-term flow records. The Water Survey of Canada operates two upper Elk Valley relevant hydrometric stations which have long term published flow records. Elk River at Natal (08NK016) has a published flow record from 1950 to 2014 and Fording River at the mouth (08NK018) has a published flow record from 1970 to 2014. Preliminary 2015 flow data was obtained by Teck for these two stations from Environment Canada via email and calculated monthly average flows for 2015 were compared with mean monthly average, maximum monthly average and minimum monthly average flows over the period of record. Results for Elk River at Natal (08NK016) and Fording River at the mouth (08NK018) are shown in Figure C-1 and Figure C-2 respectively. Obtained 2015 flow data is subject to revision upon finalization by Environment Canada.

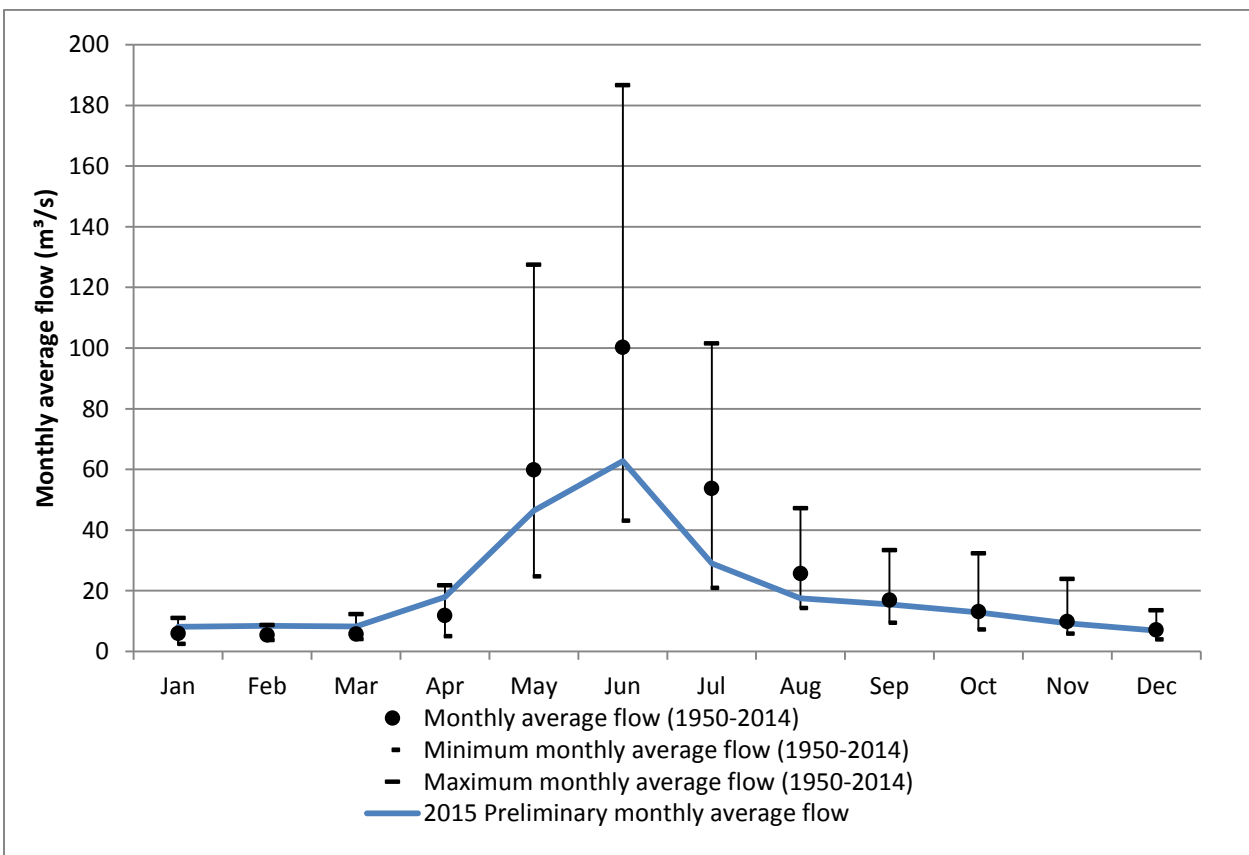
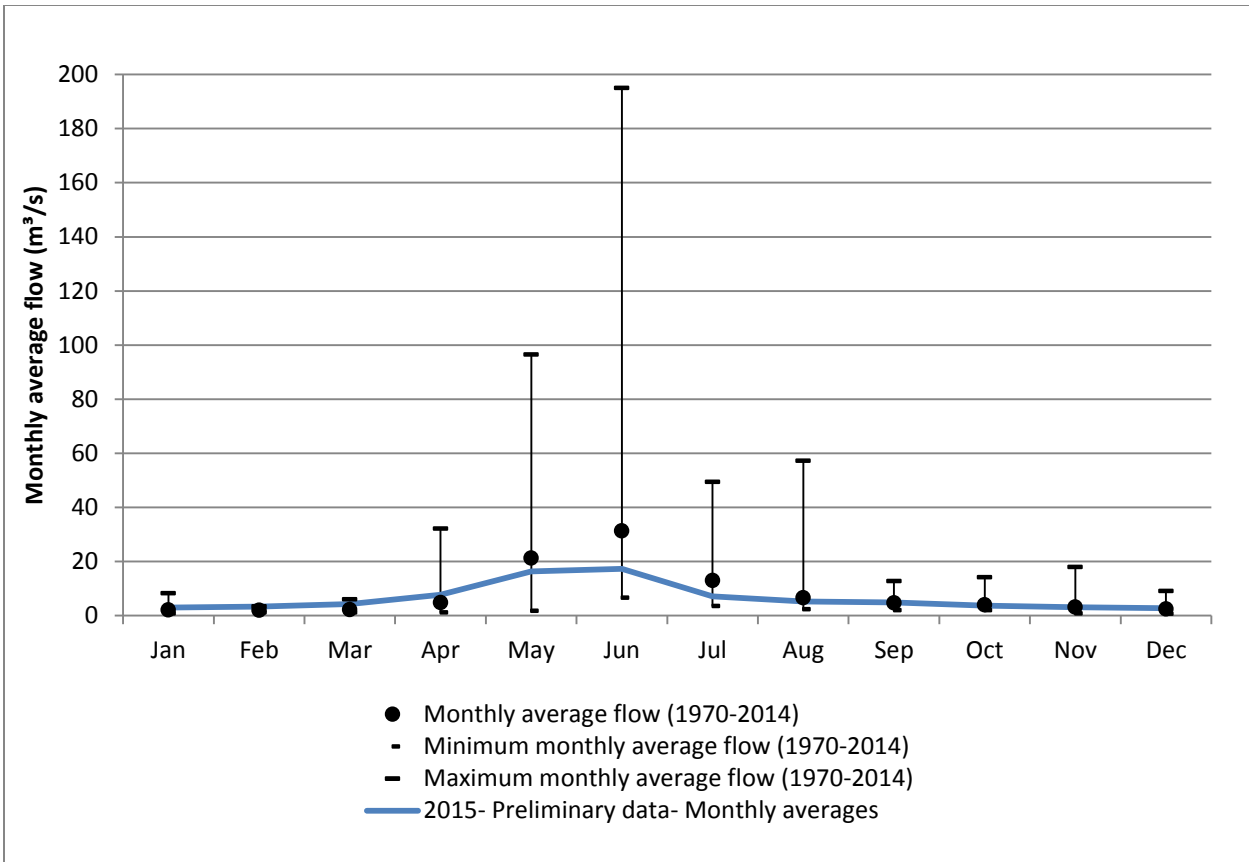


Figure C-1. Comparison of 2015 monthly average flows to long term flow record at Elk River at Natal (08NK016).



**Figure C-2. Comparison of 2015 monthly average flows to long term flow record at Fording River at the Mouth (08NK018).**

Mean annual discharges (MAD) for all Order and Compliance points were previously calculated by a qualified professional in March 2015 based on available monitoring data. This information was included in the Flow Monitoring Metadata Summary submitted March 31, 2015 as required by Section 9.1.2.4 of Permit 107517. 2015 annual average flows are compared against these calculated MAD in this Appendix.

2015 was a low flow year in the Fording and Elk Rivers with 2015 annual average flow at 77% of MAD for both locations. This was mostly due to lower than average freshet flows (May to July). Low flow conditions (January to April and September to December) in 2015 were near or slightly above average in both rivers as indicated in Figures C-1 and C-2.

In addition to the above flow information from the Fording and Elk Rivers, 2015 annual average flows were compared to MAD at all Order and Compliance Stations as defined in Permit No. 107517 (Table C-1). 2015 annual average flows were below MAD at all locations except Harmer Spillway (EV\_HC1, E102682).

**Table C-1. Comparison of 2015 annual average flow to Mean Annual Discharge (MAD) at Order and Compliance Stations.**

Name/Location	FR_FRCP1	GH_FR1	LC_LCDSSLCC	LC_LC5	GH_ERC	GH_ER1	EV_ER4	EV_HC1	CM_MC2	EV_MC2	EV_ER1	RG_ELKRES
EMS Number	EMS E300071	EMS 0200278	EMS E297110	EMS 0200028	EMS E300090	EMS E206661	EMS 0200027	EMS E102682	EMS E258937	EMS E300091	EMS 0200393	EMS E294312
Monitoring Status	Teck Station	Ungauged	Teck Station	Environment Canada station	Ungauged	Ungauged	Environment Canada Station	Teck Station	Teck Station	Teck Station	Ungauged	Ungauged
Mean Annual Discharge (MAD) (m <sup>3</sup> /s)	3.4	5.1	1.8	8.1	12.5	13.5	26.2	0.57	1.4	11	40	57
2015 Annual average flow (m <sup>3</sup> /s)	1.4	3.7	1.2	6.2	10.2	11.0	20.2	0.6	0.7	9.1	36.0	46.4

### 3 Permit 107517 Flow Monitoring Requirements

Permit 107517 flow monitoring requirements are summarized in Table C-2. Table C-2 also indicates where in Appendix C flow data is presented for each monitoring station.

**Table C-2. Flow monitoring requirements identified in Permit 107517.**

EMS ID	Site ID	Frequency	Appendix C - Data Location
		Flow	
<b>FRO</b>			
<b>E300071</b>	<b>FR_FRCP1</b>	<b>W/M</b>	<b>Figure C.3</b>
E216777	FR_UFR1	M	Figure C.3
E300096	FR_HC3	M	Figure C.3
E216779	FR_HC2	M	Figure C.3
E216778	FR_HC1	C	Figure C.3 and Figure C.8
200251	FR_FR1	C	Figure C.3 <sup>1</sup>
200201	FR_FR2	W/M	Figure C.3
200252	FR_KC1	C	Figure C.3 and Figure C.9
E300097	FR_FRRD	M	Figure C.3
<b>GHO</b>			
<b>200378</b>	<b>GH_FR1</b>	<b>W/M</b>	<b>Section 6<sup>2</sup></b>
<b>E300090</b>	<b>GH_ERC</b>	<b>W/M</b>	<b>Section 6<sup>2</sup></b>
<i>E206661</i>	<i>GH_ER1</i>	<i>W/M</i>	<i>Section 6<sup>2</sup></i>
E105061	GH_SC2	C	Figure C.4 <sup>3</sup>
E221329	GH_SC1	C	Not Included <sup>4</sup>
<b>LCO</b>			
<b>E297110</b>	<b>LC_LCDSSLCC</b>	<b>Calculated</b>	<b>Figure C.5</b>
<i>200028</i>	<i>LC_LC5</i>	<i>W/M</i>	<i>Figure C.14<sup>5</sup></i>
200335	LC_LC2	C	Figure C.11
E261958	LC_WLC	C	Figure C.10
E282149	LC_SLC	M	Figure C.5
200337	LC_LC3	C	Figure C.12
200044	LC_LC4	C	Figure C.13 <sup>5</sup>
<b>WLC</b>			
<b>E293372</b>	<b>LC_WTF_IN</b>	<b>C</b>	<b>Not Included<sup>6</sup></b>
<b>E291569</b>	<b>LC_WTF_OUT</b>	<b>C</b>	<b>Not Included<sup>6</sup></b>
<b>EVO</b>			
<b>E300091</b>	<b>EV_MC2</b>	<b>C</b>	<b>Figure C.17</b>
<b>E102682</b>	<b>EV_HC1</b>	<b>W/M</b>	<b>Figure C.6</b>
<i>200027</i>	<i>EV_ER4</i>	<i>W/M</i>	<i>Figure C.18<sup>5</sup></i>
<i>200393</i>	<i>EV_ER1</i>	<i>W/M</i>	<i>Section 6<sup>2</sup></i>
E298590	EV_DC1	C	Figure C.6 and Figure C.16
200097	EV_EC1	C	Figure C.6 and Figure C.15
E298593	EV_TC1	M	Figure C.6
E298594	EV_SPR2	M	Figure C.6
E298592	EV_BLM2	M	Figure C.6
E298591	EV_FC1	M	Figure C.6



EMS ID	Site ID	Frequency	Appendix C - Data Location
		Flow	
<b>CMO</b>			
<b>E258937</b>	<b>CM_MC2</b>	<b>W/M</b>	Figure C.7
E258175	CM_MC1	M	Figure C.7
E200209	CM_CC1	C	Figure C.7 and Figure C.19

<sup>1</sup> Not a continuous monitoring station- Instantaneous measurements collected W/M

<sup>2</sup> Calculated monthly from available measured data

<sup>3</sup> Continuous water level information collected - flows will be calculated once a stage discharge relationship has been established.

<sup>4</sup> Swift Creek sediment pond not utilized in 2015. All Swift creek flow data available from station GH\_SC2

<sup>5</sup> Preliminary continuous data obtained from Environment Canada

<sup>6</sup> Not required due to commissioning status in 2015

Abbreviations include: M = Monthly, Q = Quarterly, C = Continuous, W/M = Weekly from March 15 – July 31, Monthly during other times of year

Compliance points are shown in bold and Order Stations are shown in italic

## 4 Summary of Instantaneous Flow Data

Instantaneous flow data are collected at many of Teck's flow monitoring locations. Collection of instantaneous flow data includes manual flow measurements and/or the reading of a staff gauge to calculate a flow from an established site specific stage-discharge relationship. Figures C-3 to C-7 show instantaneous flow monitoring data collected in 2015 separated by operation.

### 4.1 Quality Assurance/Quality Control

2015 instantaneous flow measurements were collected in accordance with Teck's *Flow Monitoring Protocol* which was developed in 2010 (Kerr Wood Leidal Associates [KWL] 2010). The protocol outlines standard procedures for flow monitoring and provides information on equipment, measurement approaches, calculations, documentation, and quality control. Permit 107517 requires the development of a Regional Hydrometric Flow Monitoring Plan by December 31, 2016. During the implementation of this plan, Teck may facilitate a review and possible update to the *Flow Monitoring Protocol*.

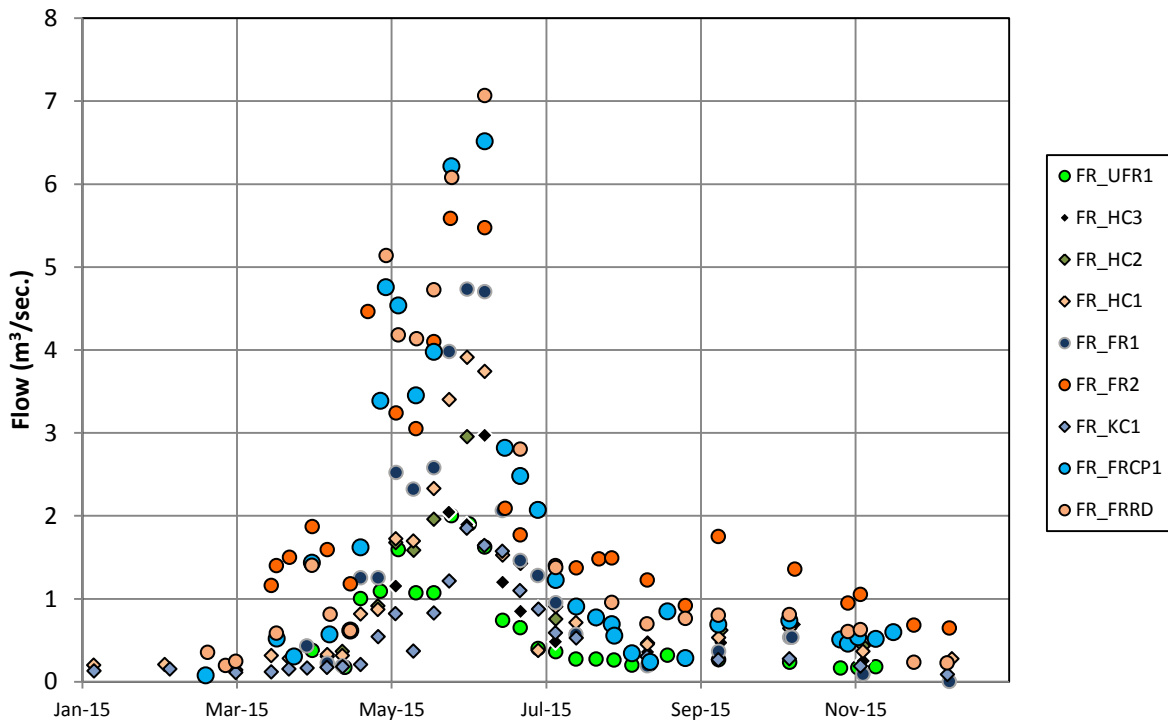


Figure C-3. Instantaneous flow measurements collected at Fording River Operations.

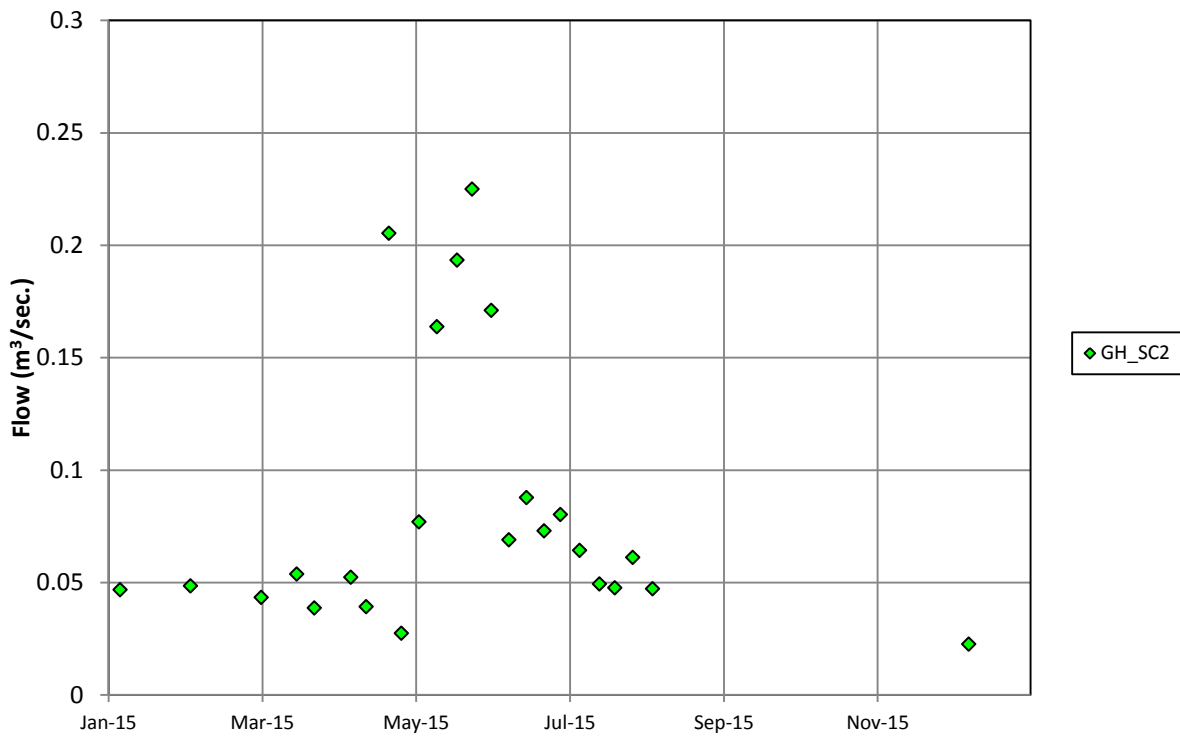


Figure C-4. Instantaneous flow measurements collected at Greenhills Operations.

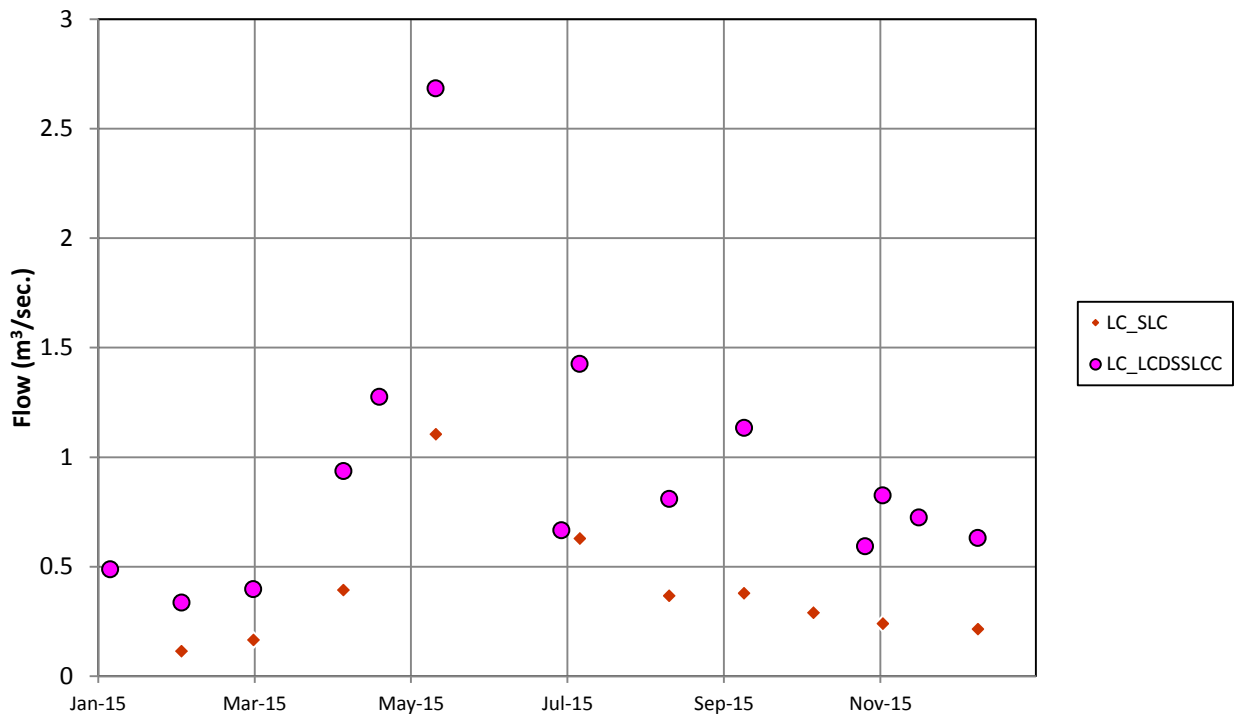


Figure C-5. Instantaneous flow measurements collected at Line Creek Operations.

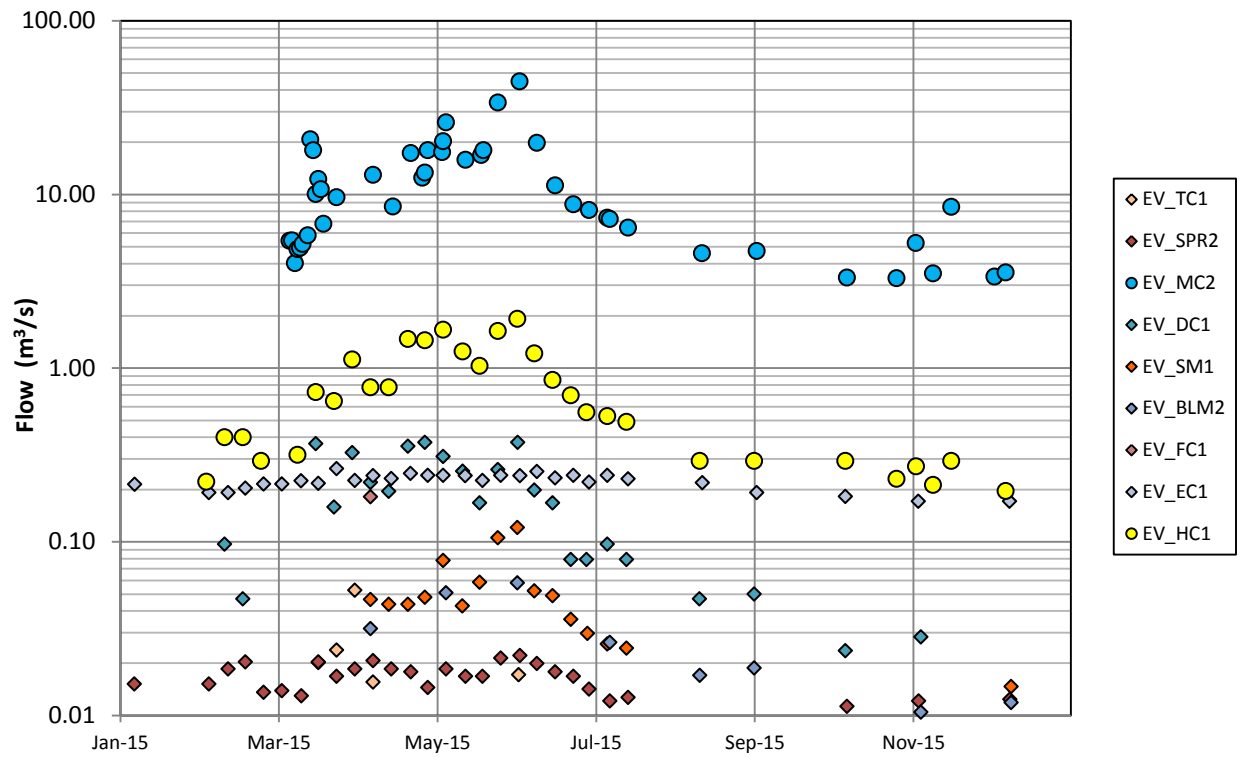


Figure C-6. Instantaneous flow measurements collected at Elkview Operations (Log Scale).

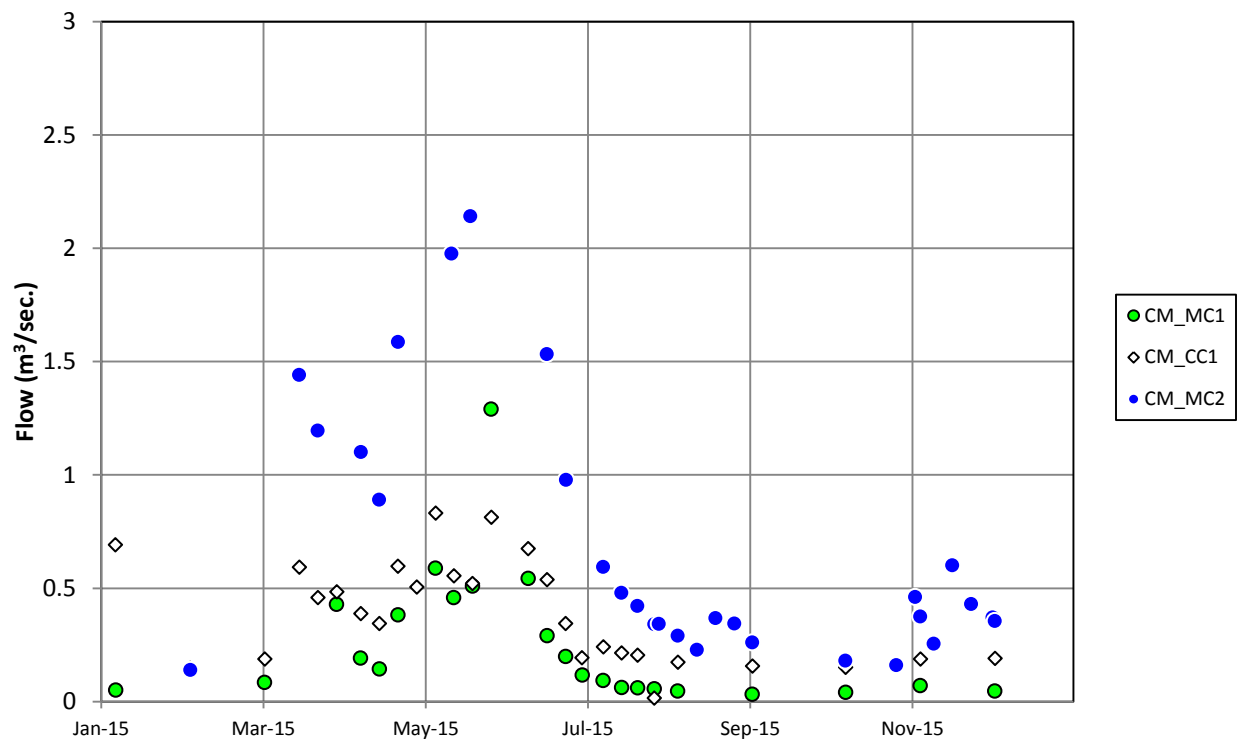


Figure C-7. Instantaneous flow measurements collected at Coal Mountain Operations.

## 5 Summary of Continuous Flow Data

Several permitted monitoring stations are equipped with continuous flow monitoring equipment. These stations are operated by Teck or Environment Canada. Table C-3 summarizes the monitoring stations at which continuous flow monitoring information was collected in 2015 and describes any issues or data gaps. Data from each continuous monitoring station is presented in Figures C-8 through C-19. Available instantaneous flow data is shown with continuous monitoring data for reference.

### 5.1 Quality Assurance/Quality Control

Nine of 11 of Teck's continuous hydrometric stations are managed by external professionally qualified consultants. Stage discharge relationships are reviewed and/or updated annually based on manual flow measurements. Generally, Teck attempts to collect hydrometric data consistent with the Resources Information Standards Committee (RISC) Grade B standard.

Teck also utilizes continuous flow data collected through the Water Survey of Canada hydrometric program. Data quality is maintained in accordance with Water Survey of Canada data standards.

**Table C-3. Summary of Continuous Flow monitoring Stations and 2015 Data availability.**

<b>EMS ID</b>	<b>Site ID</b>	<b>Operated By</b>	<b>2015 Data Status</b>	<b>Missing Data</b>	<b>Reason for Missed Data</b>
E216778	FR_HC1	Teck	Final	None	N/A
0200252	FR_KC1	Teck	Final	Jan 12- Feb 4	Ice build-up
200335	LC_LC2	Teck	Final	Feb 7- Feb 11 Oct 26 - Dec 1 Dec 22- Dec 31	Water in orifice line
E261958	LC_WLC	Teck	Final	None	N/A
200337	LC_LC3	Teck	Final	Jan 1 - Jan 10 Feb 26 - Apr 20 Nov 25 - Dec 1 Dec 24 - Dec 26 Dec 29 - Dec 31	Ice build-up/ water in orifice line
0200027	EV_ER4	Environment Canada	Preliminary	None	N/A
0200044	LC_LC4	Environment Canada	Preliminary	None	N/A
0200028	LC_LC5	Environment Canada	Preliminary	None	N/A
0200097	EV_EC1	Teck	Final	None	N/A
E298590	EV_DC1	Teck	Final	Jan 1 - May 6 Nov 19 - Dec 31	Dead Battery/ Frozen orifice line Ice cover- Inaccurate readings
E300091	EV_MC2	Teck	Final	Jan 1 - Mar 6 Nov 27 - Dec 31	Ice cover- Inaccurate readings
E200209	CM_CC1	Teck	Final	Jan 1 - Jan 5 May 9 - May 14	Noisy data removed
0200385	GH_SC1	Teck		*See Note	
E105061	GH_SC2	Teck		*See Note	

\* A stage discharge relationship has not yet been established for the Swift Creek continuous monitoring stations. Manual flow measurements were obtained and continuous water level information was logged in 2015. Flow data will be calculated once a stage discharge relationship has been established.

**Station:** Henretta Creek at the mouth (Site ID FR\_HC1, EMS E216778)

**Operated by:** Teck

**Available Data:** 2015 Final flow data

**Average Monthly and Annual Flows (m<sup>3</sup>/s):**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	0.14	0.13	0.18	0.59	2.02	1.91	0.63	0.63	0.51	0.41	0.24	0.17	0.62

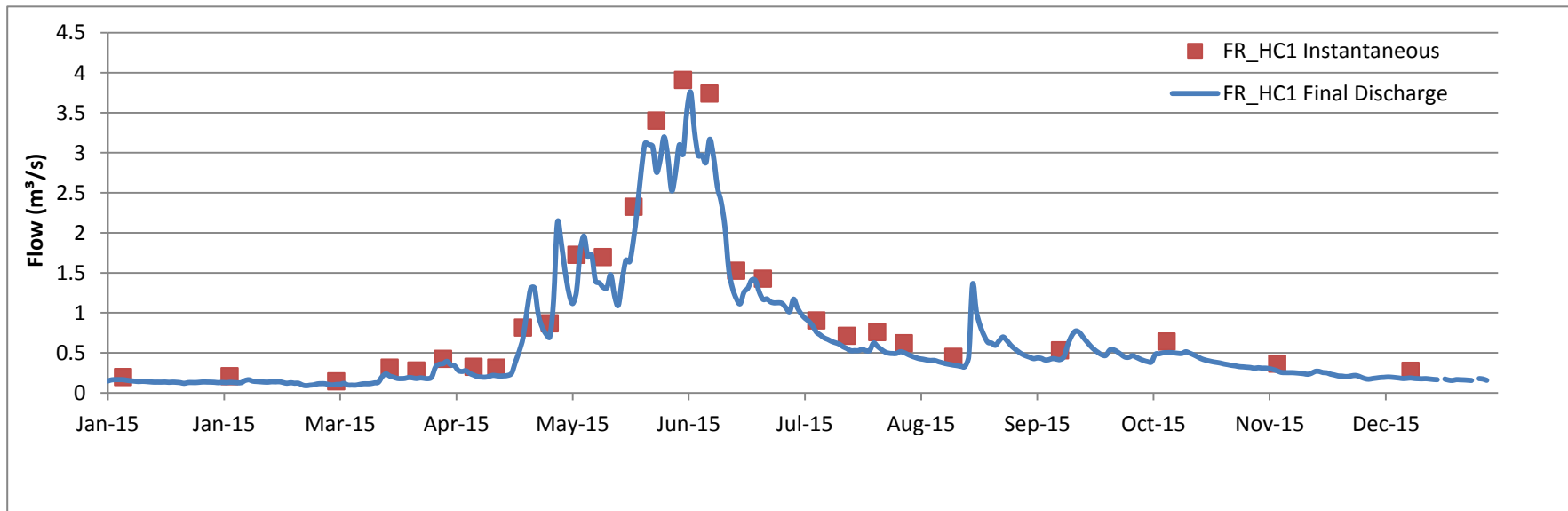


Figure C-8. Flow at Henretta Creek (FR\_HC1, E216778).



**Station:** Kilmarnock Creek downstream of rock drain (Site ID FR\_KC1, EMS 0200252)

**Operated by:** Teck

**Available Data:** 2015 Final flow data

**Average Monthly and Annual Flows (m<sup>3</sup>/s):**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	0.07	0.09	0.08	0.24	1.09	1.26	0.56	0.30	0.28	0.23	0.11	0.05	0.36

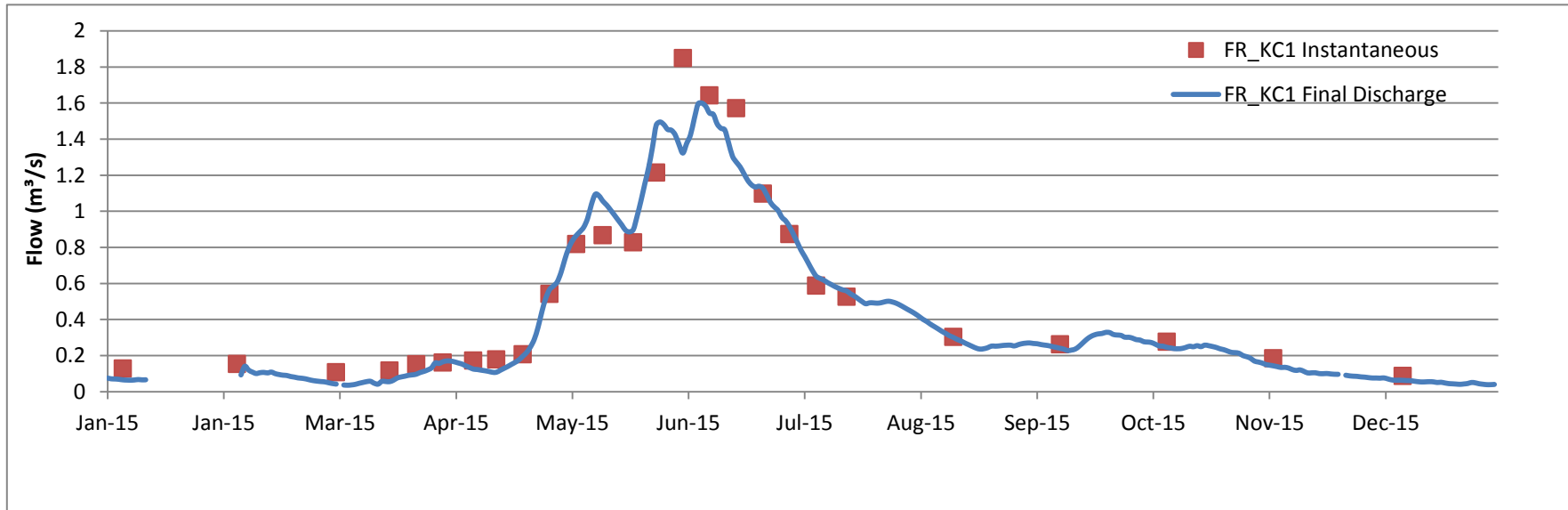


Figure C-9. Flow at Kilmarnock Creek downstream of rock drain (FR\_KC1, 0200252).

**Station:** Line Creek upstream of rock drain (Site ID LC\_LC2, EMS 200335)

**Operated by:** Teck

**Available Data:** 2015 Final flow data

**Average Monthly and Annual Flows (m<sup>3</sup>/s):**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	0.12	0.10	0.13	0.43	1.05	1.21	0.34	0.20	0.25	0.19	0.14	0.12	0.36

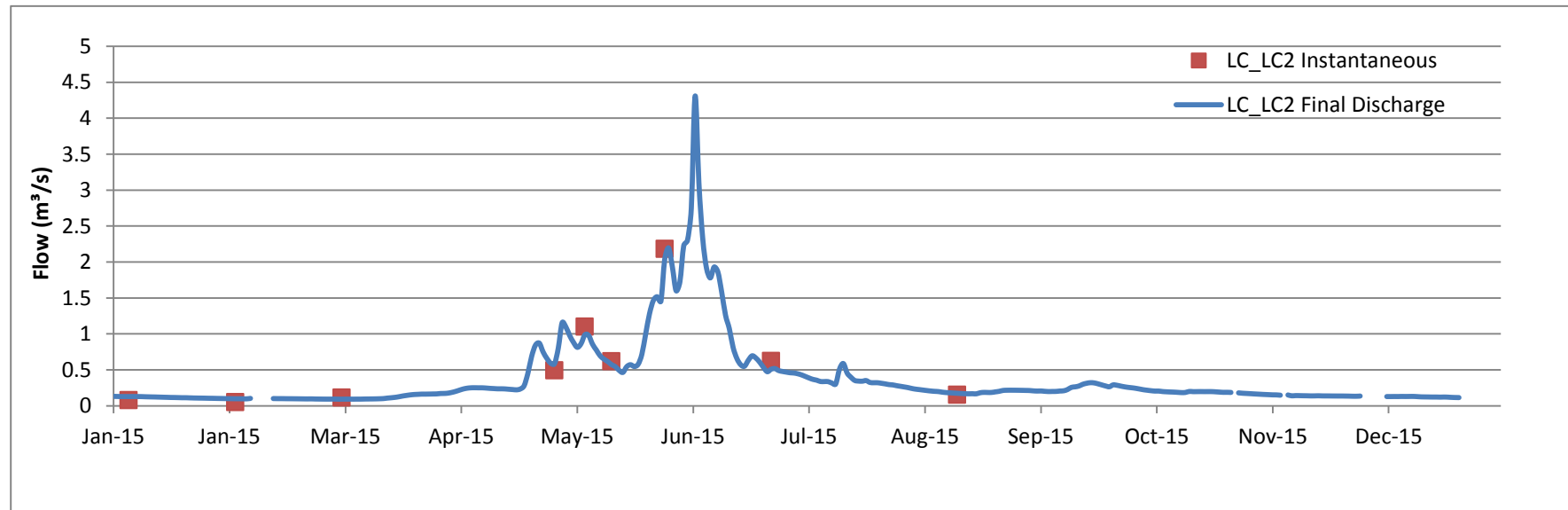


Figure C-10. Flow at Line creek upstream of rock drain (LC\_LC2, 200335).

**Station:** West Line Creek (Site ID LC\_WLC, EMS E261958)

**Operated by:** Teck

**Available Data:** 2015 Final flow data

**Average Monthly and Annual Flows (m<sup>3</sup>/s):**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	0.04	0.04	0.03	0.04	0.10	0.12	0.07	0.05	0.04	0.04	0.04	0.03	0.05

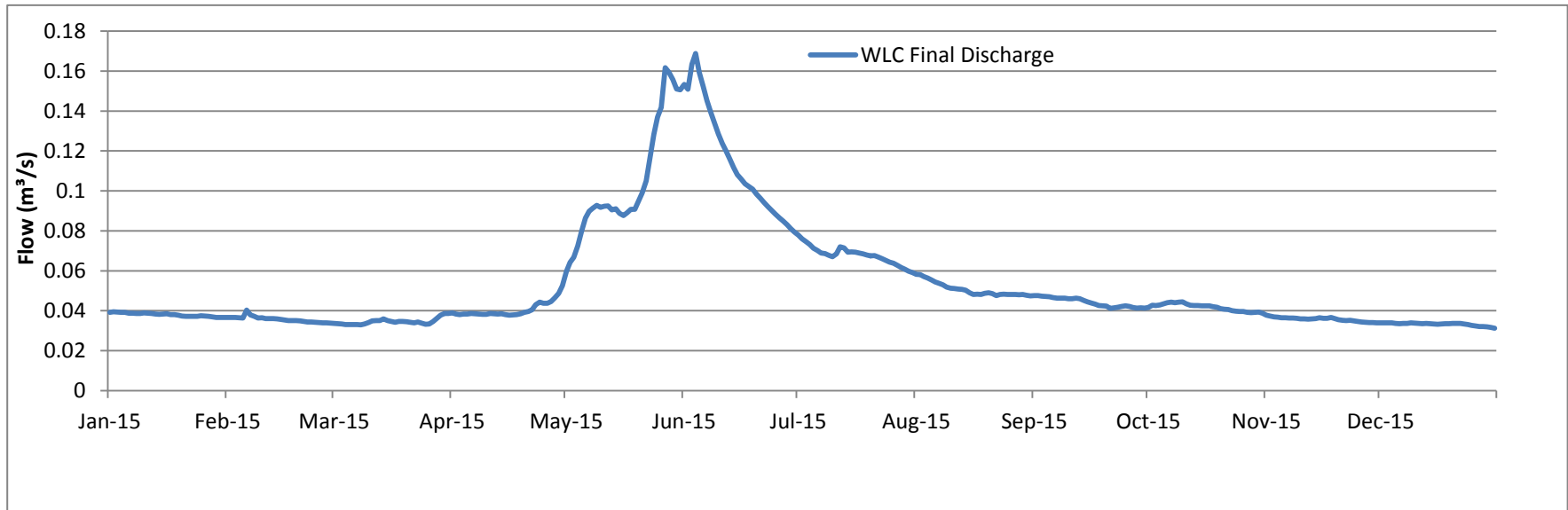


Figure C-11. Flow at West Line Creek (LC\_WLC, E261958).

**Station:** Line Creek downstream of West Line Creek (Site ID LC\_LC3, EMS 200337)

**Operated by:** Teck

**Available Data:** 2015 Final flow data

**Average Monthly and Annual Flows (m<sup>3</sup>/s):**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	0.35	0.45	-	1.22	1.67	2.05	0.56	0.43	0.52	0.40	0.30	0.32	0.05

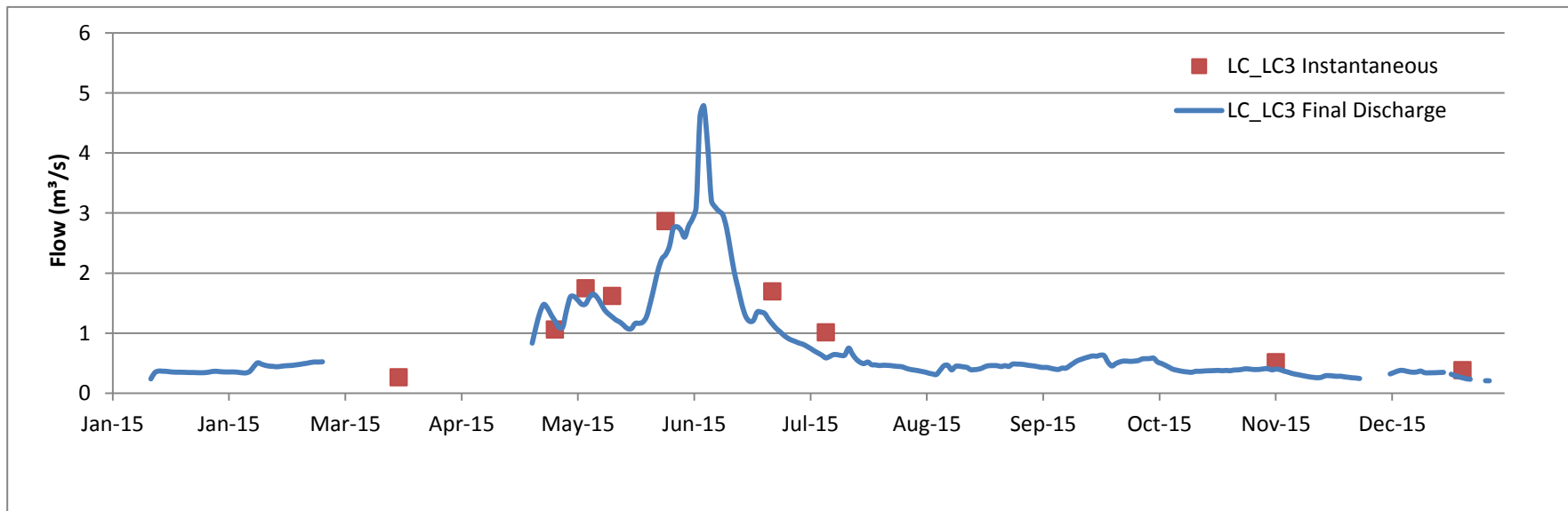


Figure C-12. Flow at Line Creek downstream of West Line Creek (LC\_LC3, 200337).

**Station:** Line creek at the mouth (Site ID LC\_LC4, EMS 0200044, WSC 08NK022)

**Operated by:** Environment Canada

**Available Data:** 2015 preliminary daily flow (unpublished- obtained by email from Environment Canada)

**Average Monthly and Annual Flows (m<sup>3</sup>/s):**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	0.67	0.90	0.95	1.68	4.25	4.86	2.28	1.94	1.62	1.20	0.94	0.71	6.53

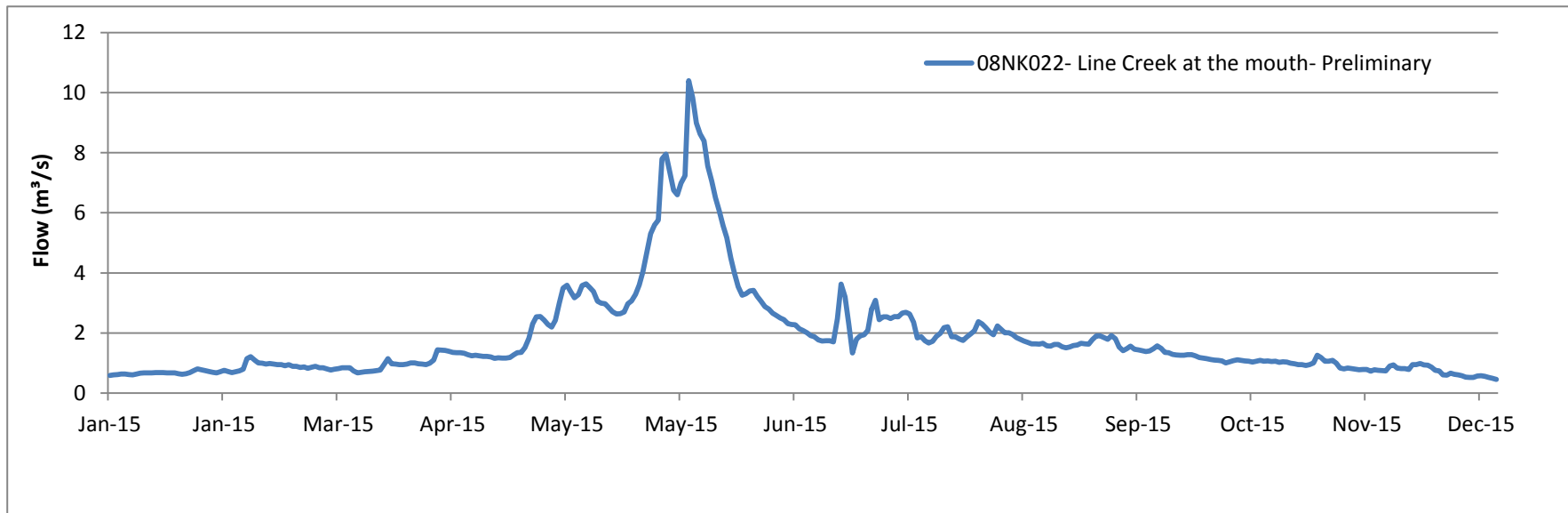


Figure C-13. Flow at Line Creek at the mouth (LC\_LC4, 0200044, 08NK022).

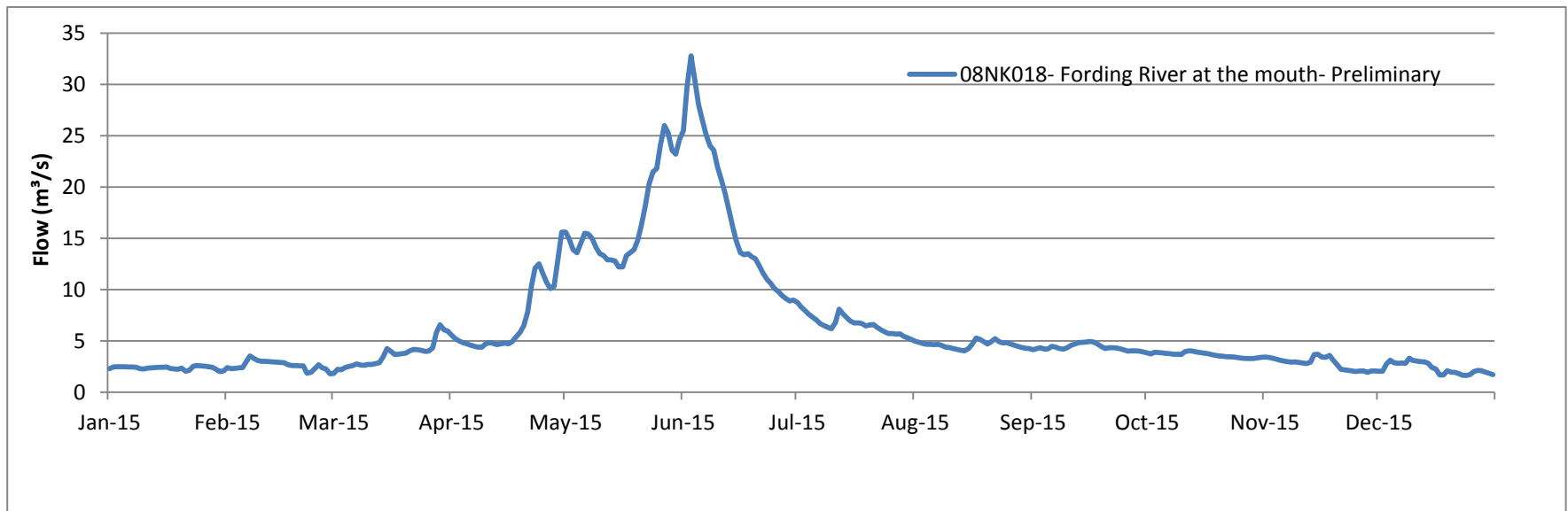
**Station:** Fording River downstream of Line Creek (Site ID LC\_LC5, EMS 0200028, WSC 08NK018)

**Operated by:** Environment Canada

**Available Data:** 2015 preliminary daily flow (unpublished- obtained by email from Environment Canada)

**Average Monthly and Annual Flows (m<sup>3</sup>/s):**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	2.36	2.62	3.63	7.10	16.86	17.50	6.65	4.62	4.37	3.64	2.81	2.32	6.22



**Figure C-14. Flow at Fording River downstream of Line Creek (LC\_LC5, 0200028, 08NK018).**

**Station:** Erickson Creek at the mouth (Site ID EV\_EC1, EMS 0200097)

**Operated by:** Teck

**Available Data:** 2015 final flow data

**Average Monthly and Annual Flows (m<sup>3</sup>/s):**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2

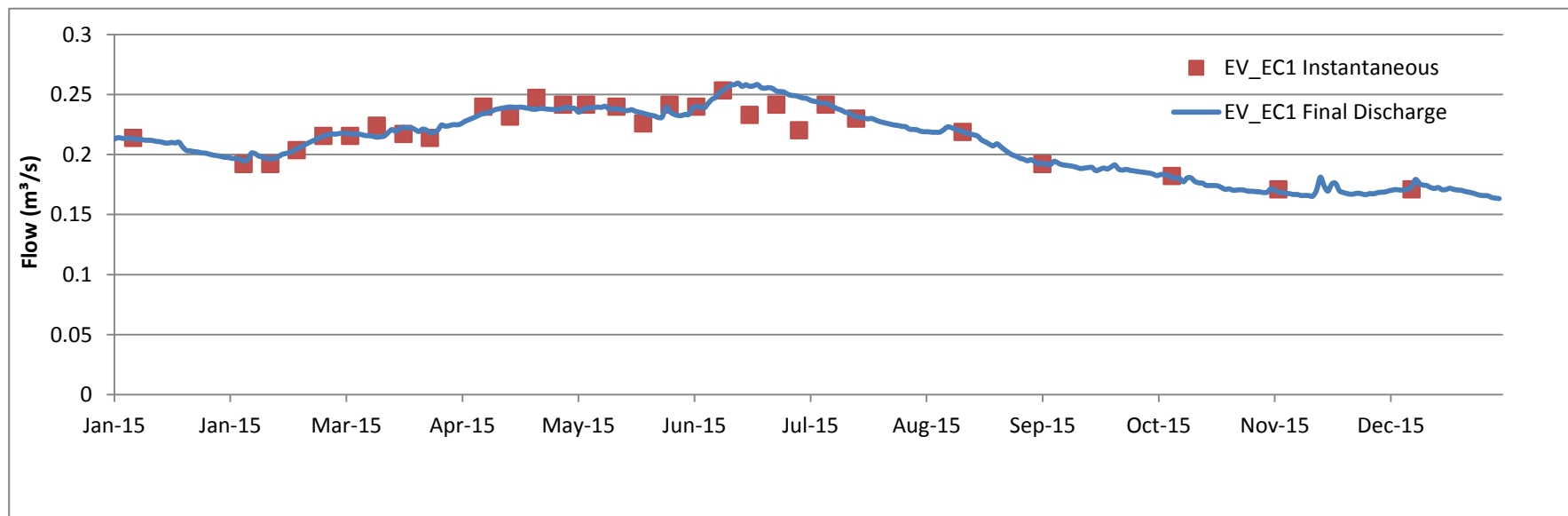


Figure C-15. Flow at Erickson Creek at the mouth (EV\_EC1, 0200097).

**Station:** Dry Creek Sediment pond decent (Site ID EV\_DC1, EMS E298590)

**Operated by:** Teck

**Available Data:** 2015 final flow data

**Average Monthly and Annual Flows (m<sup>3</sup>/s):**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	-	-	-	-	0.2	0.2	0.1	0.1	0.1	0.0	0.1	-	-

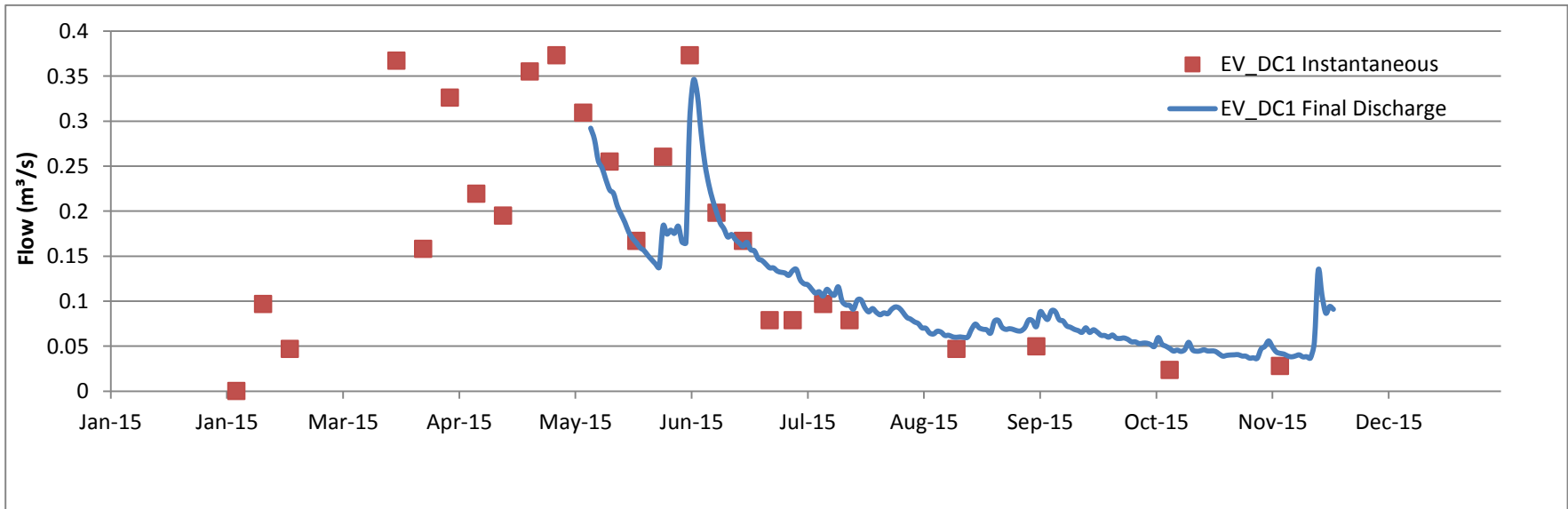


Figure C-16. Flow at Dry Creek Sediment Pond decant (EV\_DC1, E298590).



**Station:** Michel Creek at Highway 3 Bridge ( Site ID EV\_MC2, EMS E300091)

**Operated by:** Teck

**Available Data:** 2015 Final Flow Data

**Average Monthly and Annual Flows (m<sup>3</sup>/s):**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	-	-	12.4	15.3	28.3	21.6	5.0	3.1	3.5	2.8	4.9	-	9.1

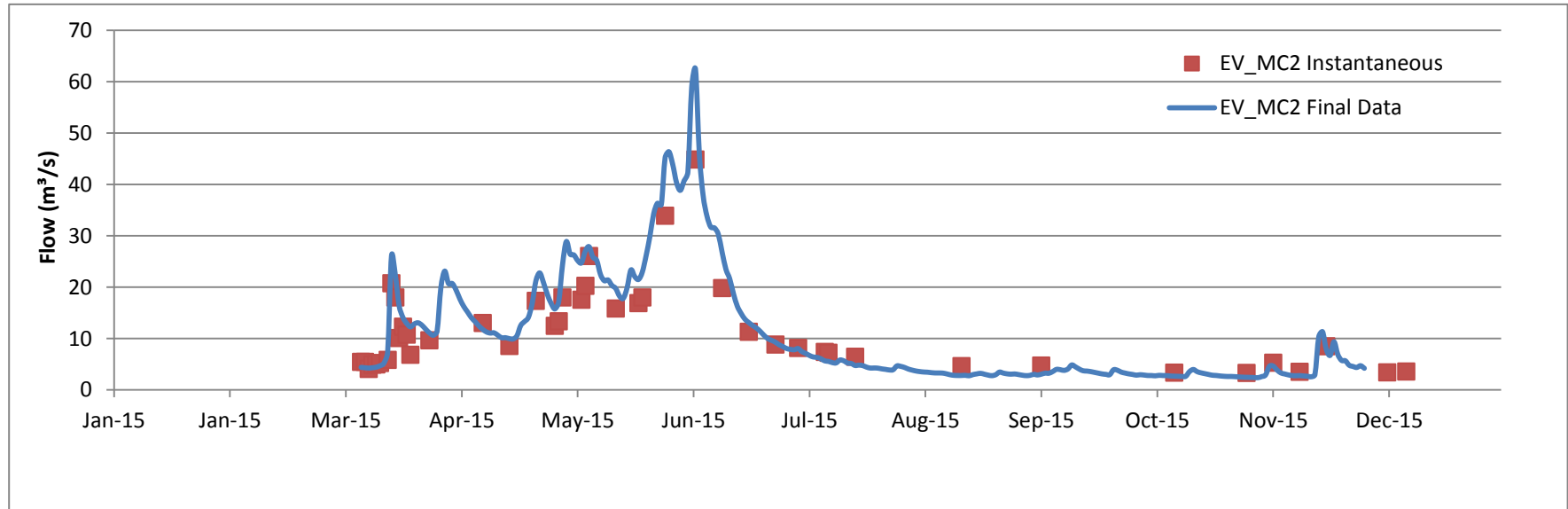


Figure C-17. Flow at Michel Creek at highway 3 bridge (EV\_MC2, E300091).

**Station:** Elk River From Fording River to Michel (Site ID EV\_ER4, EMS 0200027, WSC 08NK016)

**Operated by:** Environment Canada

**Available Data:** 2015 preliminary daily flow (unpublished- obtained by email from Environment Canada)

**Average Monthly and Annual Flows (m<sup>3</sup>/s):**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	8.2	8.4	8.3	17.9	46.4	62.7	29.0	17.5	15.5	12.9	9.3	6.8	20.2

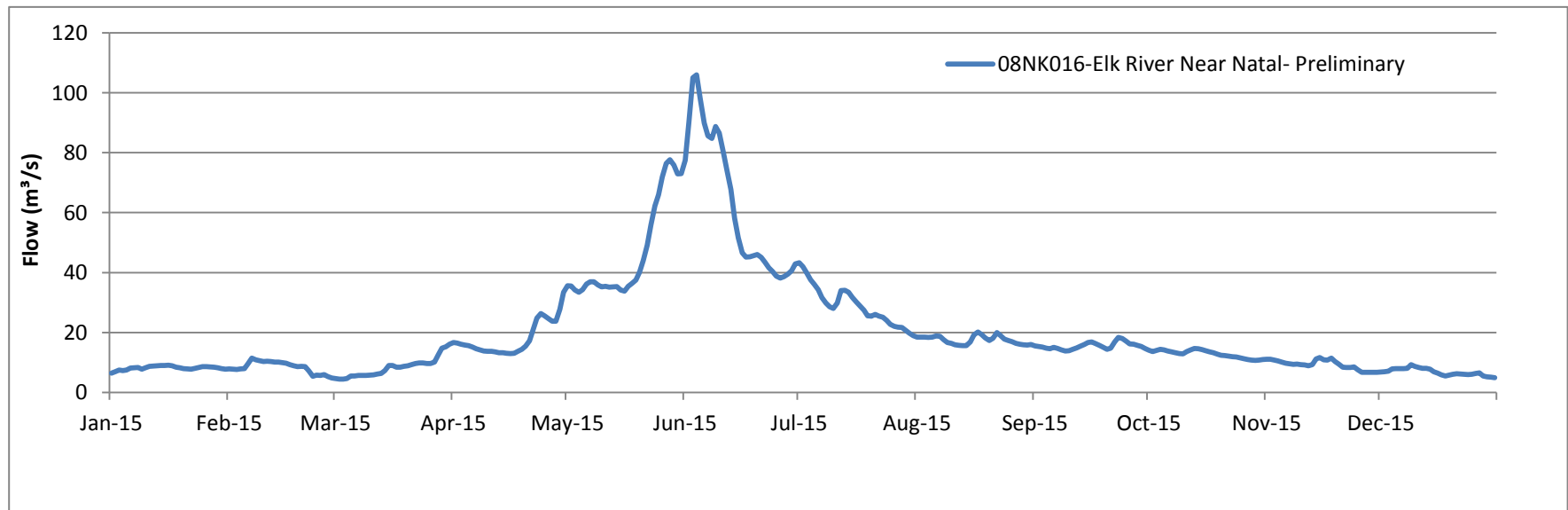


Figure C-18. Flow at Elk River Near Natal (EV\_ER4, 0200027, 08NK016).

**Station:** Corbin Creek near confluence with Michel Creek (Site ID CM\_CC1, EMS E200209)

**Operated by:** Teck

**Available Data:** 2015 final flow data

**Average Monthly and Annual Flows (m<sup>3</sup>/s):**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	0.19	0.25	0.33	0.48	0.57	0.57	0.21	0.12	0.08	0.08	0.20	0.18	0.27

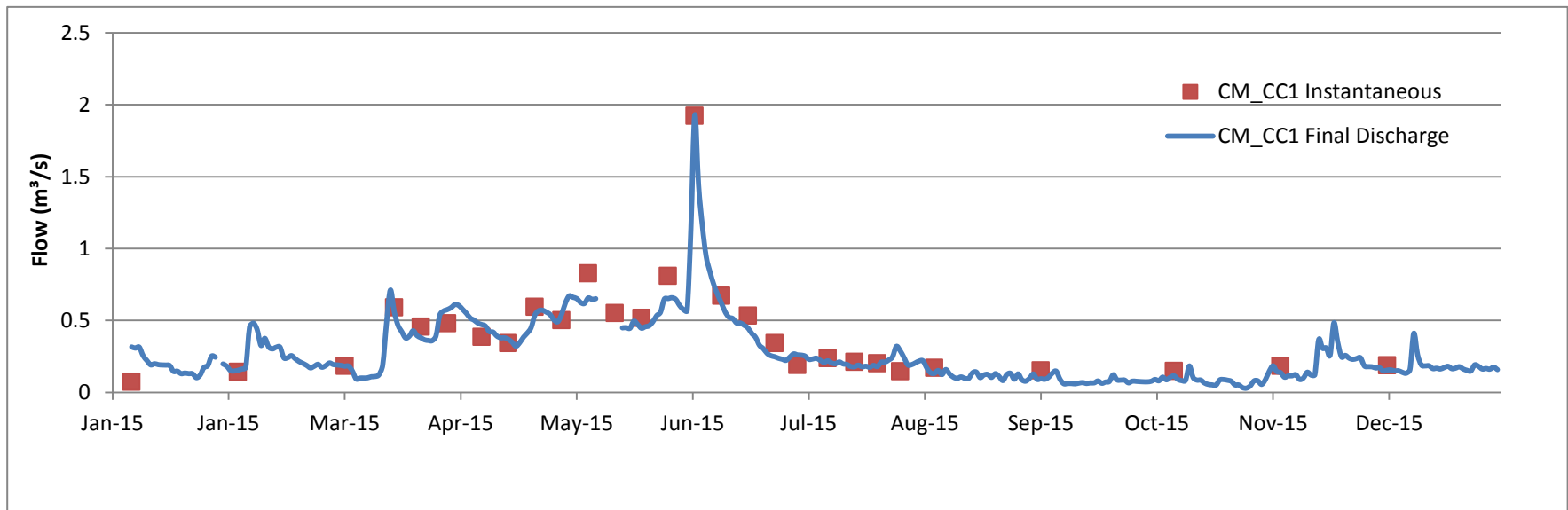


Figure C-19. Daily Average flow in Corbin Creek (CM\_CC1, E200209).

## 6 Summary of Calculated Flow Data

Flow measurements cannot be taken at several permitted monitoring locations due to safety and logistical reasons. In these situations, flows are calculated using equations and/or methods developed by qualified professionals for this purpose. In 2015, monthly average flows were derived from available 2015 monitoring data and scaled using a watershed area ratio after accounting for inflows from any large gauged tributaries. A list of permitted stations for which data has been calculated is below.

- GHO Fording River Compliance Point – Upper Fording River (upstream of Josephine Falls) (EMS 0200378, GH\_FR1)
- GHO Elk River Compliance Point – 220m downstream of Thompson Creek (EMS E300090, GH\_ERC)
- Elk River upstream of Boivin Creek (upstream of Fording River) (EMS E206661, GH\_ER1)
- Elk River Downstream of Michel Creek (EMS 0200393, EV\_ER1)

Calculation methodology for each location is presented below with the calculated monthly average flows.

### 6.1 GHO Fording River Compliance Point – Upper Fording River (upstream of Josephine Falls) (EMS 0200378, GH\_FR1)

2015 monthly flows for Upper Fording River (upstream of Josephine Falls) (EMS 0200378) estimated from Water Survey of Canada stations 08NK022 and 08NK018 data, pro-rated by watershed area, as follows:

- monthly average flow [EMS 0200378] = (monthly average flow [08NK018] – monthly average flow [08NK022]) x [watershed area EMS 0200378/(watershed area 08NK018 – watershed area 08NK022)] = (monthly average flow [08NK018] – monthly average flow [08NK022]) x [412/(619 - 138)]

#### Average Monthly Flows (m<sup>3</sup>/s):

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	1.44	1.47	2.29	4.62	10.76	10.78	3.73	2.29	2.35	2.09	1.59	1.38	3.73

### 6.2 GHO Elk River Compliance Point – 220m downstream of Thompson Creek (EMS E300090, GH\_ERC)

2015 monthly flows at Elk River downstream of Thompson Creek (EMS E300090) estimated from Water Survey of Canada stations 08NK018 and 08NK016 data, pro-rated by watershed area, as follows:

- monthly average flow [EMS E300090] = (monthly average flow [08NK016] – monthly average flow [08NK018]) x [watershed area EMS E300090/(watershed area 08NK016 – watershed area 08NK018)] = (monthly average flow [08NK016] – monthly average flow [08NK018]) x [903/(1870 - 619)]

**Average Monthly Flows (m<sup>3</sup>/s):**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	4.19	4.21	3.35	7.80	21.33	32.70	16.18	9.33	8.06	6.67	4.68	3.24	10.15

**6.3 Elk River upstream of Boivin Creek (upstream of Fording River) (EMS E206661, GH\_ER1)**

2015 monthly flows at Elk River upstream of Fording River (EMS E206661) estimated from Water Survey of Canada stations 08NK018 and 08NK016 data, pro-rated by watershed area, as follows:

- monthly average flow [E206661] = (monthly average flow [08NK016] – monthly average flow [08NK018]) x [watershed area EMS E206661/(watershed area 08NK016 – watershed area 08NK018)] = (monthly average flow [08NK016] – monthly average flow [08NK018]) x [977/(1870 - 619)]

**Average Monthly Flows (m<sup>3</sup>/s):**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	4.54	4.56	3.63	8.44	23.08	35.38	17.51	10.10	8.72	7.22	5.07	3.50	10.98

**6.4 Elk River Downstream of Michel Creek (EMS 0200393, EV\_ER1)**

2015 monthly flows estimated from Michel Creek at Hwy 3 bridge and 08NK016 data, pro-rated by watershed area, as follows:

- monthly average flow [EMS 0200393] = 2015 monthly average flow [Michel Creek at Hwy 3 bridge] + (2015 monthly average flow [08NK016] x [(watershed area EMS 0200393 – watershed area Michel at Hwy 3 bridge) / watershed area 08NK016]) = 2015 monthly average flow [Michel Creek at Hwy 3 bridge] + (2015 monthly average flow [08NK016] x [(2813 - 637)/1870])

**Average Monthly Flows (m<sup>3</sup>/s):**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015	18.75	20.23	23.99	39.03	85.42	98.39	41.70	26.10	24.25	20.37	18.19	15.01	35.95

## **Appendix D – Quality Assurance/Quality Control Data Issues**

Summary of Quality Assurance/Quality Control Issues Recorded in 2015

Date	EMS ID	Site ID	Water Quality Parameter Adversely Affected							
			Nitrite as N (NO <sub>2</sub> <sup>-</sup> - N)	Nitrate as N (NO <sub>3</sub> <sup>-</sup> - N)	Turbidity	Ortho-Phosphate	Alkalinity	Temperature	Metals	BOD
Jan 05 2015	E216778	FR_HC1			3-Day Hold Time Exceeded					
Jan 05 2015	E216779	FR_HC2			3-Day Hold Time Exceeded					
Jan 05 2015	E300096	FR_HC3			3-Day Hold Time Exceeded					
Jan 05 2015	E216777	FR_UFR1			3-Day Hold Time Exceeded					
Jan 05 2015	0200252	FR_KC1			3-Day Hold Time Exceeded					
Jan 05 2015	E105060	FR_NGD1			3-Day Hold Time Exceeded					
Jan 06 2015	E206438	CM_CCPD						Exceeded 4°C		
Jan 06 2015	E298733	CM_PC2						Exceeded 4°C		
Jan 06 2015	E298734	CM_SOW						Exceeded 4°C		
Jan 06 2015	E102488	CM_SPD						Exceeded 4°C		
Jan 06 2015	E258175	CM_MC1						Exceeded 4°C		
Jan 06 2015	E200209	CM_CC1						Exceeded 4°C		
Jan 14 2015	E102481	FR_CC1	3-Day Hold Time Exceeded							
Jan 14 2015	0200201	FR_FR2	3-Day Hold Time Exceeded							
Jan 14 2015	E206660	FR_TP3	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded						
Jan 15 2015	E297110	LC_LCDSSLCC	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded		3-Day Hold Time Exceeded				3-Day Hold Time Exceeded
Jan 20 2015	E300097	FR_FRRD			3-Day Hold Time Exceeded					
Feb 03 2015	0200201	FR_FR2			3-Day Hold Time Exceeded					
Feb 03 2015	E300097	FR_FRRD			3-Day Hold Time Exceeded					
Mar 16 2015	E102480	FR_EC1			3-Day Hold Time Exceeded					
Mar 16 2015	E102481	FR_CC1			3-Day Hold Time Exceeded					
Mar 16 2015	0200201	FR_FR2			3-Day Hold Time Exceeded					
Mar 16 2015	E216778	FR_HC1			3-Day Hold Time Exceeded					
Mar 16 2015	E216779	FR_HC2			3-Day Hold Time Exceeded					
Mar 16 2015	0200252	FR_KC1			3-Day Hold Time Exceeded					
Mar 23 2015	0200252	FR_KC1			3-Day Hold Time Exceeded					
Mar 23 2015	E102481	FR_CC1			3-Day Hold Time Exceeded					
Apr 01 2015	E298594	EV_SPR2	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Apr 01 2015	E102685	EV_BC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Apr 01 2015	E206231	EV_GT1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Apr 01 2015	E298593	EV_TC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Apr 01 2015	E208057	EV_MG1			3-Day Hold Time Exceeded					
Apr 01 2015	0200203	EV_MC3	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Apr 01 2015	0200097	EV_EC1			3-Day Hold Time Exceeded					
Apr 01 2015	E296311	EV_SP1			3-Day Hold Time Exceeded					
Apr 01 2015	E102689	EV_AQ1			3-Day Hold Time Exceeded					
Apr 01 2015	E300091	EV_MC2	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Apr 08 2015	E300097	FR_FRRD	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Apr 13 2015	E105060	FR_NGD1			3-Day Hold Time Exceeded					

Summary of Quality Assurance/Quality Control Issues Recorded in 2015

Date	EMS ID	Site ID	Water Quality Parameter Adversely Affected								
			Nitrite as N (NO <sub>2</sub> <sup>-</sup> - N)	Nitrate as N (NO <sub>3</sub> <sup>-</sup> - N)	Turbidity	Ortho-Phosphate	Alkalinity	Temperature	Metals	BOD	
Apr 14 2015	E216777	FR_UFR1			3-Day Hold Time Exceeded						
Apr 23 2015	0200201	FR_FR2	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
May 11 2015	0200252	FR_KC1			3-Day Hold Time Exceeded						
May 11 2015	E105060	FR_NGD1			3-Day Hold Time Exceeded						
May 11 2015	E261897	FR_SP1			3-Day Hold Time Exceeded						
May 11 2015	E102481	FR_CC1			3-Day Hold Time Exceeded						
May 11 2015	E102480	FR_EC1			3-Day Hold Time Exceeded						
May 11 2015	E208394	FR_SKP1			3-Day Hold Time Exceeded						
May 12 2015	E216777	FR_UFR1						14-Day Hold Time Exceeded			
May 20 2015	E102488	CM_SPD							Exceeded 4°C		
May 20 2015	E206438	CM_CCPD							Exceeded 4°C		
May 20 2015	E298733	CM_PC2							Exceeded 4°C		
May 20 2015	E258175	CM_MC1							Exceeded 4°C		
May 20 2015	E258937	CM_MC2							Exceeded 4°C		
May 20 2015	0200209	CM_CC1							Exceeded 4°C		
Jun 01 2015	0200252	FR_KC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Jun 01 2015	E102480	FR_EC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Jun 01 2015	E261897	FR_SP1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Jun 01 2015	E300096	FR_HC3	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Jun 01 2015	E105060	FR_NGD1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Jun 01 2015	E102481	FR_CC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Jun 01 2015	E216779	FR_HC2	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Jun 01 2015	E216778	FR_HC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Jun 01 2015	0200251	FR_FR1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Jun 02 2015	E216777	FR_UFR1			3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Jun 02 2015	E208395	FR_SKP2			3-Day Hold Time Exceeded						
Jun 02 2015	E300071	FR_FRCP1			3-Day Hold Time Exceeded						
Jun 03 2015	E102488	CM_SPD				3-Day Hold Time Exceeded					
Jun 03 2015	E206438	CM_CCPD				3-Day Hold Time Exceeded					
Jun 03 2015	E298733	CM_PC2				3-Day Hold Time Exceeded					
Jun 03 2015	E258175	CM_MC1				3-Day Hold Time Exceeded					
Jun 03 2015	E258937	CM_MC2				3-Day Hold Time Exceeded					
Jun 03 2015	0200209	CM_CC1				3-Day Hold Time Exceeded					
Jun 03 2015	E298734	CM_SOW				3-Day Hold Time Exceeded					
Jun 08 2015	0200252	FR_KC1			3-Day Hold Time Exceeded						
Jun 08 2015	E208395	FR_SKP2			3-Day Hold Time Exceeded						
Jun 08 2015	E102480	FR_EC1			3-Day Hold Time Exceeded						
Jun 08 2015	E261897	FR_SP1			3-Day Hold Time Exceeded						
Jun 08 2015	E105060	FR_NGD1			3-Day Hold Time Exceeded						
Jun 08 2015	E102481	FR_CC1			3-Day Hold Time Exceeded						
Jun 08 2015	0200251	FR_FR1			3-Day Hold Time Exceeded						



Summary of Quality Assurance/Quality Control Issues Recorded in 2015

Date	EMS ID	Site ID	Water Quality Parameter Adversely Affected							
			Nitrite as N (NO <sub>2</sub> <sup>-</sup> - N)	Nitrate as N (NO <sub>3</sub> <sup>-</sup> - N)	Turbidity	Ortho-Phosphate	Alkalinity	Temperature	Metals	BOD
Jun 08 2015	E300071	FR_FRCP1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Jun 08 2015	E216777	FR_UFR1			3-Day Hold Time Exceeded					
Jun 08 2015	E216778	FR_HC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded		3-Day Hold Time Exceeded				
Jun 08 2015	0200201	FR_FR2	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded		3-Day Hold Time Exceeded				
Jun 08 2015	E300096	FR_HC3			3-Day Hold Time Exceeded					
Jun 10 2015	E200209	CM_CC1	3-Day Hold Time Exceeded							
Jun 10 2015	E258937	CM_MC2	3-Day Hold Time Exceeded							
Jun 15 2015	0200252	FR_KC1			3-Day Hold Time Exceeded					
Jun 15 2015	E208395	FR_SKP2			3-Day Hold Time Exceeded					
Jun 15 2015	E102480	FR_EC1			3-Day Hold Time Exceeded					
Jun 15 2015	E261897	FR_SP1			3-Day Hold Time Exceeded					
Jun 15 2015	E105060	FR_NGD1			3-Day Hold Time Exceeded					
Jun 15 2015	E102481	FR_CC1			3-Day Hold Time Exceeded					
Jun 15 2015	0200251	FR_FR1			3-Day Hold Time Exceeded					
Jun 15 2015	E216778	FR_HC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Jun 15 2015	E206438	CM_CCPD						Exceeded 4°C		
Jun 15 2015	E298733	CM_PC2						Exceeded 4°C		
Jun 22 2015	0200252	FR_KC1			3-Day Hold Time Exceeded					
Jun 22 2015	E261897	FR_SP1			3-Day Hold Time Exceeded					
Jun 22 2015	E105060	FR_NGD1			3-Day Hold Time Exceeded					
Jun 22 2015	E102481	FR_CC1			3-Day Hold Time Exceeded					
Jun 24 2015	E102488	CM_SPD						Exceeded 4°C		
Jun 24 2015	E206438	CM_CCPD						Exceeded 4°C		
Jun 24 2015	E298733	CM_PC2						Exceeded 4°C		
Jun 24 2015	E258175	CM_MC1						Exceeded 4°C		
Jun 24 2015	E258937	CM_MC2						Exceeded 4°C		
Jun 24 2015	0200209	CM_CC1						Exceeded 4°C		
Jun 29 2016	E288273	LC_DC3		3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Jun 29 2015	E261897	FR_SP1			3-Day Hold Time Exceeded					
Jun 29 2015	E105060	FR_NGD1			3-Day Hold Time Exceeded					
Jun 29 2015	E102481	FR_CC1			3-Day Hold Time Exceeded					
Jun 29 2015	0200251	FR_FR1			3-Day Hold Time Exceeded					
Jun 29 2015	E300071	FR_FRCP1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Jun 29 2015	E216777	FR_UFR1			3-Day Hold Time Exceeded					
Jun 29 2015	E216778	FR_HC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Jun 29 2015	E300096	FR_HC3			3-Day Hold Time Exceeded					
Jun 29 2015	0200252	FR_KC1			3-Day Hold Time Exceeded					
Jun 29 2015	0200201	FR_FR2	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Jun 30 2015	E258937	CM_MC2							See Note 1	
Jul 17 2016	E216142	LC_LC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded						
Jul 17 2016	E282149	LC_SLC	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded						

Summary of Quality Assurance/Quality Control Issues Recorded in 2015

Date	EMS ID	Site ID	Water Quality Parameter Adversely Affected							
			Nitrite as N (NO <sub>2</sub> <sup>-</sup> - N)	Nitrate as N (NO <sub>3</sub> <sup>-</sup> - N)	Turbidity	Ortho-Phosphate	Alkalinity	Temperature	Metals	BOD
Jul 22 2015	E216777	FR_UFR1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Sep 02 2015	E208057	EV_MG1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Sep 02 2015	E296311	EV_SP1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Sep 02 2015	0200203	EV_MC3	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Sep 02 2015	0200027	EV_EC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Sep 02 2015	E298594	EV_SPR2	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Sep 02 2015	0200393	EV_ER1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Sep 02 2015	E102685	EV_BC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Sep 02 2015	E206231	EV_GT1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Sep 02 2015	E300091	EV_MC2	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Sep 02 2015	E102488	CM_SPD	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded			Exceeded 4°C		
Sep 02 2015	E206438	CM_CCPD	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded			Exceeded 4°C		
Sep 02 2015	E298733	CM_PC2	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded			Exceeded 4°C		
Sep 02 2015	E258175	CM_MC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded			Exceeded 4°C		
Sep 02 2015	E258937	CM_MC2	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded			Exceeded 4°C		
Sep 02 2015	0200209	CM_CC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded			Exceeded 4°C		
Sep 02 2015	E298734	CM_SOW	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded			Exceeded 4°C		
Sep 08 2015	E300071	FR_FRCP1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Sep 08 2015	E300097	FR_FRRD	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Oct 01 2015	E216777	FR_UFR1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Oct 06 2015	E300097	FR_FRRD	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Oct 06 2015	E300071	FR_FRCP1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Oct 06 2015	0200252	FR_KC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Oct 06 2015	E261897	FR_SP1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Oct 06 2015	E105060	FR_NGD1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Oct 06 2015	E102481	FR_CC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Oct 06 2015	0200251	FR_FR1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Oct 06 2015	E216778	FR_HC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Oct 06 2015	E216779	FR_HC2	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Oct 06 2015	E216777	FR_UFR1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Oct 06 2015	E102480	FR_EC1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded					
Oct 07 2015	E300096	FR_HC3	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Oct 07 2015	0200201	FR_FR2	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Oct 26 2015	E300071	FR_FRCP1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded				
Oct 26 2015	E216777	FR_UFR1			3-Day Hold Time Exceeded					
Oct 26 2015	0200028	LC_LC5							See Note 2	
Nov 03 2015	E102481	FR_CC1				3-Day Hold Time Exceeded				
Nov 16 2015	E300071	FR_FRCP1	3-Day Hold Time Exceeded	3-Day Hold Time Exceeded						
Dec 09 2015	0200044	LC_LC4							See Note 2	
Dec 09 2015	E297110	LC_LCDSSLCC							See Note 2	
Dec 09 2015	E261958	LC_WLC							See Note 2	

Summary of Quality Assurance/Quality Control Issues Recorded in 2015

Date	EMS ID	Site ID	Water Quality Parameter Adversely Affected							
			Nitrite as N (NO <sub>2</sub> <sup>-</sup> - N)	Nitrate as N (NO <sub>3</sub> <sup>-</sup> - N)	Turbidity	Ortho-Phosphate	Alkalinity	Temperature	Metals	BOD
Dec 09 2015	E293369	LC_LCUSWLC								See Note 2
Dec 09 2015	0200337	LC_LC3								See Note 2
Dec 09 2015	E216144	LC_LC7								See Note 2
Dec 09 2015	E282149	LC_SLC								See Note 2
Dec 09 2015	0200335	LC_LC2								See Note 2

Notes: 1. Dissolved metals container was damaged during transit, no analyses could be performed.  
 2. Analytical detection limit was raised by the laboratory (i.e., ALS, Calgary) due to elevated Total Dissolved Solids and conductivity values. As a result, the detection limit of beryllium was greater than the B.C. Long-Term Working Water Quality Guideline for Freshwater Aquatic Life (i.e., 0.13 µg/L).

## **Appendix E – Summary of Receiving Environment Samples at or Above Approved/Working Water Quality Guidelines**

**Table E-1. Fording River Operation: Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
0200251	FR_FR1	16-Mar-15	Mercury	< 0.01	µg/L
0200251	FR_FR1	7-Apr-15	Mercury	< 0.008	µg/L
0200251	FR_FR1	4-May-15	Mercury	< 0.005	µg/L
0200251	FR_FR1	1-Jun-15	Mercury	< 0.005	µg/L
0200251	FR_FR1	6-Jul-15	Mercury	< 0.005	µg/L
0200251	FR_FR1	11-Aug-15	Mercury	< 0.005	µg/L
0200251	FR_FR1	8-Sep-15	Mercury	< 0.005	µg/L
0200251	FR_FR1	6-Oct-15	Mercury	< 0.005	µg/L
0200251	FR_FR1	4-Nov-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	14-Jan-15	Mercury	< 0.01	µg/L
0200201	FR_FR2	3-Feb-15	Mercury	< 0.01	µg/L
0200201	FR_FR2	2-Mar-15	Mercury	< 0.01	µg/L
0200201	FR_FR2	16-Mar-15	Mercury	< 0.01	µg/L
0200201	FR_FR2	18-Mar-15	Mercury	< 0.01	µg/L
0200201	FR_FR2	23-Mar-15	Mercury	< 0.01	µg/L
0200201	FR_FR2	1-Apr-15	Mercury	< 0.01	µg/L
0200201	FR_FR2	7-Apr-15	Mercury	< 0.009	µg/L
0200201	FR_FR2	16-Apr-15	Mercury	< 0.008	µg/L
0200201	FR_FR2	23-Apr-15	Mercury	< 0.006	µg/L
0200201	FR_FR2	30-Apr-15	Mercury	< 0.006	µg/L
0200201	FR_FR2	4-May-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	12-May-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	19-May-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	26-May-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	3-Jun-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	8-Jun-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	16-Jun-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	22-Jun-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	29-Jun-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	6-Jul-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	14-Jul-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	23-Jul-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	28-Jul-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	11-Aug-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	26-Aug-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	8-Sep-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	28-Sep-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	8-Oct-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	29-Oct-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	3-Nov-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	24-Nov-15	Mercury	< 0.005	µg/L
0200201	FR_FR2	8-Dec-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	20-Jan-15	Mercury	< 0.01	µg/L
E300097	FR_FRRD	3-Feb-15	Mercury	< 0.01	µg/L
E300097	FR_FRRD	19-Feb-15	Mercury	< 0.01	µg/L
E300097	FR_FRRD	26-Feb-15	Mercury	< 0.01	µg/L
E300097	FR_FRRD	2-Mar-15	Mercury	< 0.01	µg/L
E300097	FR_FRRD	18-Mar-15	Mercury	< 0.01	µg/L

**Table E-1. Fording River Operation: Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E300097	FR_FRRD	1-Apr-15	Mercury	< 0.01	µg/L
E300097	FR_FRRD	8-Apr-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	16-Apr-15	Mercury	< 0.009	µg/L
E300097	FR_FRRD	30-Apr-15	Mercury	< 0.007	µg/L
E300097	FR_FRRD	5-May-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	12-May-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	19-May-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	26-May-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	3-Jun-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	8-Jun-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	22-Jun-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	6-Jul-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	28-Jul-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	11-Aug-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	26-Aug-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	8-Sep-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	28-Sep-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	6-Oct-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	29-Oct-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	3-Nov-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	24-Nov-15	Mercury	< 0.005	µg/L
E300097	FR_FRRD	7-Dec-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	5-Jan-15	Mercury	< 0.01	µg/L
E216778	FR_HC1	2-Feb-15	Mercury	< 0.01	µg/L
E216778	FR_HC1	2-Mar-15	Mercury	< 0.01	µg/L
E216778	FR_HC1	16-Mar-15	Mercury	< 0.01	µg/L
E216778	FR_HC1	23-Mar-15	Mercury	< 0.01	µg/L
E216778	FR_HC1	30-Mar-15	Mercury	< 0.01	µg/L
E216778	FR_HC1	7-Apr-15	Mercury	< 0.009	µg/L
E216778	FR_HC1	13-Apr-15	Mercury	< 0.008	µg/L
E216778	FR_HC1	20-Apr-15	Mercury	< 0.007	µg/L
E216778	FR_HC1	27-Apr-15	Mercury	< 0.006	µg/L
E216778	FR_HC1	4-May-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	11-May-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	19-May-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	25-May-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	1-Jun-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	8-Jun-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	15-Jun-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	22-Jun-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	29-Jun-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	6-Jul-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	14-Jul-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	22-Jul-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	29-Jul-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	11-Aug-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	8-Sep-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	6-Oct-15	Mercury	< 0.005	µg/L

**Table E-1. Fording River Operation: Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E216778	FR_HC1	4-Nov-15	Mercury	< 0.005	µg/L
E216778	FR_HC1	9-Dec-15	Mercury	< 0.005	µg/L
E216779	FR_HC2	5-Jan-15	Mercury	< 0.01	µg/L
E216779	FR_HC2	2-Feb-15	Mercury	< 0.01	µg/L
E216779	FR_HC2	2-Mar-15	Mercury	< 0.01	µg/L
E216779	FR_HC2	7-Apr-15	Mercury	< 0.005	µg/L
E216779	FR_HC2	4-May-15	Mercury	< 0.005	µg/L
E216779	FR_HC2	1-Jun-15	Mercury	< 0.005	µg/L
E216779	FR_HC2	6-Jul-15	Mercury	< 0.005	µg/L
E216779	FR_HC2	11-Aug-15	Mercury	< 0.005	µg/L
E216779	FR_HC2	9-Sep-15	Mercury	< 0.005	µg/L
E216779	FR_HC2	6-Oct-15	Mercury	< 0.005	µg/L
E216779	FR_HC2	4-Nov-15	Mercury	< 0.005	µg/L
E216779	FR_HC2	9-Dec-15	Mercury	< 0.005	µg/L
E300096	FR_HC3	5-Jan-15	Mercury	< 0.01	µg/L
E300096	FR_HC3	2-Feb-15	Mercury	< 0.01	µg/L
E300096	FR_HC3	2-Mar-15	Mercury	< 0.01	µg/L
E300096	FR_HC3	7-Apr-15	Mercury	< 0.005	µg/L
E300096	FR_HC3	4-May-15	Mercury	< 0.005	µg/L
E300096	FR_HC3	1-Jun-15	Mercury	< 0.005	µg/L
E300096	FR_HC3	6-Jul-15	Mercury	< 0.005	µg/L
E300096	FR_HC3	11-Aug-15	Mercury	< 0.005	µg/L
E300096	FR_HC3	9-Sep-15	Mercury	< 0.005	µg/L
E300096	FR_HC3	8-Oct-15	Mercury	< 0.005	µg/L
E300096	FR_HC3	4-Nov-15	Mercury	< 0.005	µg/L
E300096	FR_HC3	9-Dec-15	Mercury	< 0.005	µg/L
0200252	FR_KC1	5-Jan-15	Mercury	< 0.01	µg/L
0200252	FR_KC1	4-Feb-15	Mercury	< 0.01	µg/L
0200252	FR_KC1	2-Mar-15	Mercury	< 0.01	µg/L
0200252	FR_KC1	7-Apr-15	Mercury	< 0.005	µg/L
0200252	FR_KC1	4-May-15	Mercury	< 0.005	µg/L
0200252	FR_KC1	1-Jun-15	Mercury	< 0.005	µg/L
0200252	FR_KC1	6-Jul-15	Mercury	< 0.005	µg/L
0200252	FR_KC1	11-Aug-15	Mercury	< 0.005	µg/L
0200252	FR_KC1	8-Sep-15	Mercury	< 0.005	µg/L
0200252	FR_KC1	6-Oct-15	Mercury	< 0.005	µg/L
0200252	FR_KC1	3-Nov-15	Mercury	< 0.005	µg/L
0200252	FR_KC1	7-Dec-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	5-Jan-15	Mercury	< 0.01	µg/L
E216777	FR_UFR1	2-Feb-15	Mercury	< 0.01	µg/L
E216777	FR_UFR1	2-Mar-15	Mercury	< 0.01	µg/L
E216777	FR_UFR1	11-Mar-15	Mercury	< 0.01	µg/L
E216777	FR_UFR1	18-Mar-15	Mercury	< 0.01	µg/L
E216777	FR_UFR1	25-Mar-15	Mercury	< 0.01	µg/L
E216777	FR_UFR1	1-Apr-15	Mercury	< 0.01	µg/L
E216777	FR_UFR1	8-Apr-15	Mercury	< 0.009	µg/L
E216777	FR_UFR1	14-Apr-15	Mercury	< 0.008	µg/L
E216777	FR_UFR1	28-Apr-15	Mercury	< 0.006	µg/L

**Table E-1. Fording River Operation: Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E216777	FR_UFR1	5-May-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	12-May-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	19-May-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	26-May-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	2-Jun-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	6-Jul-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	22-Jul-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	29-Jul-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	5-Aug-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	12-Aug-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	19-Aug-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	26-Aug-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	8-Sep-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	21-Sep-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	1-Oct-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	6-Oct-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	26-Oct-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	2-Nov-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	9-Nov-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	16-Nov-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	23-Nov-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	30-Nov-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	7-Dec-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	14-Dec-15	Mercury	< 0.005	µg/L
E216777	FR_UFR1	21-Dec-15	Mercury	< 0.005	µg/L
0200252	FR_KC1	5-Jan-15	Uranium	10.0	µg/L
0200252	FR_KC1	4-Feb-15	Uranium	10.6	µg/L
0200252	FR_KC1	2-Mar-15	Uranium	11.0	µg/L
0200252	FR_KC1	7-Apr-15	Uranium	10.5	µg/L



**Table E-2. Greenhills Operation: Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
0200389	GH_ER2	9-Jun-15	Aluminum	0.23	mg/L
0200389	GH_ER2	6-Jan-15	Mercury	< 0.01	µg/L
0200389	GH_ER2	3-Feb-15	Mercury	< 0.01	µg/L
0200389	GH_ER2	3-Mar-15	Mercury	< 0.01	µg/L
0200389	GH_ER2	17-Mar-15	Mercury	< 0.01	µg/L
0200389	GH_ER2	24-Mar-15	Mercury	< 0.01	µg/L
0200389	GH_ER2	31-Mar-15	Mercury	< 0.01	µg/L
0200389	GH_ER2	7-Apr-15	Mercury	< 0.009	µg/L
0200389	GH_ER2	14-Apr-15	Mercury	< 0.008	µg/L
0200389	GH_ER2	21-Apr-15	Mercury	< 0.007	µg/L
0200389	GH_ER2	28-Apr-15	Mercury	< 0.006	µg/L
0200389	GH_ER2	5-May-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	12-May-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	19-May-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	26-May-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	2-Jun-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	9-Jun-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	16-Jun-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	23-Jun-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	30-Jun-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	6-Jul-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	15-Jul-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	21-Jul-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	28-Jul-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	5-Aug-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	9-Sep-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	6-Oct-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	26-Oct-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	3-Nov-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	9-Nov-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	16-Nov-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	30-Nov-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	7-Dec-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	7-Dec-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	14-Dec-15	Mercury	< 0.005	µg/L
0200389	GH_ER2	21-Dec-15	Mercury	< 0.005	µg/L

**Table E-3. Line Creek Operation: Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E288273	LC_DC3	20-Jul-15	Beryllium	0.13	µg/L
E288273	LC_DC3	27-Jul-15	Beryllium	< 0.13	µg/L
E288273	LC_DC3	10-Aug-15	Beryllium	< 0.14	µg/L
0200335	LC_LC2	9-Dec-15	Beryllium	< 0.5	µg/L
0200337	LC_LC3	9-Dec-15	Beryllium	< 0.5	µg/L
0200044	LC_LC4	15-Jun-15	Beryllium	< 0.25	µg/L
0200044	LC_LC4	9-Dec-15	Beryllium	< 0.5	µg/L
E293369	LC_LCUSWLC	9-Dec-15	Beryllium	< 0.5	µg/L
E261958	LC_WLC	2-Feb-15	Beryllium	< 0.15	µg/L
E261958	LC_WLC	2-Mar-15	Beryllium	< 0.2	µg/L
E261958	LC_WLC	9-Dec-15	Beryllium	< 0.5	µg/L
E288273	LC_DC3	20-Jul-15	Iron	1.04	mg/L
0200335	LC_LC2	2-Jun-15	Iron	2.61	mg/L
0200044	LC_LC4	21-Jul-15	Iron	2.64	mg/L
E288273	LC_DC3	7-Jan-15	Mercury	< 0.01	µg/L
E288273	LC_DC3	3-Feb-15	Mercury	< 0.01	µg/L
E288273	LC_DC3	4-Mar-15	Mercury	< 0.01	µg/L
E288273	LC_DC3	17-Mar-15	Mercury	< 0.01	µg/L
E288273	LC_DC3	24-Mar-15	Mercury	< 0.01	µg/L
E288273	LC_DC3	31-Mar-15	Mercury	< 0.01	µg/L
E288273	LC_DC3	7-Apr-15	Mercury	< 0.009	µg/L
E288273	LC_DC3	13-Apr-15	Mercury	< 0.008	µg/L
E288273	LC_DC3	20-Apr-15	Mercury	< 0.007	µg/L
E288273	LC_DC3	27-Apr-15	Mercury	< 0.006	µg/L
E288273	LC_DC3	4-May-15	Mercury	< 0.005	µg/L
E288273	LC_DC3	11-May-15	Mercury	< 0.005	µg/L
E288273	LC_DC3	19-May-15	Mercury	< 0.005	µg/L
E288273	LC_DC3	25-May-15	Mercury	0.005	µg/L
E288273	LC_DC3	1-Jun-15	Mercury	0.006	µg/L
E288273	LC_DC3	8-Jun-15	Mercury	< 0.006	µg/L
E288273	LC_DC3	15-Jun-15	Mercury	< 0.006	µg/L
E288273	LC_DC3	22-Jun-15	Mercury	< 0.006	µg/L
E288273	LC_DC3	29-Jun-15	Mercury	< 0.006	µg/L
E288273	LC_DC3	6-Jul-15	Mercury	< 0.005	µg/L
E288273	LC_DC3	13-Jul-15	Mercury	< 0.005	µg/L
E288273	LC_DC3	20-Jul-15	Mercury	< 0.009	µg/L
E288273	LC_DC3	27-Jul-15	Mercury	< 0.009	µg/L
E288273	LC_DC3	10-Aug-15	Mercury	< 0.01	µg/L
E288273	LC_DC3	8-Sep-15	Mercury	< 0.005	µg/L
E288273	LC_DC3	8-Sep-15	Mercury	< 0.005	µg/L
E288273	LC_DC3	5-Oct-15	Mercury	< 0.005	µg/L
E288273	LC_DC3	3-Nov-15	Mercury	< 0.005	µg/L
E288273	LC_DC3	7-Dec-15	Mercury	< 0.005	µg/L
E216142	LC_LC1	5-May-15	Mercury	< 0.005	µg/L

**Table E-3. Line Creek Operation: Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E216142	LC_LC1	2-Jun-15	Mercury	0.007	µg/L
E216142	LC_LC1	7-Jul-15	Mercury	< 0.005	µg/L
E216142	LC_LC1	11-Aug-15	Mercury	< 0.005	µg/L
E216142	LC_LC1	9-Sep-15	Mercury	< 0.005	µg/L
E216142	LC_LC1	6-Oct-15	Mercury	< 0.005	µg/L
E216142	LC_LC1	2-Nov-15	Mercury	< 0.005	µg/L
E223240	LC_LC12	5-May-15	Mercury	< 0.005	µg/L
E223240	LC_LC12	2-Jun-15	Mercury	< 0.005	µg/L
E223240	LC_LC12	7-Jul-15	Mercury	< 0.005	µg/L
0200335	LC_LC2	5-Jan-15	Mercury	< 0.01	µg/L
0200335	LC_LC2	2-Feb-15	Mercury	< 0.01	µg/L
0200335	LC_LC2	2-Mar-15	Mercury	< 0.01	µg/L
0200335	LC_LC2	6-Apr-15	Mercury	< 0.005	µg/L
0200335	LC_LC2	5-May-15	Mercury	< 0.005	µg/L
0200335	LC_LC2	2-Jun-15	Mercury	< 0.015	µg/L
0200335	LC_LC2	7-Jul-15	Mercury	< 0.005	µg/L
0200335	LC_LC2	11-Aug-15	Mercury	< 0.005	µg/L
0200335	LC_LC2	9-Sep-15	Mercury	< 0.005	µg/L
0200335	LC_LC2	6-Oct-15	Mercury	< 0.005	µg/L
0200335	LC_LC2	2-Nov-15	Mercury	< 0.005	µg/L
0200335	LC_LC2	9-Dec-15	Mercury	< 0.005	µg/L
0200337	LC_LC3	5-Jan-15	Mercury	< 0.01	µg/L
0200337	LC_LC3	2-Feb-15	Mercury	< 0.01	µg/L
0200337	LC_LC3	2-Mar-15	Mercury	< 0.01	µg/L
0200337	LC_LC3	17-Mar-15	Mercury	< 0.01	µg/L
0200337	LC_LC3	24-Mar-15	Mercury	< 0.01	µg/L
0200337	LC_LC3	31-Mar-15	Mercury	< 0.01	µg/L
0200337	LC_LC3	6-Apr-15	Mercury	< 0.009	µg/L
0200337	LC_LC3	13-Apr-15	Mercury	< 0.008	µg/L
0200337	LC_LC3	20-Apr-15	Mercury	< 0.007	µg/L
0200337	LC_LC3	27-Apr-15	Mercury	< 0.006	µg/L
0200337	LC_LC3	28-Apr-15	Mercury	< 0.006	µg/L
0200337	LC_LC3	5-May-15	Mercury	< 0.005	µg/L
0200337	LC_LC3	11-May-15	Mercury	< 0.005	µg/L
0200337	LC_LC3	19-May-15	Mercury	< 0.005	µg/L
0200337	LC_LC3	26-May-15	Mercury	< 0.005	µg/L
0200337	LC_LC3	2-Jun-15	Mercury	< 0.005	µg/L
0200337	LC_LC3	8-Jun-15	Mercury	< 0.005	µg/L
0200337	LC_LC3	16-Jun-15	Mercury	< 0.005	µg/L
0200337	LC_LC3	23-Jun-15	Mercury	< 0.004	µg/L
0200337	LC_LC3	30-Jun-15	Mercury	0.0035	µg/L
0200337	LC_LC3	7-Jul-15	Mercury	< 0.003	µg/L
0200337	LC_LC3	17-Jul-15	Mercury	< 0.0023	µg/L
0200337	LC_LC3	21-Jul-15	Mercury	< 0.003	µg/L

**Table E-3. Line Creek Operation: Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
0200337	LC_LC3	28-Jul-15	Mercury	< 0.003	µg/L
0200337	LC_LC3	11-Aug-15	Mercury	< 0.004	µg/L
0200337	LC_LC3	11-Aug-15	Mercury	< 0.004	µg/L
0200337	LC_LC3	9-Sep-15	Mercury	0.002	µg/L
0200044	LC_LC4	5-Jan-15	Mercury	< 0.01	µg/L
0200044	LC_LC4	2-Feb-15	Mercury	< 0.01	µg/L
0200044	LC_LC4	2-Mar-15	Mercury	< 0.01	µg/L
0200044	LC_LC4	17-Mar-15	Mercury	< 0.01	µg/L
0200044	LC_LC4	24-Mar-15	Mercury	< 0.01	µg/L
0200044	LC_LC4	31-Mar-15	Mercury	< 0.01	µg/L
0200044	LC_LC4	6-Apr-15	Mercury	< 0.009	µg/L
0200044	LC_LC4	13-Apr-15	Mercury	< 0.008	µg/L
0200044	LC_LC4	20-Apr-15	Mercury	< 0.007	µg/L
0200044	LC_LC4	27-Apr-15	Mercury	< 0.006	µg/L
0200044	LC_LC4	4-May-15	Mercury	< 0.005	µg/L
0200044	LC_LC4	11-May-15	Mercury	< 0.005	µg/L
0200044	LC_LC4	19-May-15	Mercury	< 0.005	µg/L
0200044	LC_LC4	26-May-15	Mercury	< 0.005	µg/L
0200044	LC_LC4	2-Jun-15	Mercury	< 0.005	µg/L
0200044	LC_LC4	8-Jun-15	Mercury	< 0.005	µg/L
0200044	LC_LC4	15-Jun-15	Mercury	< 0.01	µg/L
0200044	LC_LC4	16-Jun-15	Mercury	< 0.005	µg/L
0200044	LC_LC4	23-Jun-15	Mercury	< 0.005	µg/L
0200044	LC_LC4	30-Jun-15	Mercury	< 0.005	µg/L
0200044	LC_LC4	7-Jul-15	Mercury	< 0.005	µg/L
0200044	LC_LC4	17-Jul-15	Mercury	< 0.005	µg/L
0200044	LC_LC4	21-Jul-15	Mercury	0.0058	µg/L
0200044	LC_LC4	28-Jul-15	Mercury	< 0.006	µg/L
0200044	LC_LC4	11-Aug-15	Mercury	< 0.006	µg/L
0200044	LC_LC4	9-Sep-15	Mercury	< 0.005	µg/L
0200044	LC_LC4	6-Oct-15	Mercury	< 0.005	µg/L
0200044	LC_LC4	2-Nov-15	Mercury	< 0.005	µg/L
0200044	LC_LC4	9-Dec-15	Mercury	< 0.005	µg/L
E293369	LC_LCUSWLC	5-Jan-15	Mercury	< 0.01	µg/L
E293369	LC_LCUSWLC	2-Feb-15	Mercury	< 0.01	µg/L
E293369	LC_LCUSWLC	2-Mar-15	Mercury	< 0.01	µg/L
E293369	LC_LCUSWLC	6-Apr-15	Mercury	< 0.005	µg/L
E293369	LC_LCUSWLC	5-May-15	Mercury	< 0.005	µg/L
E293369	LC_LCUSWLC	2-Jun-15	Mercury	< 0.005	µg/L
E293369	LC_LCUSWLC	7-Jul-15	Mercury	< 0.005	µg/L
E293369	LC_LCUSWLC	11-Aug-15	Mercury	< 0.005	µg/L
E293369	LC_LCUSWLC	9-Sep-15	Mercury	< 0.005	µg/L
E293369	LC_LCUSWLC	6-Oct-15	Mercury	< 0.005	µg/L
E293369	LC_LCUSWLC	2-Nov-15	Mercury	< 0.005	µg/L

**Table E-3. Line Creek Operation: Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E293369	LC_LCUSWLC	9-Dec-15	Mercury	< 0.005	µg/L
E261958	LC_WLC	5-Jan-15	Mercury	< 0.01	µg/L
E261958	LC_WLC	2-Feb-15	Mercury	< 0.01	µg/L
E261958	LC_WLC	2-Mar-15	Mercury	< 0.01	µg/L
E261958	LC_WLC	6-Apr-15	Mercury	< 0.005	µg/L
E261958	LC_WLC	5-May-15	Mercury	< 0.005	µg/L
E261958	LC_WLC	2-Jun-15	Mercury	< 0.005	µg/L
E261958	LC_WLC	7-Jul-15	Mercury	< 0.005	µg/L
E261958	LC_WLC	11-Aug-15	Mercury	< 0.005	µg/L
E261958	LC_WLC	9-Sep-15	Mercury	< 0.005	µg/L
E261958	LC_WLC	6-Oct-15	Mercury	< 0.005	µg/L
E261958	LC_WLC	2-Nov-15	Mercury	< 0.005	µg/L
E261958	LC_WLC	9-Dec-15	Mercury	< 0.005	µg/L
E216142	LC_LC1	16-Jun-15	pH, Field	9.2	s.u.
0200335	LC_LC2	2-Feb-15	pH, Field	6.3	s.u.
0200044	LC_LC4	6-Oct-15	pH, Field	9.1	s.u.
0200044	LC_LC4	15-Jun-15	Sulfide	4.6	µg/L
E261958	LC_WLC	5-Jan-15	Uranium	19.2	µg/L
E261958	LC_WLC	2-Feb-15	Uranium	19.5	µg/L
E261958	LC_WLC	2-Mar-15	Uranium	19.7	µg/L
E261958	LC_WLC	6-Apr-15	Uranium	17.6	µg/L
E261958	LC_WLC	5-May-15	Uranium	16.9	µg/L
E261958	LC_WLC	2-Jun-15	Uranium	11.7	µg/L
E261958	LC_WLC	7-Jul-15	Uranium	11.0	µg/L
E261958	LC_WLC	11-Aug-15	Uranium	15.6	µg/L
E261958	LC_WLC	9-Sep-15	Uranium	16.5	µg/L
E261958	LC_WLC	6-Oct-15	Uranium	17.8	µg/L
E261958	LC_WLC	2-Nov-15	Uranium	20.3	µg/L
E261958	LC_WLC	9-Dec-15	Uranium	22.5	µg/L

**Table E-4. Elkview Operation: Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E298592	EV_BLM2	2-Jun-15	Beryllium	0.17	µg/L
0200027	EV_ER4	14-Dec-15	Beryllium	< 0.2	µg/L
0200027	EV_ER4	21-Dec-15	Beryllium	< 0.2	µg/L
E298596	EV_WF_SW	19-Nov-15	Cobalt	5.83	µg/L
E298594	EV_SPR2	3-Jun-15	Dissolved Oxygen, Field	7.9	mg/L
E298594	EV_SPR2	10-Jun-15	Dissolved Oxygen, Field	7.7	mg/L
E298594	EV_SPR2	17-Jun-15	Dissolved Oxygen, Field	7.6	mg/L
E298594	EV_SPR2	24-Jun-15	Dissolved Oxygen, Field	7.6	mg/L
E298594	EV_SPR2	30-Jun-15	Dissolved Oxygen, Field	7.6	mg/L
E298594	EV_SPR2	8-Jul-15	Dissolved Oxygen, Field	7.7	mg/L
E298594	EV_SPR2	12-Aug-15	Dissolved Oxygen, Field	8.0	mg/L
E298594	EV_SPR2	2-Sep-15	Dissolved Oxygen, Field	7.8	mg/L
E298594	EV_SPR2	7-Oct-15	Dissolved Oxygen, Field	7.6	mg/L
E298596	EV_WF_SW	14-May-15	Dissolved Oxygen, Field	2.4	mg/L
E298596	EV_WF_SW	14-May-15	Dissolved Oxygen, Field	2.4	mg/L
E298596	EV_WF_SW	12-Aug-15	Dissolved Oxygen, Field	1.5	mg/L
E298596	EV_WF_SW	12-Aug-15	Dissolved Oxygen, Field	1.5	mg/L
E298596	EV_WF_SW	19-Nov-15	Dissolved Oxygen, Field	4.9	mg/L
E298596	EV_WF_SW	19-Nov-15	Dissolved Oxygen, Field	4.9	mg/L
E298592	EV_BLM2	2-Jun-15	Iron	3.91	mg/L
0200111	EV_ER2	2-Jun-15	Iron	1.75	mg/L
0200027	EV_ER4	2-Jun-15	Iron	1.45	mg/L
E298591	EV_FC1	26-May-15	Iron	2.71	mg/L
E298591	EV_FC1	2-Jun-15	Iron	1.05	mg/L
0200203	EV_MC3	27-May-15	Iron	1.38	mg/L
0200203	EV_MC3	3-Jun-15	Iron	2.47	mg/L
E298596	EV_WF_SW	14-May-15	Iron	5.01	mg/L
E298596	EV_WF_SW	14-May-15	Iron	17.5	mg/L
E298596	EV_WF_SW	12-Aug-15	Iron	6.01	mg/L
E298596	EV_WF_SW	12-Aug-15	Iron	15.2	mg/L
E298596	EV_WF_SW	19-Nov-15	Iron	9.36	mg/L
E298592	EV_BLM2	3-Feb-15	Mercury	< 0.01	µg/L
E298592	EV_BLM2	3-Mar-15	Mercury	< 0.01	µg/L
E298592	EV_BLM2	7-Apr-15	Mercury	< 0.005	µg/L
E298592	EV_BLM2	6-May-15	Mercury	< 0.005	µg/L
E298592	EV_BLM2	2-Jun-15	Mercury	0.009	µg/L
E298592	EV_BLM2	8-Jul-15	Mercury	< 0.005	µg/L
E298592	EV_BLM2	11-Aug-15	Mercury	0.004	µg/L
E298592	EV_BLM2	1-Sep-15	Mercury	0.003	µg/L
E298592	EV_BLM2	7-Oct-15	Mercury	0.001	µg/L
E298592	EV_BLM2	4-Nov-15	Mercury	0.002	µg/L
E298592	EV_BLM2	9-Dec-15	Mercury	0.003	µg/L
0200111	EV_ER2	3-Feb-15	Mercury	< 0.01	µg/L
0200111	EV_ER2	3-Mar-15	Mercury	< 0.01	µg/L

**Table E-4. Elkview Operation: Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
0200111	EV_ER2	7-Apr-15	Mercury	< 0.005	µg/L
0200111	EV_ER2	6-May-15	Mercury	< 0.005	µg/L
0200111	EV_ER2	2-Jun-15	Mercury	< 0.005	µg/L
0200111	EV_ER2	8-Jul-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	3-Feb-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	10-Feb-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	17-Feb-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	24-Feb-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	3-Mar-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	10-Mar-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	18-Mar-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	25-Mar-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	31-Mar-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	7-Apr-15	Mercury	< 0.009	µg/L
0200027	EV_ER4	14-Apr-15	Mercury	< 0.008	µg/L
0200027	EV_ER4	21-Apr-15	Mercury	< 0.007	µg/L
0200027	EV_ER4	28-Apr-15	Mercury	< 0.006	µg/L
0200027	EV_ER4	6-May-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	12-May-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	19-May-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	26-May-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	2-Jun-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	9-Jun-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	16-Jun-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	23-Jun-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	29-Jun-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	8-Jul-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	14-Jul-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	11-Aug-15	Mercury	0.003	µg/L
E298591	EV_FC1	10-Feb-15	Mercury	< 0.01	µg/L
E298591	EV_FC1	17-Feb-15	Mercury	< 0.01	µg/L
E298591	EV_FC1	24-Feb-15	Mercury	< 0.01	µg/L
E298591	EV_FC1	10-Mar-15	Mercury	< 0.01	µg/L
E298591	EV_FC1	7-Apr-15	Mercury	< 0.008	µg/L
E298591	EV_FC1	6-May-15	Mercury	< 0.005	µg/L
E298591	EV_FC1	19-May-15	Mercury	< 0.005	µg/L
E298591	EV_FC1	26-May-15	Mercury	0.009	µg/L
E298591	EV_FC1	2-Jun-15	Mercury	< 0.008	µg/L
E298591	EV_FC1	9-Jun-15	Mercury	< 0.008	µg/L
E298591	EV_FC1	16-Jun-15	Mercury	< 0.007	µg/L
E298591	EV_FC1	23-Jun-15	Mercury	< 0.007	µg/L
E298591	EV_FC1	29-Jun-15	Mercury	< 0.005	µg/L
E298591	EV_FC1	8-Jul-15	Mercury	< 0.005	µg/L
E298591	EV_FC1	11-Aug-15	Mercury	0.002	µg/L

**Table E-4. Elkview Operation: Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E298591	EV_FC1	1-Sep-15	Mercury	0.001	µg/L
E298591	EV_FC1	4-Nov-15	Mercury	0.001	µg/L
E298591	EV_FC1	9-Dec-15	Mercury	0.002	µg/L
0200203	EV_MC3	6-Jan-15	Mercury	< 0.01	µg/L
0200203	EV_MC3	4-Feb-15	Mercury	< 0.01	µg/L
0200203	EV_MC3	11-Feb-15	Mercury	< 0.01	µg/L
0200203	EV_MC3	18-Feb-15	Mercury	< 0.01	µg/L
0200203	EV_MC3	25-Feb-15	Mercury	< 0.01	µg/L
0200203	EV_MC3	4-Mar-15	Mercury	< 0.01	µg/L
0200203	EV_MC3	11-Mar-15	Mercury	< 0.01	µg/L
0200203	EV_MC3	23-Mar-15	Mercury	< 0.01	µg/L
0200203	EV_MC3	25-Mar-15	Mercury	< 0.01	µg/L
0200203	EV_MC3	1-Apr-15	Mercury	< 0.009	µg/L
0200203	EV_MC3	8-Apr-15	Mercury	< 0.008	µg/L
0200203	EV_MC3	15-Apr-15	Mercury	< 0.007	µg/L
0200203	EV_MC3	22-Apr-15	Mercury	< 0.006	µg/L
0200203	EV_MC3	29-Apr-15	Mercury	< 0.005	µg/L
0200203	EV_MC3	6-May-15	Mercury	< 0.005	µg/L
0200203	EV_MC3	12-May-15	Mercury	< 0.005	µg/L
0200203	EV_MC3	20-May-15	Mercury	< 0.005	µg/L
0200203	EV_MC3	27-May-15	Mercury	0.006	µg/L
0200203	EV_MC3	3-Jun-15	Mercury	< 0.006	µg/L
0200203	EV_MC3	10-Jun-15	Mercury	< 0.006	µg/L
0200203	EV_MC3	17-Jun-15	Mercury	< 0.006	µg/L
0200203	EV_MC3	24-Jun-15	Mercury	< 0.006	µg/L
0200203	EV_MC3	30-Jun-15	Mercury	< 0.005	µg/L
0200203	EV_MC3	8-Jul-15	Mercury	< 0.005	µg/L
0200203	EV_MC3	15-Jul-15	Mercury	< 0.005	µg/L
0200203	EV_MC3	12-Aug-15	Mercury	< 0.003	µg/L
E298594	EV_SPR2	6-Jan-15	Mercury	< 0.01	µg/L
E298594	EV_SPR2	4-Feb-15	Mercury	< 0.01	µg/L
E298594	EV_SPR2	11-Feb-15	Mercury	< 0.01	µg/L
E298594	EV_SPR2	18-Feb-15	Mercury	< 0.01	µg/L
E298594	EV_SPR2	25-Feb-15	Mercury	< 0.01	µg/L
E298594	EV_SPR2	4-Mar-15	Mercury	< 0.01	µg/L
E298594	EV_SPR2	11-Mar-15	Mercury	< 0.01	µg/L
E298594	EV_SPR2	8-Apr-15	Mercury	< 0.008	µg/L
E298594	EV_SPR2	6-May-15	Mercury	< 0.005	µg/L
E298594	EV_SPR2	20-May-15	Mercury	< 0.005	µg/L
E298594	EV_SPR2	27-May-15	Mercury	< 0.005	µg/L
E298594	EV_SPR2	3-Jun-15	Mercury	< 0.005	µg/L
E298594	EV_SPR2	10-Jun-15	Mercury	< 0.005	µg/L
E298594	EV_SPR2	17-Jun-15	Mercury	< 0.005	µg/L
E298594	EV_SPR2	24-Jun-15	Mercury	< 0.005	µg/L



**Table E-4. Elkview Operation: Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E298594	EV_SPR2	30-Jun-15	Mercury	< 0.005	µg/L
E298594	EV_SPR2	8-Jul-15	Mercury	< 0.005	µg/L
E298593	EV_TC1	8-Apr-15	Mercury	< 0.005	µg/L
E298593	EV_TC1	5-May-15	Mercury	< 0.005	µg/L
E298593	EV_TC1	3-Jun-15	Mercury	< 0.005	µg/L
E298596	EV_WF_SW	14-May-15	Mercury	< 0.005	µg/L
E298596	EV_WF_SW	12-Aug-15	Mercury	< 0.005	µg/L
E298596	EV_WF_SW	19-Nov-15	Mercury	< 0.025	µg/L
0200027	EV_ER4	28-Apr-15	pH, Field	9.1	s.u.
0200027	EV_ER4	12-May-15	pH, Field	14	s.u.
0200027	EV_ER4	19-May-15	pH, Field	14	s.u.

**Table E-5. Coal Mountain Operation: Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
0200209	CM_CC1	29-Apr-15	Beryllium	< 0.14	µg/L
0200209	CM_CC1	6-May-15	Beryllium	< 0.16	µg/L
0200209	CM_CC1	13-May-15	Beryllium	< 0.16	µg/L
0200209	CM_CC1	20-May-15	Beryllium	< 0.16	µg/L
0200209	CM_CC1	27-May-15	Beryllium	< 0.16	µg/L
E258175	CM_MC1	6-May-15	Beryllium	< 0.18	µg/L
E258175	CM_MC1	3-Jun-15	Beryllium	< 0.18	µg/L
E258175	CM_MC1	3-Jun-15	Iron	1.28	mg/L
0200209	CM_CC1	6-Jan-15	Mercury	< 0.01	µg/L
0200209	CM_CC1	3-Feb-15	Mercury	< 0.01	µg/L
0200209	CM_CC1	3-Mar-15	Mercury	< 0.01	µg/L
0200209	CM_CC1	16-Mar-15	Mercury	< 0.01	µg/L
0200209	CM_CC1	23-Mar-15	Mercury	< 0.01	µg/L
0200209	CM_CC1	30-Mar-15	Mercury	< 0.01	µg/L
0200209	CM_CC1	8-Apr-15	Mercury	< 0.009	µg/L
0200209	CM_CC1	15-Apr-15	Mercury	< 0.008	µg/L
0200209	CM_CC1	22-Apr-15	Mercury	< 0.006	µg/L
0200209	CM_CC1	29-Apr-15	Mercury	< 0.006	µg/L
0200209	CM_CC1	6-May-15	Mercury	< 0.007	µg/L
0200209	CM_CC1	13-May-15	Mercury	< 0.008	µg/L
0200209	CM_CC1	20-May-15	Mercury	< 0.008	µg/L
0200209	CM_CC1	27-May-15	Mercury	< 0.008	µg/L
0200209	CM_CC1	3-Jun-15	Mercury	< 0.011	µg/L
0200209	CM_CC1	10-Jun-15	Mercury	< 0.01	µg/L
0200209	CM_CC1	17-Jun-15	Mercury	< 0.009	µg/L
0200209	CM_CC1	24-Jun-15	Mercury	< 0.009	µg/L
0200209	CM_CC1	30-Jun-15	Mercury	< 0.009	µg/L
0200209	CM_CC1	8-Jul-15	Mercury	< 0.005	µg/L
0200209	CM_CC1	15-Jul-15	Mercury	< 0.005	µg/L
0200209	CM_CC1	21-Jul-15	Mercury	< 0.005	µg/L
0200209	CM_CC1	27-Jul-15	Mercury	< 0.005	µg/L
0200209	CM_CC1	5-Aug-15	Mercury	< 0.005	µg/L
0200209	CM_CC1	2-Sep-15	Mercury	< 0.005	µg/L
0200209	CM_CC1	7-Oct-15	Mercury	< 0.005	µg/L
0200209	CM_CC1	4-Nov-15	Mercury	< 0.005	µg/L
0200209	CM_CC1	2-Dec-15	Mercury	< 0.005	µg/L
E258175	CM_MC1	6-Jan-15	Mercury	< 0.01	µg/L
E258175	CM_MC1	3-Feb-15	Mercury	< 0.01	µg/L
E258175	CM_MC1	3-Mar-15	Mercury	< 0.01	µg/L
E258175	CM_MC1	8-Apr-15	Mercury	< 0.005	µg/L
E258175	CM_MC1	6-May-15	Mercury	< 0.008	µg/L
E258175	CM_MC1	3-Jun-15	Mercury	0.01	µg/L
E258175	CM_MC1	8-Jul-15	Mercury	< 0.005	µg/L
E258175	CM_MC1	5-Aug-15	Mercury	< 0.005	µg/L

**Table E-5. Coal Mountain Operation: Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E258175	CM_MC1	2-Sep-15	Mercury	< 0.005	µg/L
E258175	CM_MC1	7-Oct-15	Mercury	< 0.005	µg/L
E258175	CM_MC1	4-Nov-15	Mercury	< 0.005	µg/L
E258175	CM_MC1	2-Dec-15	Mercury	< 0.005	µg/L
0200209	CM_CC1	6-Jan-15	Nitrite-N	0.11	mg/L
0200209	CM_CC1	3-Feb-15	Nitrite-N	0.11	mg/L
0200209	CM_CC1	4-Nov-15	Nitrite-N	0.11	mg/L
0200209	CM_CC1	2-Dec-15	Nitrite-N	0.12	mg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E258937	CM_MC2	29-Apr-15	Beryllium	< 0.14	µg/L
E258937	CM_MC2	6-May-15	Beryllium	< 0.15	µg/L
E258937	CM_MC2	12-May-15	Beryllium	< 0.15	µg/L
E258937	CM_MC2	19-May-15	Beryllium	< 0.15	µg/L
E258937	CM_MC2	26-May-15	Beryllium	0.2	µg/L
E258937	CM_MC2	3-Jun-15	Beryllium	< 0.13	µg/L
E258937	CM_MC2	26-May-15	Iron	2.8	mg/L
E258937	CM_MC2	3-Jun-15	Iron	1.4	mg/L
E258937	CM_MC2	6-Jan-15	Mercury	< 0.01	µg/L
E258937	CM_MC2	3-Feb-15	Mercury	< 0.01	µg/L
E258937	CM_MC2	3-Mar-15	Mercury	< 0.01	µg/L
E258937	CM_MC2	10-Mar-15	Mercury	< 0.01	µg/L
E258937	CM_MC2	16-Mar-15	Mercury	< 0.01	µg/L
E258937	CM_MC2	23-Mar-15	Mercury	< 0.01	µg/L
E258937	CM_MC2	30-Mar-15	Mercury	< 0.01	µg/L
E258937	CM_MC2	8-Apr-15	Mercury	< 0.009	µg/L
E258937	CM_MC2	15-Apr-15	Mercury	< 0.008	µg/L
E258937	CM_MC2	22-Apr-15	Mercury	< 0.006	µg/L
E258937	CM_MC2	29-Apr-15	Mercury	< 0.006	µg/L
E258937	CM_MC2	5-May-15	Mercury	0.01	µg/L
E258937	CM_MC2	6-May-15	Mercury	< 0.007	µg/L
E258937	CM_MC2	12-May-15	Mercury	0.01	µg/L
E258937	CM_MC2	19-May-15	Mercury	< 0.007	µg/L
E258937	CM_MC2	26-May-15	Mercury	0.01	µg/L
E258937	CM_MC2	3-Jun-15	Mercury	< 0.007	µg/L
E258937	CM_MC2	10-Jun-15	Mercury	< 0.006	µg/L
E258937	CM_MC2	17-Jun-15	Mercury	< 0.006	µg/L
E258937	CM_MC2	24-Jun-15	Mercury	< 0.006	µg/L
E258937	CM_MC2	30-Jun-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	8-Jul-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	15-Jul-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	21-Jul-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	27-Jul-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	29-Jul-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	5-Aug-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	12-Aug-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	19-Aug-15	Mercury	< 0.005	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E258937	CM_MC2	26-Aug-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	2-Sep-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	7-Oct-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	26-Oct-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	2-Nov-15	Mercury	0.01	µg/L
E258937	CM_MC2	4-Nov-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	9-Nov-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	16-Nov-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	23-Nov-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	1-Dec-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	2-Dec-15	Mercury	< 0.005	µg/L
E258937	CM_MC2	30-Jun-15	Temperature, Field	17.3	°C
E258937	CM_MC2	19-Aug-15	Temperature, Field	16.1	°C
E258937	CM_MC2	26-Aug-15	Temperature, Field	15.5	°C
0200393	EV_ER1	27-May-15	Dissolved Oxygen, Field	4.8	mg/L
0200393	EV_ER1	15-Mar-15	Iron	3.5	mg/L
0200393	EV_ER1	27-May-15	Iron	1.7	mg/L
0200393	EV_ER1	3-Jun-15	Iron	3.1	mg/L
0200393	EV_ER1	7-Jan-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	3-Feb-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	10-Feb-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	17-Feb-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	24-Feb-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	3-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	7-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	8-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	9-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	10-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	11-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	12-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	13-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	14-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	15-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	16-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	17-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	18-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	19-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	20-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	24-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	25-Mar-15	Mercury	< 0.01	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
0200393	EV_ER1	31-Mar-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	1-Apr-15	Mercury	< 0.01	µg/L
0200393	EV_ER1	7-Apr-15	Mercury	< 0.009	µg/L
0200393	EV_ER1	8-Apr-15	Mercury	< 0.009	µg/L
0200393	EV_ER1	14-Apr-15	Mercury	< 0.008	µg/L
0200393	EV_ER1	15-Apr-15	Mercury	< 0.008	µg/L
0200393	EV_ER1	21-Apr-15	Mercury	< 0.007	µg/L
0200393	EV_ER1	22-Apr-15	Mercury	< 0.007	µg/L
0200393	EV_ER1	23-Apr-15	Mercury	< 0.006	µg/L
0200393	EV_ER1	28-Apr-15	Mercury	< 0.006	µg/L
0200393	EV_ER1	6-May-15	Mercury	< 0.005	µg/L
0200393	EV_ER1	12-May-15	Mercury	< 0.005	µg/L
0200393	EV_ER1	13-May-15	Mercury	< 0.005	µg/L
0200393	EV_ER1	20-May-15	Mercury	< 0.005	µg/L
0200393	EV_ER1	27-May-15	Mercury	0.01	µg/L
0200393	EV_ER1	3-Jun-15	Mercury	< 0.006	µg/L
0200393	EV_ER1	10-Jun-15	Mercury	< 0.006	µg/L
0200393	EV_ER1	17-Jun-15	Mercury	< 0.006	µg/L
0200393	EV_ER1	24-Jun-15	Mercury	< 0.006	µg/L
0200393	EV_ER1	30-Jun-15	Mercury	< 0.005	µg/L
0200393	EV_ER1	8-Jul-15	Mercury	< 0.005	µg/L
0200393	EV_ER1	15-Jul-15	Mercury	< 0.005	µg/L
0200393	EV_ER1	12-Aug-15	Mercury	< 0.003	µg/L
0200027	EV_ER4	14-Dec-15	Beryllium	< 0.23	µg/L
0200027	EV_ER4	21-Dec-15	Beryllium	< 0.2	µg/L
0200027	EV_ER4	2-Jun-15	Iron	1.5	mg/L
0200027	EV_ER4	3-Feb-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	10-Feb-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	17-Feb-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	24-Feb-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	3-Mar-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	10-Mar-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	18-Mar-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	25-Mar-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	31-Mar-15	Mercury	< 0.01	µg/L
0200027	EV_ER4	7-Apr-15	Mercury	< 0.009	µg/L
0200027	EV_ER4	14-Apr-15	Mercury	< 0.008	µg/L
0200027	EV_ER4	21-Apr-15	Mercury	< 0.007	µg/L
0200027	EV_ER4	28-Apr-15	Mercury	< 0.006	µg/L
0200027	EV_ER4	6-May-15	Mercury	< 0.005	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
0200027	EV_ER4	12-May-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	19-May-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	26-May-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	2-Jun-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	9-Jun-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	16-Jun-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	23-Jun-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	29-Jun-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	8-Jul-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	14-Jul-15	Mercury	< 0.005	µg/L
0200027	EV_ER4	11-Aug-15	Mercury	0.003	µg/L
0200027	EV_ER4	28-Apr-15	pH, Field	9.1	s.u.
0200027	EV_ER4	12-May-15	pH, Field	14.0	s.u.
0200027	EV_ER4	19-May-15	pH, Field	14.0	s.u.
E102682	EV_HC1	2-Jun-15	Iron	1.2	mg/L
E102682	EV_HC1	7-Jan-15	Mercury	< 0.01	µg/L
E102682	EV_HC1	3-Feb-15	Mercury	< 0.01	µg/L
E102682	EV_HC1	10-Feb-15	Mercury	< 0.01	µg/L
E102682	EV_HC1	17-Feb-15	Mercury	< 0.01	µg/L
E102682	EV_HC1	24-Feb-15	Mercury	< 0.01	µg/L
E102682	EV_HC1	10-Mar-15	Mercury	< 0.01	µg/L
E102682	EV_HC1	17-Mar-15	Mercury	< 0.01	µg/L
E102682	EV_HC1	24-Mar-15	Mercury	< 0.01	µg/L
E102682	EV_HC1	31-Mar-15	Mercury	< 0.01	µg/L
E102682	EV_HC1	7-Apr-15	Mercury	< 0.009	µg/L
E102682	EV_HC1	14-Apr-15	Mercury	< 0.008	µg/L
E102682	EV_HC1	21-Apr-15	Mercury	< 0.007	µg/L
E102682	EV_HC1	28-Apr-15	Mercury	< 0.006	µg/L
E102682	EV_HC1	5-May-15	Mercury	< 0.005	µg/L
E102682	EV_HC1	12-May-15	Mercury	< 0.005	µg/L
E102682	EV_HC1	19-May-15	Mercury	< 0.005	µg/L
E102682	EV_HC1	26-May-15	Mercury	< 0.005	µg/L
E102682	EV_HC1	2-Jun-15	Mercury	0.01	µg/L
E102682	EV_HC1	9-Jun-15	Mercury	< 0.005	µg/L
E102682	EV_HC1	16-Jun-15	Mercury	< 0.005	µg/L
E102682	EV_HC1	23-Jun-15	Mercury	< 0.005	µg/L
E102682	EV_HC1	29-Jun-15	Mercury	< 0.005	µg/L
E102682	EV_HC1	30-Jun-15	Mercury	< 0.005	µg/L
E102682	EV_HC1	7-Jul-15	Mercury	< 0.005	µg/L
E102682	EV_HC1	14-Jul-15	Mercury	< 0.005	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E102682	EV_HC1	22-Jul-15	Mercury	< 0.005	µg/L
E102682	EV_HC1	11-Aug-15	Mercury	< 0.004	µg/L
E102682	EV_HC1	19-May-15	pH, Field	12.0	s.u.
E300091	EV_MC2	24-Jun-15	Beryllium	< 0.13	µg/L
E300091	EV_MC2	15-Mar-15	Iron	4.3	mg/L
E300091	EV_MC2	26-May-15	Iron	3.5	mg/L
E300091	EV_MC2	27-May-15	Iron	1.4	mg/L
E300091	EV_MC2	3-Jun-15	Iron	3.5	mg/L
E300091	EV_MC2	6-Jan-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	4-Feb-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	4-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	7-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	8-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	9-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	10-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	11-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	12-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	13-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	14-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	15-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	16-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	17-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	18-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	19-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	20-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	25-Mar-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	1-Apr-15	Mercury	< 0.01	µg/L
E300091	EV_MC2	8-Apr-15	Mercury	< 0.009	µg/L
E300091	EV_MC2	15-Apr-15	Mercury	< 0.008	µg/L
E300091	EV_MC2	22-Apr-15	Mercury	< 0.006	µg/L
E300091	EV_MC2	23-Apr-15	Mercury	< 0.006	µg/L
E300091	EV_MC2	28-Apr-15	Mercury	< 0.005	µg/L
E300091	EV_MC2	5-May-15	Mercury	< 0.005	µg/L
E300091	EV_MC2	6-May-15	Mercury	< 0.005	µg/L
E300091	EV_MC2	12-May-15	Mercury	< 0.005	µg/L
E300091	EV_MC2	13-May-15	Mercury	< 0.005	µg/L
E300091	EV_MC2	19-May-15	Mercury	< 0.005	µg/L
E300091	EV_MC2	20-May-15	Mercury	< 0.005	µg/L
E300091	EV_MC2	26-May-15	Mercury	< 0.008	µg/L
E300091	EV_MC2	27-May-15	Mercury	0.01	µg/L



**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E300091	EV_MC2	3-Jun-15	Mercury	< 0.008	µg/L
E300091	EV_MC2	10-Jun-15	Mercury	< 0.008	µg/L
E300091	EV_MC2	17-Jun-15	Mercury	< 0.008	µg/L
E300091	EV_MC2	24-Jun-15	Mercury	< 0.009	µg/L
E300091	EV_MC2	30-Jun-15	Mercury	< 0.005	µg/L
E300091	EV_MC2	30-Jun-15	Mercury	< 0.005	µg/L
E300091	EV_MC2	7-Jul-15	Mercury	< 0.005	µg/L
E300091	EV_MC2	8-Jul-15	Mercury	< 0.005	µg/L
E300091	EV_MC2	15-Jul-15	Mercury	< 0.005	µg/L
E300091	EV_MC2	22-Jul-15	Mercury	< 0.005	µg/L
E300091	EV_MC2	12-Aug-15	Mercury	< 0.004	µg/L
E300091	EV_MC2	28-Apr-15	pH, Field	9.7	s.u.
E300091	EV_MC2	13-May-15	pH, Field	9.1	s.u.
E300091	EV_MC2	19-May-15	pH, Field	14.0	s.u.
E300071	FR_FRCP1	2-Mar-15	Beryllium	< 0.14	µg/L
E300071	FR_FRCP1	11-Mar-15	Beryllium	< 0.14	µg/L
E300071	FR_FRCP1	25-Mar-15	Beryllium	< 0.13	µg/L
E300071	FR_FRCP1	3-Feb-15	Mercury	< 0.01	µg/L
E300071	FR_FRCP1	18-Feb-15	Mercury	< 0.01	µg/L
E300071	FR_FRCP1	19-Feb-15	Mercury	< 0.01	µg/L
E300071	FR_FRCP1	26-Feb-15	Mercury	< 0.01	µg/L
E300071	FR_FRCP1	2-Mar-15	Mercury	< 0.01	µg/L
E300071	FR_FRCP1	11-Mar-15	Mercury	< 0.01	µg/L
E300071	FR_FRCP1	18-Mar-15	Mercury	< 0.01	µg/L
E300071	FR_FRCP1	25-Mar-15	Mercury	< 0.01	µg/L
E300071	FR_FRCP1	1-Apr-15	Mercury	< 0.01	µg/L
E300071	FR_FRCP1	8-Apr-15	Mercury	< 0.009	µg/L
E300071	FR_FRCP1	16-Apr-15	Mercury	< 0.008	µg/L
E300071	FR_FRCP1	20-Apr-15	Mercury	< 0.007	µg/L
E300071	FR_FRCP1	28-Apr-15	Mercury	< 0.006	µg/L
E300071	FR_FRCP1	30-Apr-15	Mercury	< 0.006	µg/L
E300071	FR_FRCP1	5-May-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	12-May-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	19-May-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	26-May-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	2-Jun-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	8-Jun-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	16-Jun-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	22-Jun-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	29-Jun-15	Mercury	< 0.005	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E300071	FR_FRCP1	6-Jul-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	14-Jul-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	22-Jul-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	28-Jul-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	29-Jul-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	5-Aug-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	12-Aug-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	19-Aug-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	26-Aug-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	8-Sep-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	28-Sep-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	6-Oct-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	26-Oct-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	29-Oct-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	2-Nov-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	9-Nov-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	16-Nov-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	23-Nov-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	30-Nov-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	30-Nov-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	7-Dec-15	Mercury	< 0.005	µg/L
E300071	FR_FRCP1	3-Feb-15	Uranium	9.3	µg/L
E300071	FR_FRCP1	19-Feb-15	Uranium	8.5	µg/L
E300071	FR_FRCP1	26-Feb-15	Uranium	9.8	µg/L
E300071	FR_FRCP1	2-Mar-15	Uranium	11.0	µg/L
E300071	FR_FRCP1	11-Mar-15	Uranium	10.6	µg/L
E300071	FR_FRCP1	18-Mar-15	Uranium	8.7	µg/L
0206661	GH_ER1	9-Jun-15	Aluminum	0.1	mg/L
0206661	GH_ER1	9-Jun-15	Aluminum	0.3	mg/L
0206661	GH_ER1	16-Jun-15	Aluminum	0.1	mg/L
0206661	GH_ER1	23-Jun-15	Aluminum	< 0.06	mg/L
0206661	GH_ER1	30-Jun-15	Aluminum	< 0.05	mg/L
0206661	GH_ER1	6-Jul-15	Aluminum	< 0.05	mg/L
0206661	GH_ER1	2-Jun-15	Iron	1.1	mg/L
0206661	GH_ER1	6-Jan-15	Mercury	< 0.01	µg/L
0206661	GH_ER1	3-Feb-15	Mercury	< 0.01	µg/L
0206661	GH_ER1	3-Mar-15	Mercury	< 0.01	µg/L
0206661	GH_ER1	17-Mar-15	Mercury	< 0.01	µg/L
0206661	GH_ER1	24-Mar-15	Mercury	< 0.01	µg/L
0206661	GH_ER1	31-Mar-15	Mercury	< 0.01	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
0206661	GH_ER1	7-Apr-15	Mercury	< 0.009	µg/L
0206661	GH_ER1	14-Apr-15	Mercury	< 0.008	µg/L
0206661	GH_ER1	21-Apr-15	Mercury	< 0.007	µg/L
0206661	GH_ER1	28-Apr-15	Mercury	< 0.006	µg/L
0206661	GH_ER1	5-May-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	12-May-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	20-May-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	26-May-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	2-Jun-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	9-Jun-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	16-Jun-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	23-Jun-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	30-Jun-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	6-Jul-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	15-Jul-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	21-Jul-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	28-Jul-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	5-Aug-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	9-Sep-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	6-Oct-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	3-Nov-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	7-Dec-15	Mercury	< 0.005	µg/L
0206661	GH_ER1	30-Jun-15	pH, Field	9.3	s.u.
E300090	GH_ERC	2-Jun-15	Iron	1.3	mg/L
E300090	GH_ERC	6-Jan-15	Mercury	< 0.01	µg/L
E300090	GH_ERC	3-Feb-15	Mercury	< 0.01	µg/L
E300090	GH_ERC	3-Mar-15	Mercury	< 0.01	µg/L
E300090	GH_ERC	17-Mar-15	Mercury	< 0.01	µg/L
E300090	GH_ERC	24-Mar-15	Mercury	< 0.01	µg/L
E300090	GH_ERC	31-Mar-15	Mercury	< 0.01	µg/L
E300090	GH_ERC	7-Apr-15	Mercury	< 0.009	µg/L
E300090	GH_ERC	14-Apr-15	Mercury	< 0.008	µg/L
E300090	GH_ERC	21-Apr-15	Mercury	< 0.007	µg/L
E300090	GH_ERC	28-Apr-15	Mercury	< 0.006	µg/L
E300090	GH_ERC	5-May-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	12-May-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	19-May-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	26-May-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	2-Jun-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	9-Jun-15	Mercury	< 0.005	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E300090	GH_ERC	16-Jun-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	23-Jun-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	29-Jun-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	30-Jun-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	6-Jul-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	15-Jul-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	21-Jul-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	28-Jul-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	5-Aug-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	9-Sep-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	6-Oct-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	26-Oct-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	3-Nov-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	9-Nov-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	16-Nov-15	Mercury	< 0.005	µg/L
E300090	GH_ERC	7-Dec-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	2-Feb-15	Mercury	< 0.01	µg/L
0200378	GH_FR1	2-Mar-15	Mercury	< 0.01	µg/L
0200378	GH_FR1	9-Mar-15	Mercury	< 0.01	µg/L
0200378	GH_FR1	16-Mar-15	Mercury	< 0.01	µg/L
0200378	GH_FR1	23-Mar-15	Mercury	< 0.01	µg/L
0200378	GH_FR1	30-Mar-15	Mercury	< 0.01	µg/L
0200378	GH_FR1	7-Apr-15	Mercury	< 0.009	µg/L
0200378	GH_FR1	13-Apr-15	Mercury	< 0.008	µg/L
0200378	GH_FR1	22-Apr-15	Mercury	< 0.006	µg/L
0200378	GH_FR1	28-Apr-15	Mercury	< 0.006	µg/L
0200378	GH_FR1	5-May-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	12-May-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	19-May-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	26-May-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	2-Jun-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	8-Jun-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	15-Jun-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	22-Jun-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	29-Jun-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	6-Jul-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	14-Jul-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	21-Jul-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	28-Jul-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	5-Aug-15	Mercury	< 0.005	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
0200378	GH_FR1	8-Sep-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	5-Oct-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	26-Oct-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	2-Nov-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	9-Nov-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	16-Nov-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	23-Nov-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	30-Nov-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	7-Dec-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	14-Dec-15	Mercury	< 0.005	µg/L
0200378	GH_FR1	21-Dec-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	26-Oct-15	Beryllium	< 0.3	µg/L
0200028	LC_LC5	2-Nov-15	Beryllium	< 0.2	µg/L
0200028	LC_LC5	9-Dec-15	Beryllium	< 0.5	µg/L
0200028	LC_LC5	5-Jan-15	Mercury	< 0.01	µg/L
0200028	LC_LC5	2-Feb-15	Mercury	< 0.01	µg/L
0200028	LC_LC5	2-Mar-15	Mercury	< 0.01	µg/L
0200028	LC_LC5	17-Mar-15	Mercury	< 0.01	µg/L
0200028	LC_LC5	24-Mar-15	Mercury	< 0.01	µg/L
0200028	LC_LC5	31-Mar-15	Mercury	< 0.01	µg/L
0200028	LC_LC5	6-Apr-15	Mercury	< 0.009	µg/L
0200028	LC_LC5	13-Apr-15	Mercury	< 0.008	µg/L
0200028	LC_LC5	20-Apr-15	Mercury	< 0.007	µg/L
0200028	LC_LC5	27-Apr-15	Mercury	< 0.006	µg/L
0200028	LC_LC5	28-Apr-15	Mercury	< 0.006	µg/L
0200028	LC_LC5	4-May-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	5-May-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	11-May-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	19-May-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	26-May-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	2-Jun-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	8-Jun-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	15-Jun-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	23-Jun-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	30-Jun-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	7-Jul-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	17-Jul-15	Mercury	0.01	µg/L
0200028	LC_LC5	21-Jul-15	Mercury	< 0.01	µg/L
0200028	LC_LC5	28-Jul-15	Mercury	< 0.01	µg/L
0200028	LC_LC5	11-Aug-15	Mercury	< 0.01	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
0200028	LC_LC5	9-Sep-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	5-Oct-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	26-Oct-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	2-Nov-15	Mercury	< 0.005	µg/L
0200028	LC_LC5	9-Dec-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	9-Dec-15	Beryllium	< 0.5	µg/L
E297110	LC_LCDSSLCC	30-Dec-15	Beryllium	< 0.3	µg/L
E297110	LC_LCDSSLCC	2-Jun-15	Iron	2.4	mg/L
E297110	LC_LCDSSLCC	5-Jan-15	Mercury	< 0.01	µg/L
E297110	LC_LCDSSLCC	2-Feb-15	Mercury	< 0.01	µg/L
E297110	LC_LCDSSLCC	2-Mar-15	Mercury	< 0.01	µg/L
E297110	LC_LCDSSLCC	17-Mar-15	Mercury	< 0.01	µg/L
E297110	LC_LCDSSLCC	24-Mar-15	Mercury	< 0.01	µg/L
E297110	LC_LCDSSLCC	31-Mar-15	Mercury	< 0.01	µg/L
E297110	LC_LCDSSLCC	6-Apr-15	Mercury	< 0.009	µg/L
E297110	LC_LCDSSLCC	13-Apr-15	Mercury	< 0.008	µg/L
E297110	LC_LCDSSLCC	20-Apr-15	Mercury	< 0.007	µg/L
E297110	LC_LCDSSLCC	27-Apr-15	Mercury	< 0.006	µg/L
E297110	LC_LCDSSLCC	28-Apr-15	Mercury	< 0.006	µg/L
E297110	LC_LCDSSLCC	5-May-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	12-May-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	19-May-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	26-May-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	2-Jun-15	Mercury	< 0.009	µg/L
E297110	LC_LCDSSLCC	8-Jun-15	Mercury	< 0.009	µg/L
E297110	LC_LCDSSLCC	16-Jun-15	Mercury	< 0.009	µg/L
E297110	LC_LCDSSLCC	23-Jun-15	Mercury	< 0.009	µg/L
E297110	LC_LCDSSLCC	24-Jun-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	30-Jun-15	Mercury	< 0.009	µg/L
E297110	LC_LCDSSLCC	7-Jul-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	17-Jul-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	21-Jul-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	28-Jul-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	11-Aug-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	26-Aug-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	9-Sep-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	5-Oct-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	2-Nov-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	9-Dec-15	Mercury	< 0.005	µg/L
E297110	LC_LCDSSLCC	23-Dec-15	Mercury	< 0.005	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E297110	LC_LCDSSLCC	30-Dec-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	4-Aug-15	Dissolved Oxygen, Field	7.8	mg/L
E300094	RG_BORDER	4-Aug-15	Dissolved Oxygen, Field	7.8	mg/L
E300094	RG_BORDER	4-Aug-15	Dissolved Oxygen, Field	7.8	mg/L
E300094	RG_BORDER	4-Aug-15	Dissolved Oxygen, Field	7.8	mg/L
E300094	RG_BORDER	4-Aug-15	Dissolved Oxygen, Field	7.8	mg/L
E300094	RG_BORDER	4-Aug-15	Dissolved Oxygen, Field	7.8	mg/L
E300094	RG_BORDER	4-Aug-15	Dissolved Oxygen, Field	7.8	mg/L
E300094	RG_BORDER	4-Aug-15	Dissolved Oxygen, Field	7.8	mg/L
E300094	RG_BORDER	8-Sep-15	Dissolved Oxygen, Field	7.0	mg/L
E300094	RG_BORDER	8-Sep-15	Dissolved Oxygen, Field	7.0	mg/L
E300094	RG_BORDER	8-Sep-15	Dissolved Oxygen, Field	7.0	mg/L
E300094	RG_BORDER	6-Oct-15	Dissolved Oxygen, Field	7.4	mg/L
E300094	RG_BORDER	6-Oct-15	Dissolved Oxygen, Field	7.4	mg/L
E300094	RG_BORDER	6-Oct-15	Dissolved Oxygen, Field	7.4	mg/L
E300094	RG_BORDER	7-Apr-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	7-Apr-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	7-Apr-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	14-Apr-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	14-Apr-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	14-Apr-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	21-Apr-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	21-Apr-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	21-Apr-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	27-Apr-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	27-Apr-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	27-Apr-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	5-May-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	5-May-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	5-May-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	12-May-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	12-May-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	12-May-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	19-May-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	19-May-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	19-May-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	26-May-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	26-May-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	26-May-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	9-Jun-15	Mercury	< 0.005	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E300094	RG_BORDER	9-Jun-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	9-Jun-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	16-Jun-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	16-Jun-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	16-Jun-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	23-Jun-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	23-Jun-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	23-Jun-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	30-Jun-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	30-Jun-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	30-Jun-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	7-Jul-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	7-Jul-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	7-Jul-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	15-Jul-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	15-Jul-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	15-Jul-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	4-Aug-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	4-Aug-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	8-Sep-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	8-Sep-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	8-Sep-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	6-Oct-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	6-Oct-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	6-Oct-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	3-Nov-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	3-Nov-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	3-Nov-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	1-Dec-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	1-Dec-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	1-Dec-15	Mercury	< 0.005	µg/L
E300094	RG_BORDER	8-Sep-15	Temperature, Field	17.6	°C
E300094	RG_BORDER	8-Sep-15	Temperature, Field	17.3	°C
E300094	RG_BORDER	6-Oct-15	Temperature, Field	15.2	°C
E300230	RG_DSELK	26-May-15	Aluminum	0.3	mg/L
E300230	RG_DSELK	7-Apr-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	7-Apr-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	7-Apr-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	14-Apr-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	14-Apr-15	Mercury	< 0.005	µg/L



**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E300230	RG_DSELK	14-Apr-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	21-Apr-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	21-Apr-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	21-Apr-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	27-Apr-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	27-Apr-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	27-Apr-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	30-Apr-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	30-Apr-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	30-Apr-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	5-May-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	5-May-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	5-May-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	12-May-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	12-May-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	12-May-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	19-May-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	19-May-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	19-May-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	26-May-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	26-May-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	26-May-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	9-Jun-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	9-Jun-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	9-Jun-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	16-Jun-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	16-Jun-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	16-Jun-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	23-Jun-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	23-Jun-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	23-Jun-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	30-Jun-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	30-Jun-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	30-Jun-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	7-Jul-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	7-Jul-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	7-Jul-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	15-Jul-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	15-Jul-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	15-Jul-15	Mercury	< 0.005	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E300230	RG_DSELK	4-Aug-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	4-Aug-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	4-Aug-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	8-Sep-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	8-Sep-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	8-Sep-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	6-Oct-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	6-Oct-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	6-Oct-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	3-Nov-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	3-Nov-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	3-Nov-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	1-Dec-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	1-Dec-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	1-Dec-15	Mercury	< 0.005	µg/L
E300230	RG_DSELK	8-Sep-15	Temperature, Field	17.2	°C
E300230	RG_DSELK	8-Sep-15	Temperature, Field	17.2	°C
E300230	RG_DSELK	8-Sep-15	Temperature, Field	16.3	°C
E294312	RG_ELKORES	17-Mar-15	Aluminum	0.1	mg/L
E294312	RG_ELKORES	17-Mar-15	Aluminum	0.1	mg/L
E294312	RG_ELKORES	26-May-15	Iron	1.1	mg/L
E294312	RG_ELKORES	2-Jun-15	Iron	1.1	mg/L
E294312	RG_ELKORES	6-Jan-15	Mercury	< 0.01	µg/L
E294312	RG_ELKORES	3-Feb-15	Mercury	< 0.01	µg/L
E294312	RG_ELKORES	3-Mar-15	Mercury	< 0.01	µg/L
E294312	RG_ELKORES	17-Mar-15	Mercury	< 0.01	µg/L
E294312	RG_ELKORES	24-Mar-15	Mercury	< 0.01	µg/L
E294312	RG_ELKORES	1-Apr-15	Mercury	< 0.01	µg/L
E294312	RG_ELKORES	7-Apr-15	Mercury	< 0.009	µg/L
E294312	RG_ELKORES	14-Apr-15	Mercury	< 0.008	µg/L
E294312	RG_ELKORES	21-Apr-15	Mercury	< 0.007	µg/L
E294312	RG_ELKORES	27-Apr-15	Mercury	< 0.006	µg/L
E294312	RG_ELKORES	5-May-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	12-May-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	19-May-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	26-May-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	2-Jun-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	9-Jun-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	16-Jun-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	23-Jun-15	Mercury	< 0.005	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E294312	RG_ELKORES	30-Jun-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	7-Jul-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	15-Jul-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	21-Jul-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	28-Jul-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	4-Aug-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	8-Sep-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	6-Oct-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	3-Nov-15	Mercury	< 0.005	µg/L
E294312	RG_ELKORES	1-Dec-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	4-Aug-15	Dissolved Oxygen, Field	8.0	mg/L
E300092	RG_GRASMERE	4-Aug-15	Dissolved Oxygen, Field	8.0	mg/L
E300092	RG_GRASMERE	4-Aug-15	Dissolved Oxygen, Field	8.0	mg/L
E300092	RG_GRASMERE	7-Apr-15	Iron	1.2	mg/L
E300092	RG_GRASMERE	7-Apr-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	7-Apr-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	7-Apr-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	14-Apr-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	14-Apr-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	14-Apr-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	21-Apr-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	21-Apr-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	21-Apr-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	27-Apr-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	27-Apr-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	27-Apr-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	5-May-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	5-May-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	5-May-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	12-May-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	12-May-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	12-May-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	19-May-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	19-May-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	19-May-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	26-May-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	26-May-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	26-May-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	9-Jun-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	9-Jun-15	Mercury	< 0.005	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E300092	RG_GRASMERE	9-Jun-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	16-Jun-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	16-Jun-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	16-Jun-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	23-Jun-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	23-Jun-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	23-Jun-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	30-Jun-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	30-Jun-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	30-Jun-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	7-Jul-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	7-Jul-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	7-Jul-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	15-Jul-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	15-Jul-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	15-Jul-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	4-Aug-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	4-Aug-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	4-Aug-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	8-Sep-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	8-Sep-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	8-Sep-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	6-Oct-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	6-Oct-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	6-Oct-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	3-Nov-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	3-Nov-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	3-Nov-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	1-Dec-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	1-Dec-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	1-Dec-15	Mercury	< 0.005	µg/L
E300092	RG_GRASMERE	8-Sep-15	Temperature, Field	17.3	°C
E300092	RG_GRASMERE	8-Sep-15	Temperature, Field	16.2	°C
E300092	RG_GRASMERE	6-Oct-15	Temperature, Field	15.1	°C
E300095	RG_KERRRD	27-Apr-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	27-Apr-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	27-Apr-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	30-Apr-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	30-Apr-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	30-Apr-15	Mercury	< 0.005	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E300095	RG_KERRRD	5-May-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	5-May-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	5-May-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	12-May-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	12-May-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	12-May-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	19-May-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	19-May-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	19-May-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	26-May-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	26-May-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	26-May-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	9-Jun-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	9-Jun-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	9-Jun-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	16-Jun-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	16-Jun-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	16-Jun-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	23-Jun-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	23-Jun-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	23-Jun-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	30-Jun-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	30-Jun-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	30-Jun-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	7-Jul-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	7-Jul-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	7-Jul-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	15-Jul-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	15-Jul-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	15-Jul-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	4-Aug-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	4-Aug-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	4-Aug-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	8-Sep-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	8-Sep-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	8-Sep-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	6-Oct-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	6-Oct-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	6-Oct-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	3-Nov-15	Mercury	< 0.005	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E300095	RG_KERRRD	3-Nov-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	3-Nov-15	Mercury	< 0.005	µg/L
E300095	RG_KERRRD	8-Sep-15	Temperature, Field	16.4	°C
E300095	RG_KERRRD	8-Sep-15	Temperature, Field	16.3	°C
E300093	RG_USGOLD	4-Aug-15	Dissolved Oxygen, Field	7.5	mg/L
E300093	RG_USGOLD	4-Aug-15	Dissolved Oxygen, Field	7.5	mg/L
E300093	RG_USGOLD	4-Aug-15	Dissolved Oxygen, Field	7.5	mg/L
E300093	RG_USGOLD	4-Aug-15	Dissolved Oxygen, Field	7.5	mg/L
E300093	RG_USGOLD	4-Aug-15	Dissolved Oxygen, Field	7.5	mg/L
E300093	RG_USGOLD	4-Aug-15	Dissolved Oxygen, Field	7.5	mg/L
E300093	RG_USGOLD	7-Apr-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	7-Apr-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	7-Apr-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	14-Apr-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	14-Apr-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	14-Apr-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	21-Apr-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	21-Apr-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	21-Apr-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	27-Apr-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	27-Apr-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	27-Apr-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	5-May-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	5-May-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	5-May-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	12-May-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	12-May-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	12-May-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	19-May-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	19-May-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	19-May-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	26-May-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	26-May-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	26-May-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	9-Jun-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	9-Jun-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	9-Jun-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	16-Jun-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	16-Jun-15	Mercury	< 0.005	µg/L

**Table E-6. Regional Monitoring (includes Order Stations and Compliance Sites): Summary of Receiving Environment Water Samples Identified at or Above the British Columbia Approved/Working Freshwater Aquatic Life Water Quality Guidelines (includes data where Method Detection Limits were above the Guideline)**

EMS ID	Site ID	Date	Parameter	Reported Concentration or MDL	Units
E300093	RG_USGOLD	16-Jun-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	23-Jun-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	23-Jun-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	23-Jun-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	30-Jun-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	30-Jun-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	30-Jun-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	7-Jul-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	7-Jul-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	7-Jul-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	15-Jul-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	15-Jul-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	15-Jul-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	4-Aug-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	4-Aug-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	8-Sep-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	8-Sep-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	8-Sep-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	6-Oct-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	6-Oct-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	6-Oct-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	3-Nov-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	3-Nov-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	3-Nov-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	1-Dec-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	1-Dec-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	1-Dec-15	Mercury	< 0.005	µg/L
E300093	RG_USGOLD	8-Sep-15	Temperature, Field	17.5	°C
E300093	RG_USGOLD	8-Sep-15	Temperature, Field	17.4	°C
E300093	RG_USGOLD	8-Sep-15	Temperature, Field	16.8	°C
E300093	RG_USGOLD	6-Oct-15	Temperature, Field	15.1	°C

## **Appendix F – Acute Toxicity Biological Tests Reports during Commissioning of the WLC AWTF**





**ATTN: [lyudmyla.shvets@alsglobal.com](mailto:lyudmyla.shvets@alsglobal.com)**  
ALS Laboratory Group  
2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/10/21  
Report Date: 2015/11/02  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1424  
**Billing:** L1690822

A handwritten signature in black ink, appearing to read "J. Shvets", is positioned above a horizontal line.

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)

**Result Summary**

Client: ALS106
Reference: 15-1424-01-TRD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1690822-1 SP20

**Collection:** collected on 2015/10/19 at not given by not given

**Receipt:** received on 2015/10/21 at 0950 by MC

**Containers:** received 4 x 20 L carboy; 2 x 500 mL bottle at 8 °C, in good condition with no seals and no initials

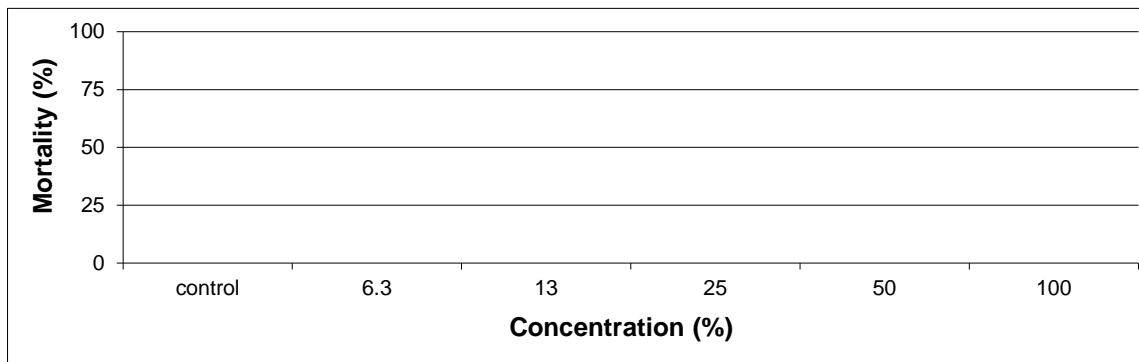
**Description:** type: water, collection method: not given

**Test:** started on 2015/10/21 ; ended on 2015/10/25

**Result:**

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute:	LC50	>100		could not be calculated
(mortality)	LC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

## Test Conditions

Client: ALS106  
Reference: 15-1424-01-TRD

**Method:** Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

**Test type:** Trout 96-h Static Acute Test (WTR-ME-041)

**Species:** *Oncorhynchus mykiss*

**Organism source:** Sam Livingston Fish Hatchery (Batch 20151009TR)

**Acclimation:** 12 days (must be  $\geq 2$  weeks)

**Stock mortality:** 0.1% (seven days preceding testing)

**Sample initial chemistry:** pH: 8.1; EC: 2970 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 8.0 (mg/L); temperature: 14 °C  
hardness (mg CaCO<sub>3</sub>/L): 630; colour: colourless; odour: odourless

**Sample holding time:** 2 days (must be  $\leq 5$  days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** The test was conducted in 22 L plastic pails with polyethylene liners

**Test volume:** 20 Litres (depth of solution in each test vessel  $\geq 15\text{cm}$ )

**Sample pre-treatment:** All test solutions and controls were pre-aerated for 120 minutes at 6.5  $\pm$  1 mL/min/L  
Dissolved oxygen in 100 % sample was 9 mg/L after pre-aeration  
The sample was not filtered or pH adjusted prior to or during testing

**Loading density:** 0.15 g/Litre (must be  $\leq 0.5$  g/Litre)

**Control/dilution water:** Dechlorinated City of Calgary water acclimated to test conditions

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment; 10 fish per replicate

**Feeding:** Fish are not fed 24 hours before test initiation and no feeding during test

**Measurements:** pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination

**Aeration:** All treatments aerated at 6.5  $\pm$  1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones

**Lighting:** Overhead full spectrum fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 15  $\pm$  1°C

**Endpoint:** Mortality, 96-h LC50 (with 95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq 90\%$ )

The control had 0 percent (%) stressed behaviour (must  $\leq 10\%$ )

**Reference toxicant:** 96-h test with Potassium Chloride (KCl) initiated October 26, 2015; current results (96-h LC50 and 95% confidence limits) = 0.58 (0.50-0.63) log (g/L KCl)  
historical results:  
(96-h LC50 and 95% confidence limits) = 0.57 (0.50-0.64) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

**Test Data**

Client: ALS106
Reference: 15-1424-01-TRD

**Test Log:**

Date	Day	Time	Technician
2015/10/21	0	1545	CQ
2015/10/22	1	0845	JK
2015/10/23	2	0900	DS
2015/10/24	3	0715	CQ
2015/10/25	4	1000	NM/HKS

**Chemistry:**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	pH (units)					
0	7.3	7.2	7.2	7.4	7.6	7.7
4	7.8	7.9	8.0	8.2	8.1	8.3

Day	Conductivity ( $\mu\text{S}/\text{cm}$ @ 25°C)					
0	450	625	765	1160	1783	3090
4	463	639	968	1148	1688	2840

Day	Dissolved Oxygen (mg/L)					
0	8.6	8.7	8.8	8.8	8.9	9.0
4	8.6	8.7	8.8	9.0	8.9	8.9

Day	Temperature (°C)					
0	15	15	14	14	14	14
4	15	14	14	14	14	14

**Number Alive (In brackets number stressed):**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	Number Alive					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	10	10	10	10	10

Day	Mortality (%)					
4	0	0	0	0	0	0

Day	Stressed (%)					
4	0	0	0	0	0	0

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**Biology Summary Tables:**

Control Fish	Length (cm)	Wet Weight(g)
1	2.6	0.3
2	2.6	0.3
3	3.0	0.3
4	3.0	0.3
5	2.5	0.2
6	3.0	0.3
7	3.0	0.4
8	3.1	0.4
9	2.6	0.3
10	2.7	0.2

average	2.8	0.3
sd	0.2	0.1
cv(%)	8.1	22.2

Notes: nd, not done; na, not applicable;  
 sd, standard deviation; cv(%), coefficient of variation

**Test Data**

Conc. (%)	Group Wet Weight (g)
control	3.0
6.3	3.4
13	3.1
25	2.9
50	2.7
100	2.9

Client: ALS106
Reference: 15-1424-01-TRD

## Comments/Statistics

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

**Protocol Deviations:**

The fish were held for less than 14 days prior to test initiation, as per the client's request

**Result Summary**

Client: ALS106 Reference: 15-1424-01-DAD
---

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1690822-1 SP20

**Collection:** collected on 2015/10/19 at not given by not given

**Receipt:** received on 2015/10/21 at 0950 by MC

**Containers:** received 4 x 20 L carboy; 2 x 500 mL bottle at 8 °C, in good condition with no seals and no initials

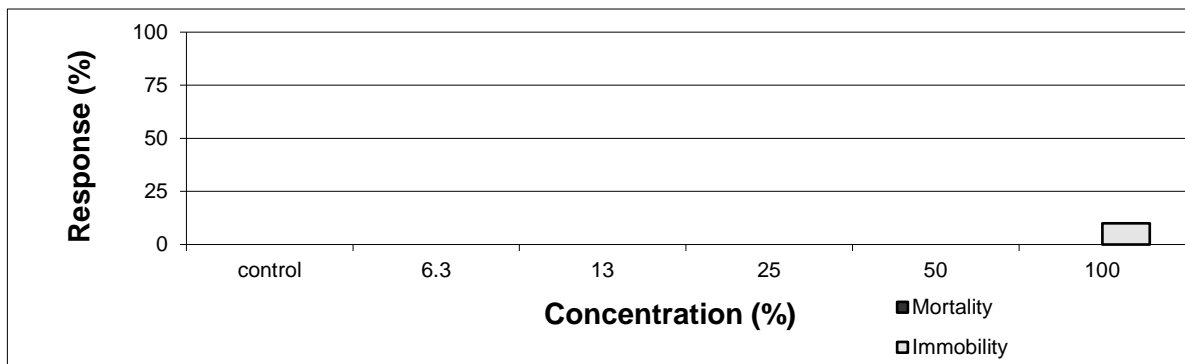
**Description:** type: water, collection method: not given

**Test:** started on 2015/10/22 ; ended on 2015/10/24

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

## Test Conditions

Client: ALS106  
Reference: 15-1424-01-DAD

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 4%

**Culture brood data:** 9 days to first brood  
17 neonates per average brood

**Sample initial chemistry:** pH: 8.1; EC: 2970 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 8.0 (mg/L); temperature: 14 °C  
hardness (mg CaCO<sub>3</sub>/L): 630; colour: colourless; odour: odourless

**Sample holding time:** 3 days (must be  $\leq$  5 days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 0 minutes (rate of 37.5  $\pm$  12.5 mL/min.L-1)  
The hardness of the sample was not adjusted (mg CaCO<sub>3</sub>/L) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and Na<sub>2</sub>SeO<sub>3</sub> (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 83 mg CaCO<sub>3</sub>/L

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 20  $\pm$  2°C

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1424-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated October 23, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.78 (0.76-0.81) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.70-0.84) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page



## Test Data

Client: ALS106
Reference: 15-1424-01-DAD

### Test Log:

Date	Day	Time	Technician
2015/10/22	0	1200	NM/DS
2015/10/23	1	0900	ML
2015/10/24	2	1030	JK

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		
pH (units)								
Day								
0	8.0	8.0	8.0	8.0	8.0	8.0		
2	7.9	8.0	8.2	8.3	8.2	8.2		
Conductivity (µS/cm @ 25°C)								
0	286	435	602	971	1575	2840		
2	235	422	613	1035	1548	2880		
Dissolved Oxygen (mg/L)								
0	7.9	8.0	7.9	7.8	7.9	7.9		
2	7.9	8.1	8.1	8.1	8.1	8.0		
Temperature (°C)								
0	20	20	19	19	19	19		
2	19	19	20	19	19	20		

### Biology:

Conc. (%)	control	6.3	13	25	50	100		
Number Alive and Behavior (behavior is in brackets)								
Day								
1	10	10	10 (1I)	10	10	10		
2	10	10	10	10	10	10 (1I)		
Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;								
Mortality (%)								
2	0	0	0	0	0	0		
Immobility (%)								
2	0	0	0	0	0	10		

**Comments/Statistics**

Client: ALS106 Reference: 15-1424-01-DAD
---

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

**Protocol Deviations:**

None

## GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated into and form part of the Chain of Custody between HydroQual Laboratories Ltd. ("HydroQual") and the party named in the Chain of Custody (the "Client").

1. **Definitions:** Capitalized terms shall have the definition ascribed as such in these General Terms and Conditions and the Chain of Custody.
2. **The Services:** HydroQual will provide the Services to the Client as listed and described in the Chain of Custody.
3. **Prices:** HydroQual may review and change all prices, fees, surcharges or other charges as set out in proposals and/or price quotations if there are changes to HydroQual's cost beyond HydroQual's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding condition 3, all quotations are reviewed and updated on a yearly basis.
4. **Payment Terms:** The Client shall pay HydroQual within 30 days of the invoice date as provided by HydroQual. HydroQual may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. **Quotation Numbers:** The Client shall provide the proposal and/or price quotation number to HydroQual (where applicable) to ensure correct pricing.
6. **Taxes:** Applicable taxes are not included in prices, surcharges and additional fees and will be added at the time of invoicing.
7. **No Guarantee of Results:** The Client is responsible for informing itself on the limitation of the results and acknowledges that the results are not guaranteed.
8. **Standard of Care:** HydroQual will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested, subject to that level of care and skill ordinarily exercised by other laboratories currently practicing under similar conditions in the same locality, subject to the time limits and financial, physical or other constraints applicable to the Services. No warranty, express or implied, is made.
9. **Storage:** Where possible, HydroQual will store samples until a final report is issued to the Client, after which time HydroQual may discard the sample.
10. **Holds:** If the Client requests a sample be placed on hold, HydroQual will store the sample for the mutually agreed upon written time and price, after which HydroQual will invoice the Client and discard the sample.
11. **Archives:** If the Client requests a sample be archived, HydroQual will store the sample for a mutually agreed upon written time frame and price, after which HydroQual will invoice the Client and discard the sample.
12. **Handling Protocol:** Legal sample handling protocol must be arranged, and provided in writing, before samples are collected. HydroQual will provide a price quotation for legal sample protocol. Samples processed under legal protocol are stored indefinitely, subject to a storage charge as advised by HydroQual.
13. **Samples:** The quality, condition, content and source of samples stored and tested are not known to HydroQual except as declared and described on the Chain of Custody completed and submitted by the Client and accompanying the sample.
14. **Risk of Loss:** HydroQual will use reasonable care to protect samples during storage, however, all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the client forever releases HydroQual from any and all claims the Client may have for any loss or damage to the sample.
15. **Environmental:** the Client must comply with all applicable environmental legislation, including labeling all hazardous samples to comply with Canada's *Workplace Hazardous Materials Information System* and the Alberta *Transfer of Dangerous Goods* regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client shall defend, indemnify and hold harmless HydroQual for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
16. **Hazardous Materials Disposal:** HydroQual may return, at the Client's cost, hazardous material to the Client for disposal.
17. **Hazardous Materials Surcharge:** HydroQual may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials ("NORM"), such as and including without limitation, H<sub>2</sub>S and CN.
18. **Sample Containers:** HydroQual may ship sample containers to the Client's location by the most cost effective means using HydroQual's preferred courier suppliers, within the specified project timeline. Shipping will be charged back to the Client.
19. **Additional Charges:** HydroQual may charge the Client:
  - (a) for pick-up and delivery services when provided subject in each instance to a minimum charge of \$50.00; and,
  - (b) for rush service (processing samples and/or reporting).
20. **Large Bottle Orders:** The Client shall provide HydroQual with not less than 24 hours' notice for large bottle orders.
21. **Re-Tests:** HydroQual reserves the right to re-test any samples that remain in HydroQual's possession. Re-tests requested by the Client may be charged to Client and Client agrees to pay for such charges.
22. **Waiver:** The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any and all claims against HydroQual that the Client may have against HydroQual as a result of the interpretation of the results provided to the Client. The Client shall defend, indemnify and save harmless HydroQual for any and all claims made by any third party against HydroQual in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.



**ATTN: Lyudmyla Shvets**  
ALS Laboratory Group  
2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/10/22  
Report Date: 2015/11/03  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1437  
**Billing:** L1691588

A handwritten signature in cursive script, reading "Jacquelyn Poole".

---

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)

**Result Summary**

Client: ALS106
Reference: 15-1437-01-TRD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1691588-1 SP20

**Collection:** collected on 2015/10/21 at not given by not given

**Receipt:** received on 2015/10/22 at 1040 by MC

**Containers:** received 4 x 20 L carboys at 10 °C, in good condition with no seals and no initials

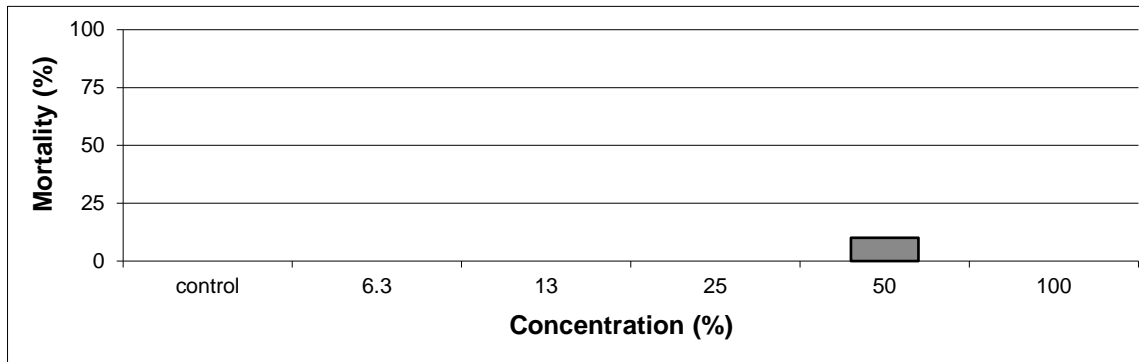
**Description:** type: water, collection method: not given

**Test:** started on 2015/10/22 ; ended on 2015/10/26

**Result:**

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute:	LC50	>100		could not be calculated
(mortality)	LC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

## Test Conditions

Client: ALS106  
Reference: 15-1437-01-TRD

**Method:** Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

**Test type:** Trout 96-h Static Acute Test (WTR-ME-041)

**Species:** *Oncorhynchus mykiss*

**Organism source:** Sam Livingston Fish Hatchery (Batch 20151009TR)

**Acclimation:** 13 days (must be  $\geq 2$  weeks)

**Stock mortality:** 0.30% (seven days preceding testing)

**Sample initial chemistry:** pH: 7.9; EC: 3140 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 7.4 (mg/L); temperature: 16 °C  
hardness (mg CaCO<sub>3</sub>/L): 636; colour: colourless; odour: odourless

**Sample holding time:** 1 day (must be  $\leq 5$  days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** The test was conducted in 22 L plastic pails with polyethylene liners

**Test volume:** 20 Litres (depth of solution in each test vessel  $\geq 15\text{cm}$ )

**Sample pre-treatment:** All test solutions and controls were pre-aerated for 30 minutes at 6.5  $\pm$  1 mL/min/L  
Dissolved oxygen in 100 % sample was 8.7 mg/L after pre-aeration  
The sample was not filtered or pH adjusted prior to or during testing

**Loading density:** 0.16 g/Litre (must be  $\leq 0.5$  g/Litre)

**Control/dilution water:** Dechlorinated City of Calgary water acclimated to test conditions

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment; 10 fish per replicate

**Feeding:** Fish are not fed 24 hours before test initiation and no feeding during test

**Measurements:** pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination

**Aeration:** All treatments aerated at 6.5  $\pm$  1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones

**Lighting:** Overhead full spectrum fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 15  $\pm$  1°C

**Endpoint:** Mortality, 96-h LC50 (with 95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq 90\%$ )

The control had 0 percent (%) stressed behaviour (must  $\leq 10\%$ )

**Reference toxicant:** 96-h test with Potassium Chloride (KCl) initiated October 26, 2015; current results (96-h LC50 and 95% confidence limits) = 0.58 (0.50-0.63) log (g/L KCl)  
historical results:

(96-h LC50 and 95% confidence limits) = 0.57 (0.50-0.64) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

**Test Data**

Client: ALS106
Reference: 15-1437-01-TRD

**Test Log:**

Date	Day	Time	Technician
2015/10/22	0	1530	CQ
2015/10/23	1	915	DS
2015/10/24	2	710	CQ
2015/10/25	3	930	NM
2015/10/26	4	940	HKS/ML

**Chemistry:**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	pH (units)					
0	7.5	7.6	7.7	7.8	8.0	8.1
4	8.2	8.3	8.3	8.3	8.3	8.3

Day	Conductivity ( $\mu\text{S/cm}$ @ 25°C)					
0	451	645	845	1215	1860	3170
4	467	651	847	1201	1831	3070

Day	Dissolved Oxygen (mg/L)					
0	8.6	8.6	8.7	8.7	8.6	8.7
4	8.7	8.9	8.9	8.9	8.9	8.9

Day	Temperature (°C)					
0	15	15	15	16	15	14
4	16	15	15	15	15	15

**Number Alive (In brackets number stressed):**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	Number Alive					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	10	10	10	9	10

Day	Mortality (%)					
4	0	0	0	0	10	0

Day	Stressed (%)					
4	0	0	0	0	0	0

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**Biology Summary Tables:**

Control Fish	Length (cm)	Wet Weight(g)
1	3.5	0.4
2	3.4	0.3
3	3.4	0.4
4	3.1	0.3
5	3.2	0.5
6	3.3	0.2
7	2.8	0.2
8	3.3	0.4
9	2.8	0.3
10	2.6	0.2

average	3.1	0.3
sd	0.3	0.1
cv(%)	9.8	32.3

Notes: nd, not done; na, not applicable;  
 sd, standard deviation; cv(%), coefficient  
 of variation

**Test Data**

Conc. (%)	Group Wet Weight (g)
control	3.2
6.3	2.5
13	3.0
25	3.1
50	2.7
100	2.9

Client: ALS106
Reference: 15-1437-01-TRD

## Comments/Statistics

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

**Protocol Deviations:**

The fish were held for less than 14 days prior to test initiation, as per the client's request



## Result Summary

 Client: ALS106  
 Reference: 15-1437-01-DAD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1691588-1 SP20

**Collection:** collected on 2015/10/21 at not given by not given

**Receipt:** received on 2015/10/22 at 1040 by MC

**Containers:** received 4 x 20 L carboys at 10 °C, in good condition with no seals and no initials

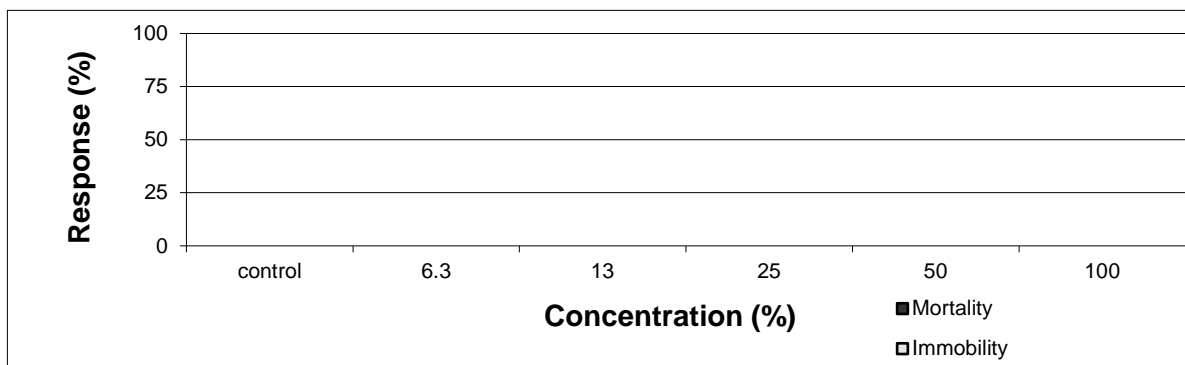
**Description:** type: water, collection method: not given

**Test:** started on 2015/10/22 ; ended on 2015/10/24

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

**Test Conditions**

Client: ALS106 Reference: 15-1437-01-DAD
---

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 7%

**Culture brood data:** 9 days to first brood

17 neonates per average brood

**Sample initial chemistry:** pH: 7.9; EC: 3140 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 7.4 (mg/L); temperature: 16 °C  
hardness (mg CaCO<sub>3</sub>/L): 636; colour: colourless; odour: odourless

**Sample holding time:** 1 day (must be  $\leq$  5 days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 0 minutes (rate of 37.5  $\pm$  12.5 mL/min.L-1)  
The hardness of the sample was not adjusted (mg CaCO<sub>3</sub>/L) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and Na<sub>2</sub>SeO<sub>3</sub> (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 83 mg CaCO<sub>3</sub>/L

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 20  $\pm$  2°C

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1437-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated October 23, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.78 (0.76-0.81) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.70-0.84) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

## Test Data

Client: ALS106
Reference: 15-1437-01-DAD

### Test Log:

Date	Day	Time	Technician
2015/10/22	0	1200	NM/DS
2015/10/23	1	900	ML
2015/10/24	2	1040	JK

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		

Day

pH (units)

0	7.8	7.9	8.0	8.0	8.0	7.9		
2	7.4	7.8	7.9	8.2	8.3	8.2		

 Conductivity ( $\mu\text{S}/\text{cm}$  @ 25°C)

0	214	421	629	995	1720	3120		
2	222	420	626	1128	1846	3110		

Dissolved Oxygen (mg/L)

0	7.9	7.9	7.9	7.9	7.9	7.9		
2	8.1	8.2	8.1	8.1	8.2	8.1		

Temperature (°C)

0	20	20	20	20	20	20		
2	19	19	19	19	19	19		

### Biology:

Conc. (%)	control	6.3	13	25	50	100		

Day

Number Alive and Behavior (behavior is in brackets)

1	10 (1F)	10	10	10	10	10		
2	10	10	10	10	10	10		

Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;

Mortality (%)

2	0	0	0	0	0	0		
---	---	---	---	---	---	---	--	--

Immobility (%)

2	0	0	0	0	0	0		
---	---	---	---	---	---	---	--	--

## Comments/Statistics

Client: ALS106 Reference: 15-1437-01-DAD
---

### Test Result Comments:

None

### Data Analysis:

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

### Protocol Deviations:

None

## GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated into and form part of the Chain of Custody between HydroQual Laboratories Ltd. ("HydroQual") and the party named in the Chain of Custody (the "Client").

1. **Definitions:** Capitalized terms shall have the definition ascribed as such in these General Terms and Conditions and the Chain of Custody.
2. **The Services:** HydroQual will provide the Services to the Client as listed and described in the Chain of Custody.
3. **Prices:** HydroQual may review and change all prices, fees, surcharges or other charges as set out in proposals and/or price quotations if there are changes to HydroQual's cost beyond HydroQual's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding condition 3, all quotations are reviewed and updated on a yearly basis.
4. **Payment Terms:** The Client shall pay HydroQual within 30 days of the invoice date as provided by HydroQual. HydroQual may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. **Quotation Numbers:** The Client shall provide the proposal and/or price quotation number to HydroQual (where applicable) to ensure correct pricing.
6. **Taxes:** Applicable taxes are not included in prices, surcharges and additional fees and will be added at the time of invoicing.
7. **No Guarantee of Results:** The Client is responsible for informing itself on the limitation of the results and acknowledges that the results are not guaranteed.
8. **Standard of Care:** HydroQual will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested, subject to that level of care and skill ordinarily exercised by other laboratories currently practicing under similar conditions in the same locality, subject to the time limits and financial, physical or other constraints applicable to the Services. No warranty, express or implied, is made.
9. **Storage:** Where possible, HydroQual will store samples until a final report is issued to the Client, after which time HydroQual may discard the sample.
10. **Holds:** If the Client requests a sample be placed on hold, HydroQual will store the sample for the mutually agreed upon written time and price, after which HydroQual will invoice the Client and discard the sample.
11. **Archives:** If the Client requests a sample be archived, HydroQual will store the sample for a mutually agreed upon written time frame and price, after which HydroQual will invoice the Client and discard the sample.
12. **Handling Protocol:** Legal sample handling protocol must be arranged, and provided in writing, before samples are collected. HydroQual will provide a price quotation for legal sample protocol. Samples processed under legal protocol are stored indefinitely, subject to a storage charge as advised by HydroQual.
13. **Samples:** The quality, condition, content and source of samples stored and tested are not known to HydroQual except as declared and described on the Chain of Custody completed and submitted by the Client and accompanying the sample.
14. **Risk of Loss:** HydroQual will use reasonable care to protect samples during storage, however, all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the client forever releases HydroQual from any and all claims the Client may have for any loss or damage to the sample.
15. **Environmental:** the Client must comply with all applicable environmental legislation, including labeling all hazardous samples to comply with Canada's *Workplace Hazardous Materials Information System* and the Alberta *Transfer of Dangerous Goods* regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client shall defend, indemnify and hold harmless HydroQual for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
16. **Hazardous Materials Disposal:** HydroQual may return, at the Client's cost, hazardous material to the Client for disposal.
17. **Hazardous Materials Surcharge:** HydroQual may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials ("NORM"), such as and including without limitation, H<sub>2</sub>S and CN.
18. **Sample Containers:** HydroQual may ship sample containers to the Client's location by the most cost effective means using HydroQual's preferred courier suppliers, within the specified project timeline. Shipping will be charged back to the Client.
19. **Additional Charges:** HydroQual may charge the Client:
  - (a) for pick-up and delivery services when provided subject in each instance to a minimum charge of \$50.00; and,
  - (b) for rush service (processing samples and/or reporting).
20. **Large Bottle Orders:** The Client shall provide HydroQual with not less than 24 hours' notice for large bottle orders.
21. **Re-Tests:** HydroQual reserves the right to re-test any samples that remain in HydroQual's possession. Re-tests requested by the Client may be charged to Client and Client agrees to pay for such charges.
22. **Waiver:** The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any and all claims against HydroQual that the Client may have against HydroQual as a result of the interpretation of the results provided to the Client. The Client shall defend, indemnify and save harmless HydroQual for any and all claims made by any third party against HydroQual in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.



**ATTN: Lyudmyla Shvets**  
ALS Laboratory Group  
2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/10/22  
Report Date: 2015/11/03  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1439  
**Billing:** L1691693

A handwritten signature in cursive script, reading "Jacklyn Rose".

---

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1**  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)

## Result Summary

Client: ALS106
Reference: 15-1439-01-TRD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1691693-1 LC 100

**Collection:** collected on 2015/10/21 at not given by not given

**Receipt:** received on 2015/10/22 at 1050 by MC

**Containers:** received 2 x 20 L carboy, 2 x 1 L bottle at 13 °C, in good condition with no seals and no initials

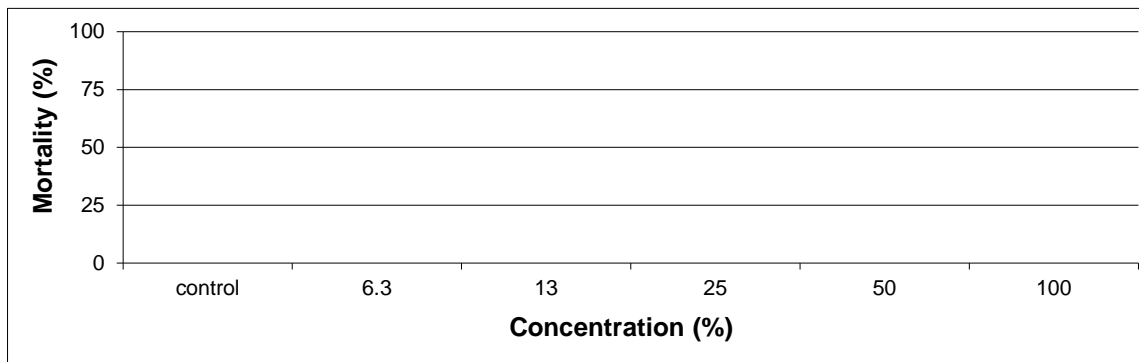
**Description:** type: water, collection method: not given

**Test:** started on 2015/10/22 ; ended on 2015/10/26

**Result:**

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%)		Method Calculated
			lower	upper	
Acute:	LC50	>100			could not be calculated
(mortality)	LC25	>100			could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.



## Test Conditions

Client: ALS106  
Reference: 15-1439-01-TRD

**Method:** Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

**Test type:** Trout 96-h Static Acute Test (WTR-ME-041)

**Species:** *Oncorhynchus mykiss*

**Organism source:** Sam Livingston (Batch 20151009TR)

**Acclimation:** 13 days (must be  $\geq 2$  weeks)

**Stock mortality:** 0.30% (seven days preceding testing)

**Sample initial chemistry:** pH: 7.7; EC: 990 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 8.7 (mg/L); temperature: 14 °C  
hardness (mg CaCO<sub>3</sub>/L): 390; colour: colourless; odour: odourless

**Sample holding time:** 1 day (must be  $\leq 5$  days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** The test was conducted in 22 L plastic pails with polyethylene liners

**Test volume:** 20 Litres (depth of solution in each test vessel  $\geq 15\text{cm}$ )

**Sample pre-treatment:** All test solutions and controls were pre-aerated for 120 minutes at 6.5  $\pm$  1 mL/min/L  
Dissolved oxygen in 100 % sample was 9.5 mg/L after pre-aeration  
The sample was not filtered or pH adjusted prior to or during testing

**Loading density:** 0.14 g/Litre (must be  $\leq 0.5$  g/Litre)

**Control/dilution water:** Dechlorinated City of Calgary water acclimated to test conditions

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment; 10 fish per replicate

**Feeding:** Fish are not fed 24 hours before test initiation and no feeding during test

**Measurements:** pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination

**Aeration:** All treatments aerated at 6.5  $\pm$  1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones

**Lighting:** Overhead full spectrum fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 15  $\pm$  1°C

**Endpoint:** Mortality, 96-h LC50 (with 95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq 90\%$ )

The control had 0 percent (%) stressed behaviour (must  $\leq 10\%$ )

**Reference toxicant:** 96-h test with Potassium Chloride (KCl) initiated October 26, 2015; current results (96-h LC50 and 95% confidence limits) = 0.58 (0.50-0.63) log (g/L KCl)  
historical results:  
(96-h LC50 and 95% confidence limits) = 0.57 (0.50-0.64) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

**Test Data**

Client: ALS106
Reference: 15-1439-01-TRD

**Test Log:**

Date	Day	Time	Technician
2015/10/22	0	1700	CQ
2015/10/23	1	0915	DS
2015/10/24	2	0710	CQ
2015/10/25	3	0930	NM
2015/10/26	4	0930	ML

**Chemistry:**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	pH (units)					
0	7.5	7.6	7.5	7.5	7.6	7.7
4	8.2	8.2	8.2	8.2	8.2	8.2

Day	Conductivity ( $\mu\text{S/cm}$ @ 25°C)					
0	463	503	535	606	734	981
4	469	506	531	606	736	978

Day	Dissolved Oxygen (mg/L)					
0	8.9	8.9	8.9	8.9	9.1	9.5
4	8.9	8.9	8.9	8.9	8.9	8.9

Day	Temperature (°C)					
0	15	16	16	15	15	14
4	15	15	15	15	15	15

**Number Alive (In brackets number stressed):**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	Number Alive (In brackets number stressed)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	10	10	10	10	10

Day	Mortality (%)					
4	0	0	0	0	0	0

Day	Stressed (%)					
4	0	0	0	0	0	0

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**Biology Summary Tables:**

Control Fish	Length (cm)	Wet Weight(g)
1	2.8	0.2
2	2.8	0.3
3	2.4	0.2
4	2.1	0.3
5	3.8	0.3
6	3.4	0.4
7	2.6	0.3
8	3.1	0.3
9	2.8	0.2
10	3.0	0.3

average	2.9	0.3
sd	0.5	0.1
cv(%)	16.8	22.6

Notes: nd, not done; na, not applicable;  
 sd, standard deviation; cv(%), coefficient of variation

**Test Data**

Conc. (%)	Group Wet Weight (g)
control	2.8
6.3	2.9
13	3.5
25	2.7
50	2.5
100	2.7

Client: ALS106
Reference: 15-1439-01-TRD

## Comments/Statistics

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

**Protocol Deviations:**

The fish were held for less than 14 days prior to test initiation, as requested by the client

## Result Summary

 Client: ALS106  
 Reference: 15-1439-01-DAD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1691693-1 LC 100

**Collection:** collected on 2015/10/21 at not given by not given

**Receipt:** received on 2015/10/22 at 1050 by MC

**Containers:** received 2 x 20 L carboy, 2 x 1 L bottle at 13 °C, in good condition with no seals and no initials

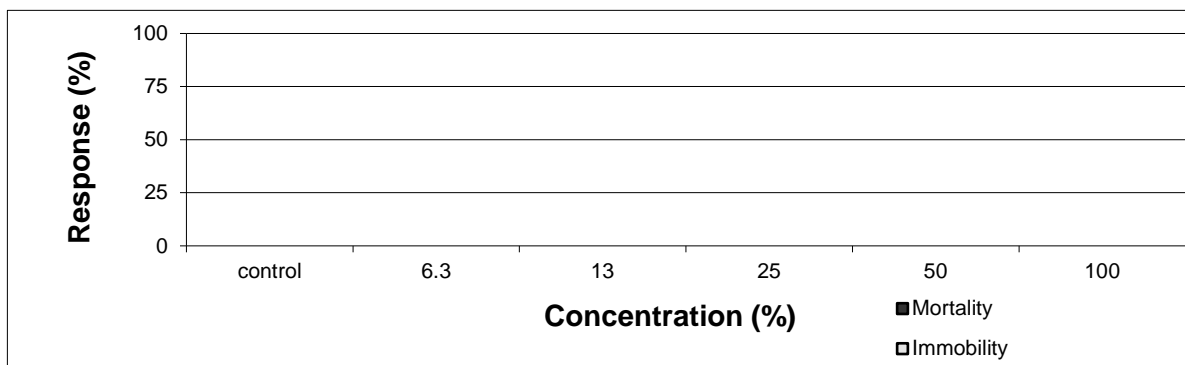
**Description:** type: water, collection method: not given

**Test:** started on 2015/10/23 ; ended on 2015/10/25

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

## Test Conditions

Client: ALS106  
Reference: 15-1439-01-DAD

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 5%

**Culture brood data:** 12 days to first brood

16 neonates per average brood

**Sample initial chemistry:** pH: 7.7; EC: 990 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 8.7 (mg/L); temperature: 14 °C  
hardness (mg CaCO<sub>3</sub>/L): 390; colour: colourless; odour: odourless

**Sample holding time:** 2 days (must be  $\leq$  5 days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 20 minutes (rate of 37.5  $\pm$  12.5 mL/min.L-1)  
The hardness of the sample was not adjusted (mg CaCO<sub>3</sub>/L) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and Na<sub>2</sub>SeO<sub>3</sub> (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 83 mg CaCO<sub>3</sub>/L

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 20  $\pm$  2°C

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1439-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated October 23, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.78 (0.76-0.81) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.70-0.84) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

## Test Data

Client: ALS106
Reference: 15-1439-01-DAD

### Test Log:

Date	Day	Time	Technician
2015/10/23	0	1610	ML/JK
2015/10/24	1	1015	JK
2015/10/25	2	1105	NM

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		
pH (units)								
Day								
0	7.7	7.8	7.8	7.8	7.8	7.8		
2	8.0	8.0	8.0	8.1	8.1	8.2		
Conductivity (µS/cm @ 25°C)								
0	228	274	326	418	588	941		
2	236	280	350	474	606	937		
Dissolved Oxygen (mg/L)								
0	8.0	8.0	8.1	8.1	8.1	8.0		
2	8.3	8.3	8.2	8.1	8.2	8.2		
Temperature (°C)								
0	19	19	19	19	19	19		
2	19	19	19	19	19	19		

### Biology:

Conc. (%)	control	6.3	13	25	50	100		
Number Alive and Behavior (behavior is in brackets)								
Day								
1	10	10	10	10	10	10		
2	10	10	10	10	10	10		
Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;								
Mortality (%)								
2	0	0	0	0	0	0		
Immobility (%)								
2	0	0	0	0	0	0		

## Comments/Statistics

Client: ALS106 Reference: 15-1439-01-DAD
---

### Test Result Comments:

None

### Data Analysis:

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

### Protocol Deviations:

None



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**ATTN: Lyudmyla Shvets**  
ALS Laboratory Group  
2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/10/22  
Report Date: 2015/11/03  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1440  
**Billing:** L1691693

A handwritten signature in cursive script, appearing to read "Jacquelyn Poole".

---

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1**  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)

**Result Summary**

Client: ALS106 Reference: 15-1440-01-TRD
---

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1691693-2 LC 75

**Collection:** collected on 2015/10/21 at not given by not given

**Receipt:** received on 2015/10/22 at 1050 by MC

**Containers:** received 2 x 20 L carboy, 2 x 1 L bottle at 13 °C, in good condition with no seals and no initials

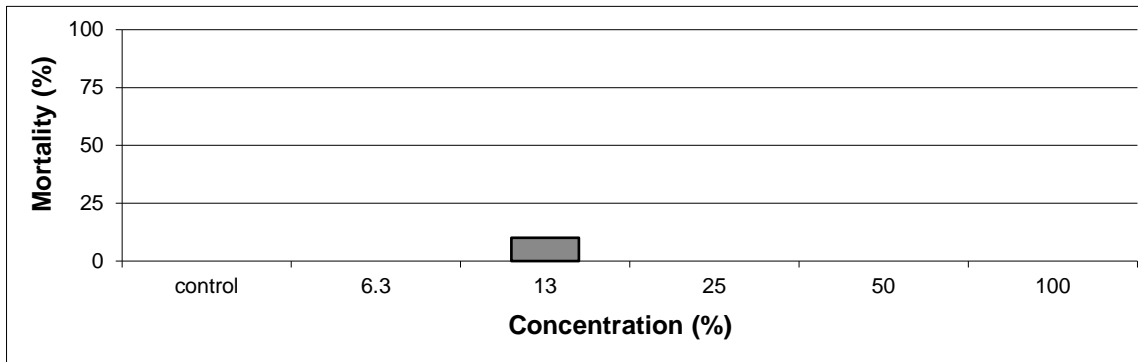
**Description:** type: water, collection method: not given

**Test:** started on 2015/10/22 ; ended on 2015/10/26

**Result:**

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute:	LC50	>100		could not be calculated
(mortality)	LC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

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## Test Conditions

Client: ALS106  
Reference: 15-1440-01-TRD

**Method:** Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

**Test type:** Trout 96-h Static Acute Test (WTR-ME-041)

**Species:** *Oncorhynchus mykiss*

**Organism source:** Sam Livingston (Batch 20151009TR)

**Acclimation:** 13 days (must be  $\geq 2$  weeks)

**Stock mortality:** 0.30% (seven days preceding testing)

**Sample initial chemistry:** pH: 7.8; EC: 1520 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.2 (mg/L); temperature: 13 °C  
hardness (mg CaCO<sub>3</sub>/L): 485; colour: colourless; odour: odourless

**Sample holding time:** 1 day (must be  $\leq 5$  days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** The test was conducted in 22 L plastic pails with polyethylene liners

**Test volume:** 20 Litres (depth of solution in each test vessel  $\geq 15\text{cm}$ )

**Sample pre-treatment:** All test solutions and controls were pre-aerated for 120 minutes at 6.5  $\pm$  1 mL/min/L  
Dissolved oxygen in 100 % sample was 9.1 mg/L after pre-aeration  
The sample was not filtered or pH adjusted prior to or during testing

**Loading density:** 0.145 g/Litre (must be  $\leq 0.5$  g/Litre)

**Control/dilution water:** Dechlorinated City of Calgary water acclimated to test conditions

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment; 10 fish per replicate

**Feeding:** Fish are not fed 24 hours before test initiation and no feeding during test

**Measurements:** pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination

**Aeration:** All treatments aerated at 6.5  $\pm$  1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones

**Lighting:** Overhead full spectrum fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 15  $\pm$  1°C

**Endpoint:** Mortality, 96-h LC50 (with 95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq 90\%$ )

The control had 0 percent (%) stressed behaviour (must  $\leq 10\%$ )

**Reference toxicant:** 96-h test with Potassium Chloride (KCl) initiated October 26, 2015; current results (96-h LC50 and 95% confidence limits) = 0.58 (0.50-0.63) log (g/L KCl)  
historical results:  
(96-h LC50 and 95% confidence limits) = 0.57 (0.50-0.64) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

**Test Data**

Client: ALS106
Reference: 15-1440-01-TRD

**Test Log:**

Date	Day	Time	Technician
2015/10/22	0	1700	CQ
2015/10/23	1	0915	DS
2015/10/24	2	0700	CQ
2015/10/25	3	0930	NM
2015/10/26	4	1000	ML

**Chemistry:**

Conc. (%)	control	6.3	13	25	50	100
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Day	pH (units)					
0	7.5	7.5	7.5	7.5	7.6	7.8
4	8.2	8.2	8.2	8.3	8.4	8.2

Day	Conductivity ( $\mu\text{S}/\text{cm}$ @ 25°C)					
0	464	536	593	767	1035	1550
4	476	535	591	760	1037	1509

Day	Dissolved Oxygen (mg/L)					
0	9.0	9.0	9.0	9.0	9.0	9.1
4	8.9	8.9	8.9	8.9	8.9	8.9

Day	Temperature (°C)					
0	15	15	15	15	15	15
4	15	15	15	15	15	15

**Number Alive (In brackets number stressed):**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	Number Alive (In brackets number stressed)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	10	9	10	10	10

Day	Mortality (%)					
4	0	0	10	0	0	0

Day	Stressed (%)					
4	0	0	0	0	0	0

**Biology Summary Tables:**

Control Fish	Length (cm)	Wet Weight(g)
1	2.8	0.2
2	3.0	0.3
3	3.0	0.3
4	3.8	0.3
5	2.5	0.2
6	2.9	0.3
7	2.9	0.3
8	2.9	0.3
9	3.3	0.4
10	2.8	0.3

average	3.0	0.3
sd	0.3	0.1
cv(%)	11.6	19.6

Notes: nd, not done; na, not applicable;  
sd, standard deviation; cv(%), coefficient of variation

**Test Data**

Conc. (%)	Group Wet Weight (g)
control	2.9
6.3	2.7
13	3.1
25	2.7
50	2.8
100	3.0

Client: ALS106
Reference: 15-1440-01-TRD

**Comments/Statistics**

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

**Protocol Deviations:**

The fish were held for less than 14 days prior to test initiation, as per the client's request

**Result Summary**

Client: ALS106 Reference: 15-1440-01-DAD
---

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1691693-2 LC 75

**Collection:** collected on 2015/10/21 at not given by not given

**Receipt:** received on 2015/10/22 at 1050 by MC

**Containers:** received 2 x 20 L carboy, 2 x 1 L bottle at 13 °C, in good condition with no seals and no initials

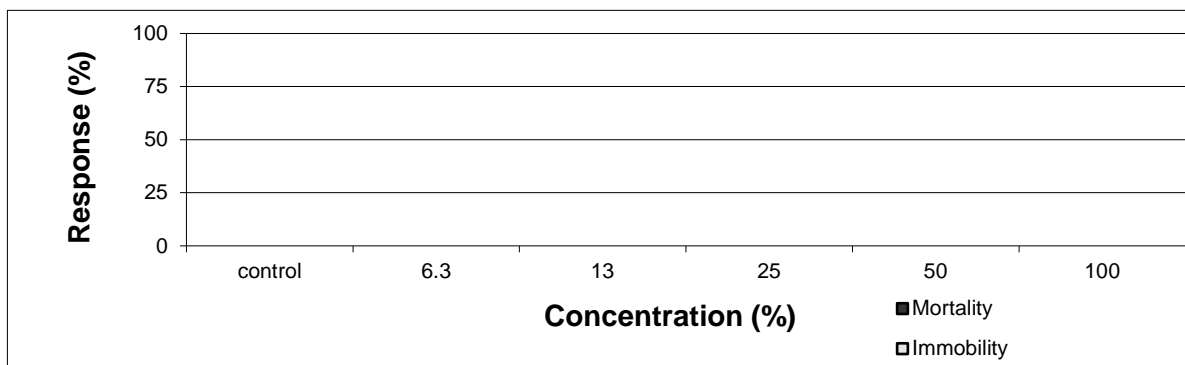
**Description:** type: water, collection method: not given

**Test:** started on 2015/10/23 ; ended on 2015/10/25

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

## Test Conditions

Client: ALS106  
Reference: 15-1440-01-DAD

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 2%

**Culture brood data:** 12 days to first brood

16 neonates per average brood

**Sample initial chemistry:** pH: 7.8; EC: 1520 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.2 (mg/L); temperature: 13 °C  
hardness (mg CaCO<sub>3</sub>/L): 485; colour: colourless; odour: odourless

**Sample holding time:** 2 days (must be  $\leq$  5 days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 20 minutes (rate of 37.5  $\pm$  12.5 mL/min.L-1)  
The hardness of the sample was not adjusted (mg CaCO<sub>3</sub>/L) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and Na<sub>2</sub>SeO<sub>3</sub> (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 83 mg CaCO<sub>3</sub>/L

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 20  $\pm$  2°C

Note: Outlined sections are protocol deviations explained on the comment page



## Test Conditions

Client: ALS106 Reference: 15-1440-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated October 23, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.78 (0.76-0.81) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.70-0.84) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

## Test Data

Client: ALS106
Reference: 15-1440-01-DAD

### Test Log:

Date	Day	Time	Technician
2015/10/23	0	1620	ML/JK
2015/10/24	1	1015	JK
2015/10/25	2	1105	NM

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		

Day

pH (units)

0	7.5	7.6	7.8	7.8	7.9	7.9		
2	7.4	7.7	7.8	8.0	8.1	8.0		

Conductivity ( $\mu\text{S/cm}$  @ 25°C)

0	222	312	396	557	855	1457		
2	224	317	399	553	854	1384		

Dissolved Oxygen (mg/L)

0	8.0	8.0	8.0	8.0	8.0	8.0		
2	8.3	8.3	8.3	8.2	8.2	8.2		

Temperature (°C)

0	19	19	19	19	19	19		
2	18	19	19	19	19	19		

### Biology:

Conc. (%)	control	6.3	13	25	50	100		

Day

Number Alive and Behavior (behavior is in brackets)

1	10	10	10	10	10	10		
2	10	10	10	10	10	10		

Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;

Mortality (%)

2	0	0	0	0	0	0		
---	---	---	---	---	---	---	--	--

Immobility (%)

2	0	0	0	0	0	0		
---	---	---	---	---	---	---	--	--

## Comments/Statistics

Client: ALS106 Reference: 15-1440-01-DAD
---

### Test Result Comments:

None

### Data Analysis:

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

### Protocol Deviations:

None

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**ATTN: Lyudmyla Shvets**  
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Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/10/22  
Report Date: 2015/11/04  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1441  
**Billing:** L1691693

A handwritten signature in cursive script that reads "Jacquyn Poole".

---

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1**  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)

**Result Summary**

Client: ALS106 Reference: 15-1441-01-TRD
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**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1691693-3 LC 50

**Collection:** collected on 2015/10/21 at not given by not given

**Receipt:** received on 2015/10/22 at 1050 by MC

**Containers:** received 2 x 20 L carboy, 2 x 1 L bottle at 13 °C, in good condition with no seals and no initials

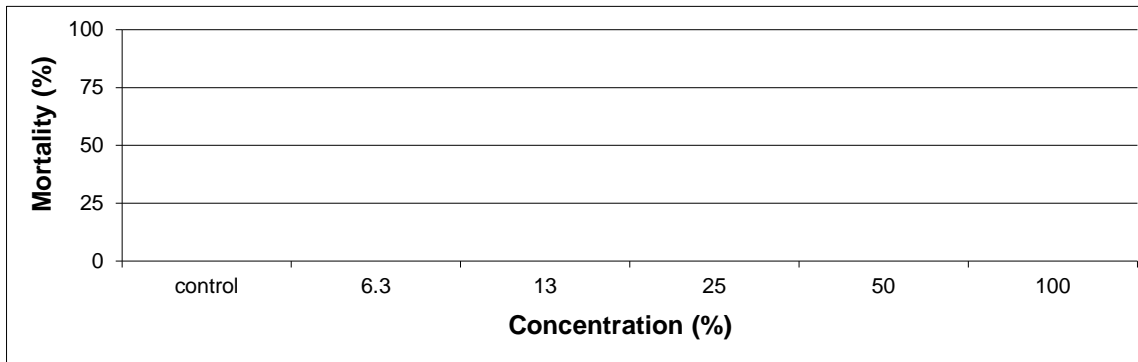
**Description:** type: water, collection method: not given

**Test:** started on 2015/10/22 ; ended on 2015/10/26

**Result:**

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%)		Method Calculated
			lower	upper	
Acute:	LC50	>100			could not be calculated
(mortality)	LC25	>100			could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

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## Test Conditions

Client: ALS106 Reference: 15-1441-01-TRD
---

**Method:** Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

**Test type:** Trout 96-h Static Acute Test (WTR-ME-041)

**Species:** *Oncorhynchus mykiss*

**Organism source:** Sam Livingston (Batch 20151009TR)

**Acclimation:** 13 days (must be  $\geq 2$  weeks)

**Stock mortality:** .30% (seven days preceding testing)

**Sample initial chemistry:** pH: 7.9; EC: 2140 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.2 (mg/L); temperature: 13 °C  
hardness (mg CaCO<sub>3</sub>/L): 503; colour: colourless; odour: odourless

**Sample holding time:** 1 day (must be  $\leq 5$  days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** The test was conducted in 22 L plastic pails with polyethylene liners

**Test volume:** 20 Litres (depth of solution in each test vessel  $\geq 15\text{cm}$ )

**Sample pre-treatment:** All test solutions and controls were pre-aerated for 120 minutes at 6.5  $\pm$  1 mL/min/L  
Dissolved oxygen in 100 % sample was 9.1 mg/L after pre-aeration  
The sample was not filtered or pH adjusted prior to or during testing

**Loading density:** 0.14 g/Litre (must be  $\leq 0.5$  g/Litre)

**Control/dilution water:** Dechlorinated City of Calgary water acclimated to test conditions

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment; 10 fish per replicate

**Feeding:** Fish are not fed 24 hours before test initiation and no feeding during test

**Measurements:** pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination

**Aeration:** All treatments aerated at 6.5  $\pm$  1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones

**Lighting:** Overhead full spectrum fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 15  $\pm$  1°C

**Endpoint:** Mortality, 96-h LC50 (with 95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq 90\%$ )

The control had 0 percent (%) stressed behaviour (must  $\leq 10\%$ )

**Reference toxicant:** 96-h test with Potassium Chloride (KCl) initiated October 26, 2015; current results (96-h LC50 and 95% confidence limits) = 0.58 (0.50-0.63) log (g/L KCl)  
historical results:  
(96-h LC50 and 95% confidence limits) = 0.57 (0.50-0.64) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

**Test Data**

Client: ALS106
Reference: 15-1441-01-TRD

**Test Log:**

Date	Day	Time	Technician
2015/10/22	0	1700	CQ
2015/10/23	1	0915	DS
2015/10/24	2	0710	CQ
2015/10/25	3	0930	NM
2015/10/26	4	1010	NM

**Chemistry:**

Conc. (%)	control	6.3	13	25	50	100
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Day	pH (units)					
0	7.5	7.5	7.6	7.6	7.8	7.9
4	8.2	8.2	8.2	8.3	8.4	8.2

Day	Conductivity ( $\mu\text{S}/\text{cm}$ @ 25°C)					
0	468	572	672	923	1327	2170
4	480	568	665	920	1326	2090

Day	Dissolved Oxygen (mg/L)					
0	9.1	9.1	9.1	9.1	9.1	9.1
4	8.9	8.9	8.9	8.9	8.9	8.9

Day	Temperature (°C)					
0	14	14	14	14	15	14
4	15	15	15	14	15	15

**Number Alive (In brackets number stressed):**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	Number Alive (In brackets number stressed)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	10	10	10	10	10

Day	Mortality (%)					
4	0	0	0	0	0	0

Day	Stressed (%)					
4	0	0	0	0	0	0

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**Biology Summary Tables:**

Control Fish	Length (cm)	Wet Weight(g)
1	2.7	0.2
2	2.9	0.3
3	2.9	0.3
4	2.8	0.3
5	2.8	0.2
6	2.6	0.2
7	2.8	0.3
8	2.6	0.3
9	3.1	0.3
10	3.3	0.4

average	2.9	0.3
sd	0.2	0.1
cv(%)	7.6	22.6

Notes: nd, not done; na, not applicable;  
 sd, standard deviation; cv(%), coefficient  
 of variation

**Test Data**

Conc. (%)	Group Wet Weight (g)
control	2.8
6.3	2.8
13	3.1
25	2.8
50	2.8
100	3.2

Client: ALS106
Reference: 15-1441-01-TRD

## Comments/Statistics

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

**Protocol Deviations:**

The fish were held for less than 14 days prior to test initiation, the client was notified

## Result Summary

 Client: ALS106  
 Reference: 15-1441-01-DAD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1691693-3 LC 50

**Collection:** collected on 2015/10/21 at not given by not given

**Receipt:** received on 2015/10/22 at 1050 by MC

**Containers:** received 2 x 20 L carboy, 2 x 1 L bottle at 13 °C, in good condition with no seals and no initials

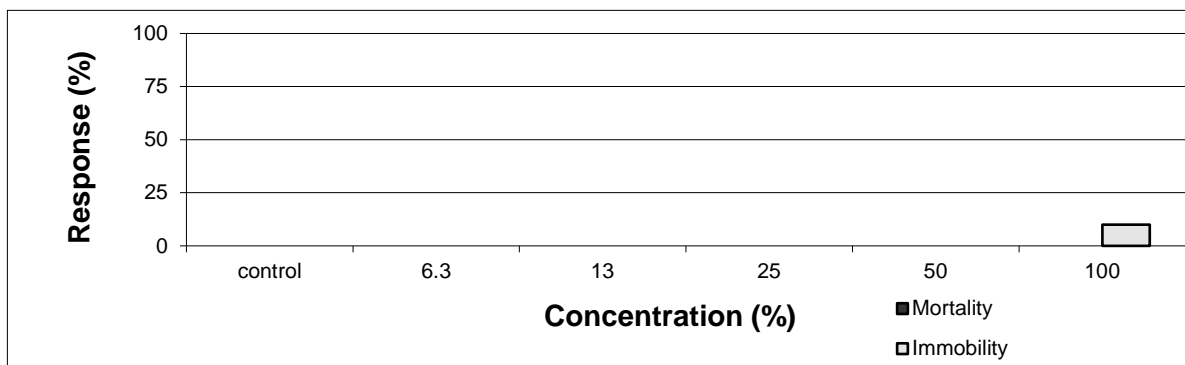
**Description:** type: water, collection method: not given

**Test:** started on 2015/10/24 ; ended on 2015/10/26

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower      upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

## Test Conditions

Client: ALS106  
Reference: 15-1441-01-DAD

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 7%

**Culture brood data:** 12 days to first brood

16 neonates per average brood

**Sample initial chemistry:** pH: 7.9; EC: 2140 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.2 (mg/L); temperature: 13 °C  
hardness (mg  $\text{CaCO}_3/\text{L}$ ): 503; colour: colourless; odour: odourless

**Sample holding time:** 3 days (must be  $\leq$  5 days)

**Sample storage:**  $4 \pm 2^\circ\text{C}$  in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 20 minutes (rate of  $37.5 \pm 12.5$  mL/min.L-1)  
The hardness of the sample was not adjusted (mg  $\text{CaCO}_3/\text{L}$ ) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and  $\text{Na}_2\text{SeO}_3$  (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 83 mg  $\text{CaCO}_3/\text{L}$

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:**  $20 \pm 2^\circ\text{C}$

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1441-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated October 23, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.78 (0.76-0.81) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.70-0.84) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

## Test Data

Client: ALS106
Reference: 15-1441-01-DAD

### Test Log:

Date	Day	Time	Technician
2015/10/24	0	1550	JK/CQ
2015/10/25	1	1130	NM
2015/10/26	2	1055	NM

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		

Day

pH (units)

0	7.8	7.9	8.0	8.0	8.0	8.0		
2	8.2	8.1	8.1	8.3	8.3	8.2		

 Conductivity ( $\mu\text{S}/\text{cm}$  @ 25°C)

0	224	343	470	703	1142	1957		
2	265	375	490	700	1161	1956		

Dissolved Oxygen (mg/L)

0	8.0	8.0	8.1	8.1	8.1	8.1		
2	8.1	8.1	8.2	8.2	8.1	8.1		

Temperature (°C)

0	19	19	19	19	19	20		
2	18	18	19	19	19	19		

### Biology:

Conc. (%)	control	6.3	13	25	50	100		

Day

Number Alive and Behavior (behavior is in brackets)

1	10 (IF)	10	10	10	10	10		
2	10	10	10	10	10	10 (1I)		

Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;

Mortality (%)

2	0	0	0	0	0	0		
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Immobility (%)

2	0	0	0	0	0	10		
---	---	---	---	---	---	----	--	--

**Comments/Statistics**

Client: ALS106 Reference: 15-1441-01-DAD
---

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

**Protocol Deviations:**

None

## GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated into and form part of the Chain of Custody between HydroQual Laboratories Ltd. ("HydroQual") and the party named in the Chain of Custody (the "Client").

1. **Definitions:** Capitalized terms shall have the definition ascribed as such in these General Terms and Conditions and the Chain of Custody.
2. **The Services:** HydroQual will provide the Services to the Client as listed and described in the Chain of Custody.
3. **Prices:** HydroQual may review and change all prices, fees, surcharges or other charges as set out in proposals and/or price quotations if there are changes to HydroQual's cost beyond HydroQual's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding condition 3, all quotations are reviewed and updated on a yearly basis.
4. **Payment Terms:** The Client shall pay HydroQual within 30 days of the invoice date as provided by HydroQual. HydroQual may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. **Quotation Numbers:** The Client shall provide the proposal and/or price quotation number to HydroQual (where applicable) to ensure correct pricing.
6. **Taxes:** Applicable taxes are not included in prices, surcharges and additional fees and will be added at the time of invoicing.
7. **No Guarantee of Results:** The Client is responsible for informing itself on the limitation of the results and acknowledges that the results are not guaranteed.
8. **Standard of Care:** HydroQual will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested, subject to that level of care and skill ordinarily exercised by other laboratories currently practicing under similar conditions in the same locality, subject to the time limits and financial, physical or other constraints applicable to the Services. No warranty, express or implied, is made.
9. **Storage:** Where possible, HydroQual will store samples until a final report is issued to the Client, after which time HydroQual may discard the sample.
10. **Holds:** If the Client requests a sample be placed on hold, HydroQual will store the sample for the mutually agreed upon written time and price, after which HydroQual will invoice the Client and discard the sample.
11. **Archives:** If the Client requests a sample be archived, HydroQual will store the sample for a mutually agreed upon written time frame and price, after which HydroQual will invoice the Client and discard the sample.
12. **Handling Protocol:** Legal sample handling protocol must be arranged, and provided in writing, before samples are collected. HydroQual will provide a price quotation for legal sample protocol. Samples processed under legal protocol are stored indefinitely, subject to a storage charge as advised by HydroQual.
13. **Samples:** The quality, condition, content and source of samples stored and tested are not known to HydroQual except as declared and described on the Chain of Custody completed and submitted by the Client and accompanying the sample.
14. **Risk of Loss:** HydroQual will use reasonable care to protect samples during storage, however, all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the client forever releases HydroQual from any and all claims the Client may have for any loss or damage to the sample.
15. **Environmental:** the Client must comply with all applicable environmental legislation, including labeling all hazardous samples to comply with Canada's *Workplace Hazardous Materials Information System* and the Alberta *Transfer of Dangerous Goods* regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client shall defend, indemnify and hold harmless HydroQual for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
16. **Hazardous Materials Disposal:** HydroQual may return, at the Client's cost, hazardous material to the Client for disposal.
17. **Hazardous Materials Surcharge:** HydroQual may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials ("NORM"), such as and including without limitation, H<sub>2</sub>S and CN.
18. **Sample Containers:** HydroQual may ship sample containers to the Client's location by the most cost effective means using HydroQual's preferred courier suppliers, within the specified project timeline. Shipping will be charged back to the Client.
19. **Additional Charges:** HydroQual may charge the Client:
  - (a) for pick-up and delivery services when provided subject in each instance to a minimum charge of \$50.00; and,
  - (b) for rush service (processing samples and/or reporting).
20. **Large Bottle Orders:** The Client shall provide HydroQual with not less than 24 hours' notice for large bottle orders.
21. **Re-Tests:** HydroQual reserves the right to re-test any samples that remain in HydroQual's possession. Re-tests requested by the Client may be charged to Client and Client agrees to pay for such charges.
22. **Waiver:** The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any and all claims against HydroQual that the Client may have against HydroQual as a result of the interpretation of the results provided to the Client. The Client shall defend, indemnify and save harmless HydroQual for any and all claims made by any third party against HydroQual in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.



**ATTN: see paperwork**  
ALS Laboratory Group  
2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/10/22  
Report Date: 2015/11/04  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1442  
**Billing:** L1691693

A handwritten signature in cursive script, appearing to read "Jacquelyn Poole".

---

Senior Verifier

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**HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1**  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)



**Result Summary**

Client: ALS106 Reference: 15-1442-01-TRD
---

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1691693-4 LC 25

**Collection:** collected on 2015/10/21 at not given by not given

**Receipt:** received on 2015/10/22 at 1050 by MC

**Containers:** received 2 x 20 L carboy, 2 x 1 L bottle at 13 °C, in good condition with no seals and no initials

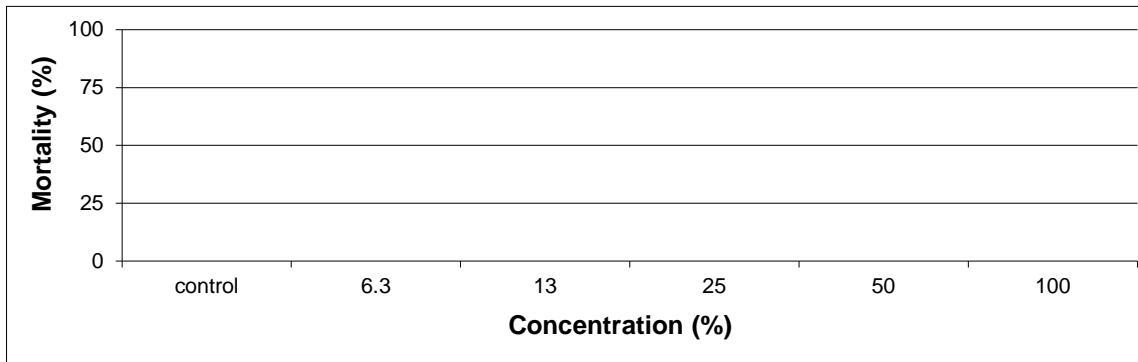
**Description:** type: water, collection method: not given

**Test:** started on 2015/10/22 ; ended on 2015/10/26

**Result:**

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute:	LC50	>100		could not be calculated
(mortality)	LC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

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## Test Conditions

Client: ALS106  
Reference: 15-1442-01-TRD

**Method:** Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

**Test type:** Trout 96-h Static Acute Test (WTR-ME-041)

**Species:** *Oncorhynchus mykiss*

**Organism source:** Sam Livingston (Batch 20151009TR)

**Acclimation:** 13 days (must be  $\geq 2$  weeks)

**Stock mortality:** .30% (seven days preceding testing)

**Sample initial chemistry:** pH: 7.9; EC: 2630 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.1 (mg/L); temperature: 13 °C  
hardness (mg CaCO<sub>3</sub>/L): 648; colour: colourless; odour: odourless

**Sample holding time:** 1 day (must be  $\leq 5$  days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** The test was conducted in 22 L plastic pails with polyethylene liners

**Test volume:** 20 Litres (depth of solution in each test vessel  $\geq 15\text{cm}$ )

**Sample pre-treatment:** All test solutions and controls were pre-aerated for 30 minutes at 6.5  $\pm$  1 mL/min/L  
Dissolved oxygen in 100 % sample was 8.7 mg/L after pre-aeration  
The sample was not filtered or pH adjusted prior to or during testing

**Loading density:** 0.18 g/Litre (must be  $\leq 0.5$  g/Litre)

**Control/dilution water:** Dechlorinated City of Calgary water acclimated to test conditions

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment; 10 fish per replicate

**Feeding:** Fish are not fed 24 hours before test initiation and no feeding during test

**Measurements:** pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination

**Aeration:** All treatments aerated at 6.5  $\pm$  1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones

**Lighting:** Overhead full spectrum fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 15  $\pm$  1°C

**Endpoint:** Mortality, 96-h LC50 (with 95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq 90\%$ )

The control had 0 percent (%) stressed behaviour (must  $\leq 10\%$ )

**Reference toxicant:** 96-h test with Potassium Chloride (KCl) initiated October 26, 2015; current results (96-h LC50 and 95% confidence limits) = 0.58 (0.50-0.63) log (g/L KCl)  
historical results:  
(96-h LC50 and 95% confidence limits) = 0.57 (0.50-0.64) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

**Test Data**

Client: ALS106
Reference: 15-1442-01-TRD

**Test Log:**

Date	Day	Time	Technician
2015/10/22	0	1530	CQ
2015/10/23	1	0915	DS
2015/10/24	2	0710	CQ
2015/10/25	3	0930	NM
2015/10/26	4	1000	HKS/ML

**Chemistry:**

Conc. (%)	control	6.3	13	25	50	100
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Day	pH (units)					
0	7.5	7.7	7.7	7.8	8.0	8.1
4	8.2	8.3	8.4	8.4	8.4	8.4

Day	Conductivity ( $\mu\text{S/cm}$ @ 25°C)					
0	461	506	694	1030	1608	2680
4	459	517	703	1044	1583	2600

Day	Dissolved Oxygen (mg/L)					
0	8.8	8.7	8.9	9.0	8.8	8.7
4	8.7	8.8	8.9	8.9	8.9	8.9

Day	Temperature (°C)					
0	14	15	15	15	15	15
4	16	15	15	15	15	15

**Number Alive (In brackets number stressed):**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	Number Alive (In brackets number stressed)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	10	10	10	10	10

Day	Mortality (%)					
4	0	0	0	0	0	0

Day	Stressed (%)					
4	0	0	0	0	0	0

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**Biology Summary Tables:**

Control Fish	Length (cm)	Wet Weight(g)
1	3.5	0.5
2	3.3	0.4
3	2.9	0.3
4	3.3	0.5
5	2.9	0.3
6	3.2	0.3
7	3.4	0.4
8	3.5	0.3
9	2.7	0.2
10	2.8	0.4

average	3.2	0.4
sd	0.3	0.1
cv(%)	9.5	26.8

Notes: nd, not done; na, not applicable;  
 sd, standard deviation; cv(%), coefficient  
 of variation

**Test Data**

Conc. (%)	Group Wet Weight (g)
control	3.6
6.3	2.8
13	3.2
25	3.7
50	3.1
100	3.5

Client: ALS106
Reference: 15-1442-01-TRD

## Comments/Statistics

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

**Protocol Deviations:**

The fish were held for less than 14 days prior to test initiation, as requested by the client

## Result Summary

Client: ALS106
Reference: 15-1442-01-DAD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1691693-4 LC 25

**Collection:** collected on 2015/10/21 at not given by not given

**Receipt:** received on 2015/10/22 at 1050 by MC

**Containers:** received 2 x 20 L carboy, 2 x 1 L bottle at 13 °C, in good condition with no seals and no initials

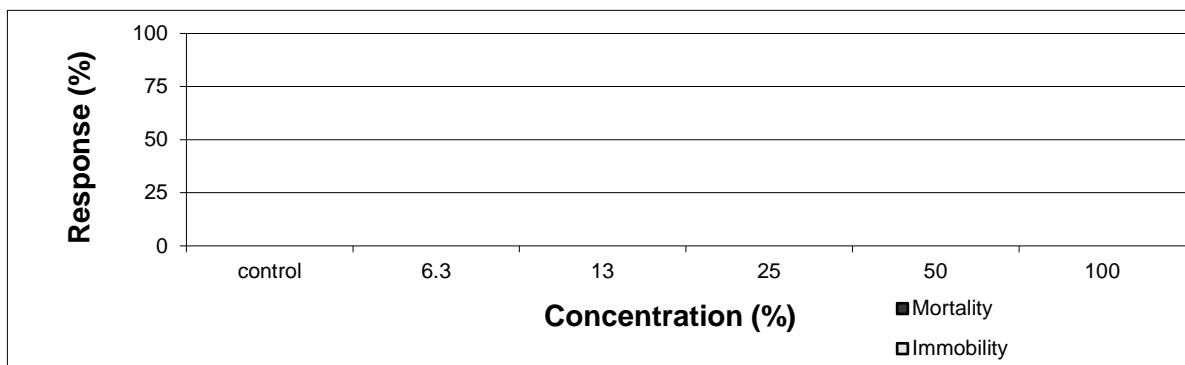
**Description:** type: water, collection method: not given

**Test:** started on 2015/10/24 ; ended on 2015/10/26

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

## Test Conditions

Client: ALS106  
Reference: 15-1442-01-DAD

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 0%

**Culture brood data:** 12 days to first brood

16 neonates per average brood

**Sample initial chemistry:** pH: 7.9; EC: 2630 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.1 (mg/L); temperature: 13 °C  
hardness (mg  $\text{CaCO}_3/\text{L}$ ): 648; colour: colourless; odour: odourless

**Sample holding time:** 3 days (must be  $\leq$  5 days)

**Sample storage:**  $4 \pm 2^\circ\text{C}$  in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 20 minutes (rate of  $37.5 \pm 12.5$  mL/min.L-1)  
The hardness of the sample was not adjusted (mg  $\text{CaCO}_3/\text{L}$ ) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and  $\text{Na}_2\text{SeO}_3$  (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 83 mg  $\text{CaCO}_3/\text{L}$

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:**  $20 \pm 2^\circ\text{C}$

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1442-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated October 23, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.78 (0.76-0.81) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.70-0.84) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

## Test Data

Client: ALS106
Reference: 15-1442-01-DAD

### Test Log:

Date	Day	Time	Technician
2015/10/24	0	1550	JK/CQ
2015/10/25	1	1130	NM
2015/10/26	2	1045	NM

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		
pH (units)								
Day								
0	7.9	8.0	8.1	8.1	8.1	8.1		
2	8.1	8.1	8.1	8.3	8.3	8.2		
Conductivity (µS/cm @ 25°C)								
0	226	385	546	853	1410	2570		
2	258	392	550	900	1453	2530		
Dissolved Oxygen (mg/L)								
0	8.0	8.0	8.0	8.1	8.1	8.1		
2	8.1	8.1	8.1	8.0	8.1	8.0		
Temperature (°C)								
0	19	19	19	19	19	19		
2	19	19	19	19	19	19		

### Biology:

Conc. (%)	control	6.3	13	25	50	100		
Number Alive and Behavior (behavior is in brackets)								
Day								
1	10	10	10	10	10	10		
2	10	10	10	10	10	10		
Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;								
Mortality (%)								
2	0	0	0	0	0	0		
Immobility (%)								
2	0	0	0	0	0	0		



**Comments/Statistics**

Client: ALS106 Reference: 15-1442-01-DAD
---

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

**Protocol Deviations:**

None

## GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated into and form part of the Chain of Custody between HydroQual Laboratories Ltd. ("HydroQual") and the party named in the Chain of Custody (the "Client").

1. **Definitions:** Capitalized terms shall have the definition ascribed as such in these General Terms and Conditions and the Chain of Custody.
2. **The Services:** HydroQual will provide the Services to the Client as listed and described in the Chain of Custody.
3. **Prices:** HydroQual may review and change all prices, fees, surcharges or other charges as set out in proposals and/or price quotations if there are changes to HydroQual's cost beyond HydroQual's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding condition 3, all quotations are reviewed and updated on a yearly basis.
4. **Payment Terms:** The Client shall pay HydroQual within 30 days of the invoice date as provided by HydroQual. HydroQual may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. **Quotation Numbers:** The Client shall provide the proposal and/or price quotation number to HydroQual (where applicable) to ensure correct pricing.
6. **Taxes:** Applicable taxes are not included in prices, surcharges and additional fees and will be added at the time of invoicing.
7. **No Guarantee of Results:** The Client is responsible for informing itself on the limitation of the results and acknowledges that the results are not guaranteed.
8. **Standard of Care:** HydroQual will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested, subject to that level of care and skill ordinarily exercised by other laboratories currently practicing under similar conditions in the same locality, subject to the time limits and financial, physical or other constraints applicable to the Services. No warranty, express or implied, is made.
9. **Storage:** Where possible, HydroQual will store samples until a final report is issued to the Client, after which time HydroQual may discard the sample.
10. **Holds:** If the Client requests a sample be placed on hold, HydroQual will store the sample for the mutually agreed upon written time and price, after which HydroQual will invoice the Client and discard the sample.
11. **Archives:** If the Client requests a sample be archived, HydroQual will store the sample for a mutually agreed upon written time frame and price, after which HydroQual will invoice the Client and discard the sample.
12. **Handling Protocol:** Legal sample handling protocol must be arranged, and provided in writing, before samples are collected. HydroQual will provide a price quotation for legal sample protocol. Samples processed under legal protocol are stored indefinitely, subject to a storage charge as advised by HydroQual.
13. **Samples:** The quality, condition, content and source of samples stored and tested are not known to HydroQual except as declared and described on the Chain of Custody completed and submitted by the Client and accompanying the sample.
14. **Risk of Loss:** HydroQual will use reasonable care to protect samples during storage, however, all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the client forever releases HydroQual from any and all claims the Client may have for any loss or damage to the sample.
15. **Environmental:** the Client must comply with all applicable environmental legislation, including labeling all hazardous samples to comply with Canada's *Workplace Hazardous Materials Information System* and the Alberta *Transfer of Dangerous Goods* regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client shall defend, indemnify and hold harmless HydroQual for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
16. **Hazardous Materials Disposal:** HydroQual may return, at the Client's cost, hazardous material to the Client for disposal.
17. **Hazardous Materials Surcharge:** HydroQual may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials ("NORM"), such as and including without limitation, H<sub>2</sub>S and CN.
18. **Sample Containers:** HydroQual may ship sample containers to the Client's location by the most cost effective means using HydroQual's preferred courier suppliers, within the specified project timeline. Shipping will be charged back to the Client.
19. **Additional Charges:** HydroQual may charge the Client:
  - (a) for pick-up and delivery services when provided subject in each instance to a minimum charge of \$50.00; and,
  - (b) for rush service (processing samples and/or reporting).
20. **Large Bottle Orders:** The Client shall provide HydroQual with not less than 24 hours' notice for large bottle orders.
21. **Re-Tests:** HydroQual reserves the right to re-test any samples that remain in HydroQual's possession. Re-tests requested by the Client may be charged to Client and Client agrees to pay for such charges.
22. **Waiver:** The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any and all claims against HydroQual that the Client may have against HydroQual as a result of the interpretation of the results provided to the Client. The Client shall defend, indemnify and save harmless HydroQual for any and all claims made by any third party against HydroQual in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.



November 4, 2015

Lyudmyla Shvets  
ALS Laboratories Group  
2559 29 Street NE  
Calgary, AB T1Y 7B5

Dear Lyudmyla:

On October 28, 2015, Pollutech EnviroQuatics Limited personnel received a water sample (SP20 L1693072-1) from ALS Laboratories in Winnipeg. The following acute toxicity test was performed on this sample observing Environment Canada methods:

- *Daphnia magna* 48-hour LC50 toxicity test according to the criteria outlined in the "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*", Environmental Technology Center, Ottawa, Ontario, Report EPS 1/RM/14 Second Edition, December 2000.

**Summary of LC50 Toxicity Results for SP20 L1693072-1 Water Sample Collected October 24, 2015**

Sample Name and Sample #	Toxicity Test	Endpoint	Effect	Result <sup>1</sup>
SP20 L1693072-1 #873815180	<i>Daphnia magna</i>	48-hour LC50 (95% Confidence)	Mortality	Non-lethal (Not applicable)

1 - Results relate only to the sample tested

Toxicity Test Endpoint Descriptions

LC50            The estimated concentration which causes acute lethality to 50% of the test organisms.

The following pages contain the required details for reporting of the acute lethality toxicity test. If there are any further details which you require, please do not hesitate to contact us.

Sincerely,  
**Pollutech EnviroQuatics Limited**

**Rachel (Abma) Giacomini, M.Sc.**  
**QA/QC Leader**

File ID: \bioassay\2015\8000\8738\8738oc8 D LC50

**bringing clarity to your environment**

704 Mara Street, Suite 122, Point Edward, Ontario, Canada N7V 1X4 • T: 519.339.8787 • F: 519.336.6965  
Email: info@pollutechgroup.com • www.pollutechgroup.com

## Daphnia magna 48-Hour LC50 Toxicity Test

**METHOD:** Environment Canada, "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*", Method Development and Applications Section, Ottawa, ON. Report EPS 1/RM/14, Second Edition, December 2000. Pollutech Test Method DM-LC-R10.8.

### Test Material

**Client Name/Location:** ALS Laboratories Group, Winnipeg, MB

**Sample #:** 873815180      **Sample Name:** SP20 L1693072-1

**Sample Method:** Grab      **Collected by:** N/A

**Date/Time Collected:** October 24, 2015; 10:00      **Arrival Temp.:** 10.3 °C

**Date/Time Received:** October 28, 2015; 11:40      **Sample Description:** Clear

**Sample Point Description:** Other      **Sample Type:** Effluent

**Transportation:** Road/Air

**Storage:** None

N/A - Not Available

### Test Organisms

**Species:** *Daphnia magna*      **Source:** Pollutech Culture (MOE/EPA)

**Culture Temp.:** 20 ± 2°C      **Age:** < 24-hours old

**Water Source:** Reconstituted dechlorinated tap water

**Cultures Used in Testing:** 51 RA

**Days to First Brood:** 8

**Average # Number of Neonates/Brood:** 51

**Previous 7 Days Mortality in Culture:** 0%

### Test Facilities



**CALA**  
Testing  
Accreditation No. A1225

#### **Testing Laboratory:**

Pollutech EnviroQuatics Limited, 704 Mara St.  
Suite 122, Point Edward, Ontario, N7V 1X4

This laboratory is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). The test included in this report is within the scope of this laboratory.

**Test Performed By:** M. Long/ B. Steven

**Daphnia magna 48-Hour LC50 Toxicity Test - Continued**

**Sample Number:** 873815180

**Sample Name:** SP20 L1693072-1

Test Conditions

**Date/Time Started:** October 28, 2015;  
13:40  
**Test Volume:** 50 mL /Vessel  
**Reps/Concentration:** 4  
**Pre-aeration:** No  
**Pre-aeration Duration:** N/A  
**Sample pH Adjustment Procedure:** N/A  
**Hardness Before and After Adjustment:** N/A  
**Test Method Deviations:** None  
N/A - Not Applicable

**# of Neonates/Vessel:** 3  
**mL Solution/Neonate:** 16.7 mL  
**Dilution Water:** DW15-90  
**Pre-aeration Rate:** N/A  
**Test Temperature:** 20 ± 2°C  
**Sample pH Adjustment:** No  
**Sample Hardness Adjustment:** No

Initial Measurement of Variables of Unadjusted, Undiluted Sample

**pH:** 8.1      **DO:** 9.0 mg/L      **Cond:** 3050 µmhos      **Temp:** 20.2 °C

Test Results

**TOXICITY TEST VARITABLES**

Concentration (mg/L Volume)	pH		DO mg/L		Cond. µmhos	Hardness mg/L	Temperature °C	
	Initial	Final	Initial	Final			Initial	Final
Control	8.2	8.0	8.9	8.2	521	198	20.5	20.9
6.25	8.2	8.1	8.9	7.9	587	-	21.2	20.7
12.5	8.1	8.1	8.9	8.2	644	-	21.0	20.5
25.0	8.1	8.2	8.9	8.2	756	-	21.0	20.4
50.0	8.1	8.3	8.9	8.3	960	-	21.1	20.5
100.0	8.1	8.3	9.0	8.2	3,050	526	20.2	20.7

***Daphnia magna* 48-Hour LC50 Toxicity Test - Continued**

**Sample Number:** 873815180

**Sample Name:** SP20 L1693072-1

Test Results - continued

Concentration (%Volume)	Test Vessel	Number of Daphnia Immobile		Number of Daphnia
		24 hr.	48 hr.	Dead 48 hr.
Control	A	0	0	0
	B	0	0	0
	C	0	0	0
	D	0	0	0
6.25	A	0	0	0
	B	0	0	0
	C	0	0	0
	D	0	0	0
12.5	A	0	0	0
	B	0	0	0
	C	0	0	0
	D	0	0	0
25	A	0	0	0
	B	0	0	0
	C	0	0	0
	D	0	0	0
50	A	0	0	0
	B	0	0	0
	C	0	0	0
	D	0	0	0
100	A	0	0	0
	B	0	0	0
	C	0	0	0
	D	0	0	0

***Daphnia magna* 48-Hour LC50 Toxicity Test - Continued**

---

**Sample Number:** 873815180

**Sample Name:** SP20 L1693072-1

Summary of Test Results

**48-Hour LC50:** Non-lethal  
**95% Confidence Limits:** Not applicable  
**Analysis Method:** No mortality  
**Results Verified By:** R. C. Ferguson

Reference Toxicant Results

**Reference Chemical:** Phenol                      **Date Test Initiated:** 10/21/15  
**Method:** Spearman-Kärber ( $\alpha = 0\%$ )  
**48-Hour LC50 (95% Confidence Limits):** 9.84 mg/L (7.83 mg/L; 12.37 mg/L)  
**Historic Geometric Mean LC50:** 16.59 mg/L (7.74 mg/L; 35.57 mg/L)  
**(Historic Warning Limits) ( $\pm 2$  Standard Deviations)**

L1693072-1

**Pollutech EnviroQuatics Daphnia magna Toxicity Test Bench Sheet**

Sample Information	Sample Method: Composite (Grab) Other	Test Information	Test Type: Single Concentration	LC50	TIE	Screen
Account Number 8738	Sample # 8738	Date Started/Time 10:28.15	1340	Analyst Starting Test		
Client ALS Winnipedia	Sample Name 5800	Date Ended/Time 10:30.15	1140	#Neonates/Vessel		
Person Collecting Sample	Temperature Upon Receipt 0.3°C	Test Volume	mL/Vessel	mL Solution/Daphnid	10.7	mL
Date/Time Sampled 10:24.15	Pre-aeration	Pre-aeration	yes	Pre-aeration Duration		min
Date/Time Received 10:28.15	Pre-aeration Rate	Pre-aeration Rate	±2 mL/min L <sup>-1</sup>	Sample Hardness Adjustment	no	yes
Sample Description clear	Dilution H <sub>2</sub> O # DW15	Dilution H <sub>2</sub> O # 90		Sample pH Adjustment	no	yes
Sample Type Description effluent	Sample Point Description: MISA other	Sample Point Description: MISA other		Storage Temperature		°C

Initial Sample Measurements: pH 8.1 Dissolved O<sub>2</sub> 9.0 mg/L Conductivity 3000 µmhos Temperature 20.2°C  
 Instrument Identification: Meter/Probe # 10169 Meter/Probe # 45

Concentration (% Volume)	pH		Dissolved Oxygen (mg/L)		Cond. (µmhos)		Hardness (mg/L)		Temperature (°C)	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Control	8.2	8.0	8.9	8.2	521	3	198	20.5	20.9	3
10.25	8.2	7.8	8.9	7.9	587	1	=	21.1	20.7	1
10.5	8.1	8.1	8.9	8.2	644	1	=	21.0	20.5	1
20.0	8.1	8.2	8.9	8.2	756	1	=	21.9	20.4	1
Initials	hnt	BS	hnt	BS	hnt	BS	hnt	hnt	BS	BS

**NEONATE SOURCE AND OBSERVATIONS OF NUMBER IMMOBILE AND DEAD**

Brood Culture #	Control				6.257				12.57				25.07				Init
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	
Brood culture # 51A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-Hr. # Immobile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-Hr. # Immobile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-Hr. # Dead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total # Immobile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total # Dead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**BROOD CULTURE HEALTH INFORMATION**

Brood Culture #	51A
Culture age (days)	08
Days to 1 <sup>st</sup> Brood (≤12)	8
Average # of Neonates/Brood (≥15)	51
Previous 7 Days Mortality in Culture (≤25%)	0

Percent Mortality None % Standard Deviation of Control Survival 0 Standard Deviation of Test Survival 0 Verified By (Initials) hnt Notes  
 Addition observations at 14:30 All ok  
 Y:\Masters\Masters Binder\Daphnia magna\DM Toxicity Testing Sheet 03-06-12.doc



L1693072-1

[py 04 d]

**Pollutech EnviroQuatics Daphnia magna Toxicity Test Bench Sheet**

<b>Sample Information</b>		Sample Method: Composite <input checked="" type="radio"/> Grab <input type="radio"/> Other		<b>Test Information</b>		Test Type: Single Concentration <input checked="" type="radio"/> LC50 <input type="radio"/> TIE <input type="radio"/> Screen	
Account Number 8738	Sample # 873815180	Date Started/Time 10.28.15	1340	Analyst Starting Test <i>inf</i>			
Client ALS Winnipeg	Sample Name SP20 10.24.15	Date Ended/Time 10.30.15	1140	#Neonates/Vessel 3			
Person Collecting Sample <i>inf</i>	Temperature Upon Receipt 10.3 °C	Test Volume 50 mL/Vessel	mL Solution/Daphnid 16.7 mL				
Date/Time Sampled 10.24.15 / 1000	Pre-aeration <input checked="" type="radio"/> no <input type="radio"/> yes	Pre-aeration Duration — min					
Date/Time Received 10.28.15 / 1140	Pre-aeration Rate — ±2 mL/min L <sup>-1</sup>	Sample Hardness Adjustment <input checked="" type="radio"/> no <input type="radio"/> yes					
Sample Description clear.	Dilution H <sub>2</sub> O # DW15-90	Sample pH Adjustment <input checked="" type="radio"/> no <input type="radio"/> yes					
Sample Type Description effluent.	Sample Point Description: MISA <input checked="" type="radio"/> other	Storage Temperature — °C					

Initial Sample Measurements: pH 8.1 Dissolved O<sub>2</sub> 9.0 mg/L Conductivity 3050 µmhos Temperature 20.2 °C  
 Instrument Identification: Meter/Probe # 10169 Meter/Probe # 4 Meter/Probe # 015 Meter/Probe # 4

Concentration (% Volume)	pH			Dissolved Oxygen (mg/L)			Cond. (µmhos)	Hardness (mg/L)	Temperature (°C)		
	Initial	Final	Final M/P	Initial	Final	Final M/P	Initial	Initial	Initial	Final	Final M/P
Control 50.0	8.1	8.3	8/67	8.9	8.3	3	960	—	21.1	20.5	3
100.0	8.1	8.3	↓	9.0	8.2	↓	3050	526	20.2	20.7	↓
Initials	<i>inf</i>	<i>BS</i>	<i>inf</i>	<i>BS</i>	<i>inf</i>	<i>BS</i>	<i>inf</i>	<i>BS</i>	<i>inf</i>	<i>BS</i>	

**NEONATE SOURCE AND OBSERVATIONS OF NUMBER IMMOBILE AND DEAD**

Control	7.				100.07.												Init
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	
Brood culture # 51A	<i>51A → 751A → 7</i>																<i>inf</i>
24-Hr. # Immobile	0	0	0	0	0	0	0	0									<i>inf</i>
48-Hr. # Immobile	0	0	0	0	0	0	0	0									<i>inf</i>
48-Hr. # Dead	0	0	0	0	0	0	0	0									<i>BS</i>
Total # Immobile	0				0												<i>BS</i>
Total # Dead	0				0												

**BROOD CULTURE HEALTH INFORMATION**

Brood Culture #	51A			
Culture age (days)	28			
Days to 1 <sup>st</sup> Brood (≤12)	8			
Average # of Neonates/Brood (≥15)	51			
Previous 7 Days Mortality in Culture (≤25%)	0			

Percent Mortality \_\_\_\_\_ % Standard Deviation of Control Survival \_\_\_\_\_ Standard Deviation of Test Survival \_\_\_\_\_ Verified By (Initials) \_\_\_\_\_ Notes \_\_\_\_\_





### Rainbow Trout Bioassay Test Report - LC50

Sample ID:	L1693072-1
------------	------------

#### Summary Results

96-hour LC50 v/v (%):	Non-Lethal
95% Lower Confidence Interval (%):	n/a
95% Upper Confidence Interval (%):	n/a
Method of Calculation:	n/a
Confirmed by Graph:	n/a

#### Sample Information

Sample Origin:	Line Creek Operations
Sample Description:	SP20
Sampling Date and Time:	24-Oct-15 10:00
Sampling Method:	Grab
Sampled By:	Not Provided
Container(s) Description:	2 x 20L cube containers
Sample Volume:	40L
Date and Time Received:	27-Oct-15
Transit Irregularities:	None
Storage Temperature (°C):	n/a

#### Test Information

Test Organism:	Oncorhynchus mykiss
Test Description:	Acute, 96-hour, Static, LC50
Reference Method(s):	EPS 1/RM/13, 2nd Ed. Dec. 2000, with May 2007 amendments, Environment Canada EPS 1/RM/9, May 1996 with May 2007 amendments, Environment Canada
Performed By:	EAC
Starting Date and Time:	27-Oct-15 16:00
Deviations from Reference Method:	None



**Initial Parameters**

**Observations**

Colour:	None		
Odour:	Mild		
Turbidity:	Low		
Solids:	Low		
Hardness (mg/L):	6.1	mL Titration Solution/ 10	mL of Sample x 1000 = 610
Alkalinity (mg/L):	5.4	mL Titration Solution/ 10	mL of Sample x 1000 = 540
Temperature (°C):	14.5	Thermometer	S/N 91154465
Dissolved Oxygen (mg/L):	9.32	YSI Dissolved Oxygen Meter	S/N 97A0728 AJ
Conductivity (µmhos/cm):	3810	VWR Portable Conductivity Meter	S/N 51071543
pH (5.5-8.5 pH units):	7.99	VWR SympHony pH Meter	S/N D01908
pH Adjustment:	Not Adjusted		
pH Adjustment Procedure:	n/a		

**Pre-Aeration**

Aeration Time (min):	30					
Sample Test Concentration (v/v):	100%	50%	25%	12.5%	6.25%	0%
Aeration Rate (5.5-7.5 mL/min/L):	6.8 ± 0.2	6.6 ± 0.2	6.8 ± 0.2	6.8 ± 0.2	6.8 ± 0.2	6.6 ± 0.2
Oxygen (D.O.) Before Pre-Aeration (%):	90.5	n/a	n/a	n/a	n/a	91.6
Average D.O. After Pre-Aeration (%):	95.2	n/a	n/a	n/a	n/a	97.8

**Test Organism Data**

Lot Number:	23/09/15 T6
Weekly Mortality Preceding Test (%):	0.36
Sample Size:	10

**Conditions Common to All Concentrations During Test**

Source of Holding/Dilution Water:	Dechlorinated UV Treated City of Winnipeg Tap Water
Container Description:	20 L Polyethylene Pail with Liner
Aeration Method:	Compressed air bubbled through silica-glass air diffuser
Aeration Rate (5.5-7.5 mL/min/L):	(as set during pre-aeration above)
Test Solution Volume (L):	20
Test Solution Depth (cm):	34
Number of Test Organisms per Container:	10
Loading Density (g/L):	0.24



### Conditions During Test

Concentration (% v/v)	Temperature (°C) (15 ± 1°C)					Dissolved Oxygen (mg/L)					pH (pH units)				
	0h	24h	48h	72h	96h	0h	24h	48h	72h	96h	0h	24h	48h	72h	96h
0	15	n/a	n/a	n/a	15	9.45	n/a	n/a	n/a	7.16	7.46	n/a	n/a	n/a	7.35
6.25	15	n/a	n/a	n/a	15	9.60	n/a	n/a	n/a	8.54	7.62	n/a	n/a	n/a	7.52
12.5	15	n/a	n/a	n/a	15	9.60	n/a	n/a	n/a	8.47	7.74	n/a	n/a	n/a	7.66
25	15	n/a	n/a	n/a	15	9.52	n/a	n/a	n/a	8.50	7.87	n/a	n/a	n/a	7.83
50	15	n/a	n/a	n/a	15	9.64	n/a	n/a	n/a	8.41	7.98	n/a	n/a	n/a	7.97
100	15	n/a	n/a	n/a	15	9.44	n/a	n/a	n/a	8.37	8.01	n/a	n/a	n/a	8.20

Conc. (% v/v)	Conductivity (µmhos/cm)	Number of Fish Dead				Number of Fish Stressed			
		0h	24h	48h	72h	96h	24h	48h	72h
0	310	0	0	0	0	0	0	0	0
6.25	555	0	0	0	0	0	0	0	0
12.5	793	0	0	0	0	0	0	0	0
25	1258	0	0	0	0	0	0	0	0
50	2160	0	0	0	0	0	0	0	0
100	3780	0	0	0	0	0	0	0	0

### Control Fish Information at End of Test

Mean Fork Length (mm):	38
Lower Range Fork Length (mm):	34
Upper Range Fork Length (mm):	41
Mean Wet Weight (g):	0.49



**Mortality and Stressed Behaviour Information**

Conc. (% v/v)	Mean Number of Fish at End of Test		Mean Rate of Fish at End of Test (%)	
	Dead	Stressed	Dead	Stressed
0	0	0	0	0
6.25	0	0	0	0
12.5	0	0	0	0
25	0	0	0	0
50	0	0	0	0
100	0	0	0	0

**Median Lethal Concentration Results for Multi-Concentration Tests**

LC50:	Non-Lethal
LC50 Lower 95% Confidence Limit:	n/a
LC50 Upper 95% Confidence Limit:	n/a
Statistical Method:	n/a

Note: Non-lethal = 0 mortality

**Reference Toxicant Test Results**

Reference Toxicant:	Zinc Sulfate
Date Reference Toxicant Initiated:	15-Oct-15
Recent 96h Reference Toxicant Test LC50 (mg/L Zinc):	1.09
Lower 95% Confidence Limit (mg/L Zinc):	0.81
Upper 95% Confidence Limit (mg/L Zinc):	1.46
Historic Geometric Mean LC50 (mg/L Zinc):	0.74
Lower 95% Confidence Limit (mg/L Zinc):	0.37
Upper 95% Confidence Limit (mg/L Zinc):	1.50
Method of Calculation:	Stephan LC50 Program, Probit
Confirmed by Graph:	Yes



### Sublethal Biological Effects

No sublethal biological effects observed.

### Observations/Comments

No toxicity observed.



**ATTN: Lyudmyla Shvets**  
ALS Laboratory Group  
2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/10/27  
Report Date: 2015/11/06  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1483  
**Billing:** L1693754

A handwritten signature in cursive script that reads "Jacquelyn Poole".

---

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)



## Result Summary

 Client: ALS106  
 Reference: 15-1483-01-DAD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1693754-2 SP20

**Collection:** collected on 2015/10/26 at 1410 by not given

**Receipt:** received on 2015/10/27 at 1415 by MC

**Containers:** received 1 x 1 L bottle at 7 °C, in good condition with seals and no initials

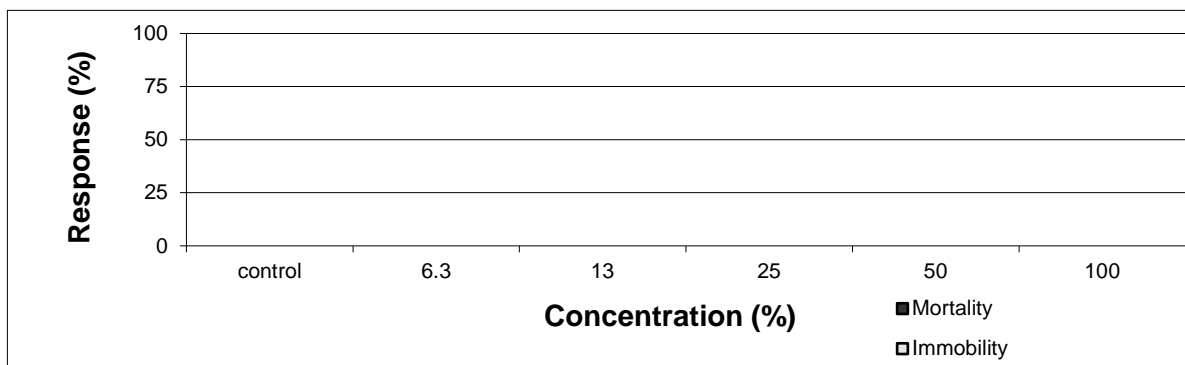
**Description:** type: water, collection method: not given

**Test:** started on 2015/10/28 ; ended on 2015/10/30

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

## Test Conditions

Client: ALS106  
Reference: 15-1483-01-DAD

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 0%

**Culture brood data:** 12 days to first brood

16 neonates per average brood

**Sample initial chemistry:** pH: 7.5; EC: 2710 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 8.4 (mg/L); temperature: 12 °C  
hardness (mg  $\text{CaCO}_3/\text{L}$ ): 673; colour: colourless; odour: odourless

**Sample holding time:** 2 days (must be  $\leq$  5 days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 20 minutes (rate of 37.5  $\pm$  12.5 mL/min.L-1)  
The hardness of the sample was not adjusted (mg  $\text{CaCO}_3/\text{L}$ ) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and  $\text{Na}_2\text{SeO}_3$  (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 87 mg  $\text{CaCO}_3/\text{L}$

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 20  $\pm$  2°C

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1483-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated October 23, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.78 (0.76-0.81) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.70-0.84) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

## Test Data

Client: ALS106
Reference: 15-1483-01-DAD

### Test Log:

Date	Day	Time	Technician
2015/10/28	0	1645	JN/NM
2015/10/29	1	1130	CQ
2015/10/30	2	1040	JK

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		
pH (units)								
Day								
0	7.9	7.8	7.9	7.9	7.9	7.9		
2	7.7	7.9	8.0	8.2	8.3	8.3		
Conductivity (µS/cm @ 25°C)								
0	247	384	555	859	1435	2610		
	223	372	535	830	1366	2460		
Dissolved Oxygen (mg/L)								
0	8.2	8.2	8.2	8.1	8.1	8.1		
2	7.8	7.8	7.8	7.9	7.9	7.9		
Temperature (°C)								
0	18	18	19	19	19	19		
2	20	20	20	20	20	20		

### Biology:

Conc. (%)	control	6.3	13	25	50	100		
Number Alive and Behavior (behavior is in brackets)								
Day								
1	10	10	10	10	10	10		
2	10	10	10	10	10	10		
Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;								
Mortality (%)								
2	0	0	0	0	0	0		
Immobility (%)								
2	0	0	0	0	0	0		

**Comments/Statistics**

Client: ALS106 Reference: 15-1483-01-DAD
---

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

**Protocol Deviations:**

None

## GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated into and form part of the Chain of Custody between HydroQual Laboratories Ltd. ("HydroQual") and the party named in the Chain of Custody (the "Client").

1. **Definitions:** Capitalized terms shall have the definition ascribed as such in these General Terms and Conditions and the Chain of Custody.
2. **The Services:** HydroQual will provide the Services to the Client as listed and described in the Chain of Custody.
3. **Prices:** HydroQual may review and change all prices, fees, surcharges or other charges as set out in proposals and/or price quotations if there are changes to HydroQual's cost beyond HydroQual's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding condition 3, all quotations are reviewed and updated on a yearly basis.
4. **Payment Terms:** The Client shall pay HydroQual within 30 days of the invoice date as provided by HydroQual. HydroQual may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. **Quotation Numbers:** The Client shall provide the proposal and/or price quotation number to HydroQual (where applicable) to ensure correct pricing.
6. **Taxes:** Applicable taxes are not included in prices, surcharges and additional fees and will be added at the time of invoicing.
7. **No Guarantee of Results:** The Client is responsible for informing itself on the limitation of the results and acknowledges that the results are not guaranteed.
8. **Standard of Care:** HydroQual will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested, subject to that level of care and skill ordinarily exercised by other laboratories currently practicing under similar conditions in the same locality, subject to the time limits and financial, physical or other constraints applicable to the Services. No warranty, express or implied, is made.
9. **Storage:** Where possible, HydroQual will store samples until a final report is issued to the Client, after which time HydroQual may discard the sample.
10. **Holds:** If the Client requests a sample be placed on hold, HydroQual will store the sample for the mutually agreed upon written time and price, after which HydroQual will invoice the Client and discard the sample.
11. **Archives:** If the Client requests a sample be archived, HydroQual will store the sample for a mutually agreed upon written time frame and price, after which HydroQual will invoice the Client and discard the sample.
12. **Handling Protocol:** Legal sample handling protocol must be arranged, and provided in writing, before samples are collected. HydroQual will provide a price quotation for legal sample protocol. Samples processed under legal protocol are stored indefinitely, subject to a storage charge as advised by HydroQual.
13. **Samples:** The quality, condition, content and source of samples stored and tested are not known to HydroQual except as declared and described on the Chain of Custody completed and submitted by the Client and accompanying the sample.
14. **Risk of Loss:** HydroQual will use reasonable care to protect samples during storage, however, all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the client forever releases HydroQual from any and all claims the Client may have for any loss or damage to the sample.
15. **Environmental:** the Client must comply with all applicable environmental legislation, including labeling all hazardous samples to comply with Canada's *Workplace Hazardous Materials Information System* and the Alberta *Transfer of Dangerous Goods* regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client shall defend, indemnify and hold harmless HydroQual for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
16. **Hazardous Materials Disposal:** HydroQual may return, at the Client's cost, hazardous material to the Client for disposal.
17. **Hazardous Materials Surcharge:** HydroQual may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials ("NORM"), such as and including without limitation, H<sub>2</sub>S and CN.
18. **Sample Containers:** HydroQual may ship sample containers to the Client's location by the most cost effective means using HydroQual's preferred courier suppliers, within the specified project timeline. Shipping will be charged back to the Client.
19. **Additional Charges:** HydroQual may charge the Client:
  - (a) for pick-up and delivery services when provided subject in each instance to a minimum charge of \$50.00; and,
  - (b) for rush service (processing samples and/or reporting).
20. **Large Bottle Orders:** The Client shall provide HydroQual with not less than 24 hours' notice for large bottle orders.
21. **Re-Tests:** HydroQual reserves the right to re-test any samples that remain in HydroQual's possession. Re-tests requested by the Client may be charged to Client and Client agrees to pay for such charges.
22. **Waiver:** The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any and all claims against HydroQual that the Client may have against HydroQual as a result of the interpretation of the results provided to the Client. The Client shall defend, indemnify and save harmless HydroQual for any and all claims made by any third party against HydroQual in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.



### Rainbow Trout Bioassay Test Report - LC50

Sample ID:	L1693754-2
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#### Summary Results

96-hour LC50 v/v (%):	>100
95% Lower Confidence Interval (%):	n/a
95% Upper Confidence Interval (%):	n/a
Method of Calculation:	n/a
Confirmed by Graph:	n/a

#### Sample Information

Sample Origin:	Line Creek Operations
Sample Description:	SP20
Sampling Date and Time:	26-Oct-15 14:10
Sampling Method:	Grab
Sampled By:	Not Provided
Container(s) Description:	2 x 20L cube containers
Sample Volume:	40L
Date and Time Received:	27-Oct-15
Transit Irregularities:	None
Storage Temperature (°C):	4

#### Test Information

Test Organism:	Oncorhynchus mykiss
Test Description:	Acute, 96-hour, Static, LC50
Reference Method(s):	EPS 1/RM/13, 2nd Ed. Dec. 2000, with May 2007 amendments, Environment Canada EPS 1/RM/9, May 1996 with May 2007 amendments, Environment Canada
Performed By:	JRB
Starting Date and Time:	29-Oct-15 11:00
Deviations from Reference Method:	None



### Initial Parameters

#### Observations

Colour:	Light Yellow		
Odour:	Mild		
Turbidity:	None		
Solids:	Low		
Hardness (mg/L):	5.9	mL Titration Solution/ 10	mL of Sample x 1000 = 590
Alkalinity (mg/L):	3.1	mL Titration Solution/ 10	mL of Sample x 1000 = 310
Temperature (°C):	14.5	Thermometer	S/N 91154465
Dissolved Oxygen (mg/L):	9.64	YSI Dissolved Oxygen Meter	S/N 97A0728 AJ
Conductivity (µmhos/cm):	2380	VWR Portable Conductivity Meter	S/N 51071543
pH (5.5-8.5 pH units):	7.73	VWR SympHony pH Meter	S/N D01908
pH Adjustment:	Not Adjusted		
pH Adjustment Procedure:	n/a		

#### Pre-Aeration

Aeration Time (min):	30					
Sample Test Concentration (v/v):	100%	50%	25%	12.5%	6.25%	0%
Aeration Rate (5.5-7.5 mL/min/L):	6.4 ± 0.2	6.4 ± 0.2	6.4 ± 0.2	6.4 ± 0.2	6.4 ± 0.2	6.4 ± 0.2
Oxygen (D.O.) Before Pre-Aeration (%):	94.4	n/a	n/a	n/a	n/a	96.6
Average D.O. After Pre-Aeration (%):	96.8	n/a	n/a	n/a	n/a	99.7

#### Test Organism Data

Lot Number:	23/09/15 T2
Weekly Mortality Preceding Test (%):	0.27
Sample Size:	10

#### Conditions Common to All Concentrations During Test

Source of Holding/Dilution Water:	Dechlorinated UV Treated City of Winnipeg Tap Water
Container Description:	20 L Polyethylene Pail with Liner
Aeration Method:	Compressed air bubbled through silica-glass air diffuser
Aeration Rate (5.5-7.5 mL/min/L):	(as set during pre-aeration above)
Test Solution Volume (L):	20
Test Solution Depth (cm):	34
Number of Test Organisms per Container:	10
Loading Density (g/L):	0.23





### Conditions During Test

Concentration (% v/v)	Temperature (°C) (15 ± 1°C)					Dissolved Oxygen (mg/L)					pH (pH units)				
	0h	24h	48h	72h	96h	0h	24h	48h	72h	96h	0h	24h	48h	72h	96h
0	15	n/a	n/a	n/a	15	9.97	n/a	n/a	n/a	10.18	7.35	n/a	n/a	n/a	7.64
6.25	15	n/a	n/a	n/a	15	9.94	n/a	n/a	n/a	10.15	7.47	n/a	n/a	n/a	7.67
12.5	15	n/a	n/a	n/a	15	9.90	n/a	n/a	n/a	10.21	7.56	n/a	n/a	n/a	7.66
25	15	n/a	n/a	n/a	15	9.86	n/a	n/a	n/a	10.18	7.64	n/a	n/a	n/a	7.85
50	15	n/a	n/a	n/a	15	9.78	n/a	n/a	n/a	10.23	7.73	n/a	n/a	n/a	8.01
100	15	n/a	n/a	n/a	15	9.76	n/a	n/a	n/a	10.18	7.75	n/a	n/a	n/a	8.17

Conc. (% v/v)	Conductivity (µmhos/cm)	Number of Fish Dead				Number of Fish Stressed			
		0h	24h	48h	72h	96h	24h	48h	72h
0	306	0	0	0	0	0	0	0	0
6.25	454	0	0	0	1	0	0	0	0
12.5	599	0	0	0	0	0	0	0	0
25	883	0	0	0	1	0	0	0	0
50	1412	0	0	0	0	0	0	0	0
100	2360	0	0	0	1	0	0	0	0

### Control Fish Information at End of Test

Mean Fork Length (mm):	37
Lower Range Fork Length (mm):	34
Upper Range Fork Length (mm):	41
Mean Wet Weight (g):	0.45



**Mortality and Stressed Behaviour Information**

Conc. (% v/v)	Mean Number of Fish at End of Test		Mean Rate of Fish at End of Test (%)	
	Dead	Stressed	Dead	Stressed
0	0	0	0	0
6.25	1	0	10	0
12.5	0	0	0	0
25	1	0	10	0
50	0	0	0	0
100	1	0	10	0

**Median Lethal Concentration Results for Multi-Concentration Tests**

LC50:	>100%
LC50 Lower 95% Confidence Limit:	n/a
LC50 Upper 95% Confidence Limit:	n/a
Statistical Method:	n/a

Note: Non-lethal = 0 mortality

**Reference Toxicant Test Results**

Reference Toxicant:	Zinc Sulfate
Date Reference Toxicant Initiated:	15-Oct-15
Recent 96h Reference Toxicant Test LC50 (mg/L Zinc):	1.09
Lower 95% Confidence Limit (mg/L Zinc):	0.81
Upper 95% Confidence Limit (mg/L Zinc):	1.46
Historic Geometric Mean LC50 (mg/L Zinc):	0.74
Lower 95% Confidence Limit (mg/L Zinc):	0.37
Upper 95% Confidence Limit (mg/L Zinc):	1.50
Method of Calculation:	Stephan LC50 Program, Probit
Confirmed by Graph:	Yes



### Sublethal Biological Effects

No sublethal biological effects observed.

### Observations/Comments

No toxicity observed.



**ATTN: Lyudmyla Shvets**  
ALS Laboratory Group  
2559 29th St NE  
Calgary, Alberta  
Canada T2Y 7B5

Received: 2015/11/03  
Report Date: 2015/11/16  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1527  
**Billing:** L1697035

A handwritten signature in cursive script that reads "Jacquelyn Poole".

---

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)

## Result Summary

 Client: ALS106  
 Reference: 15-1527-01-DAD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1697035-2 SP21 OUTFALL

**Collection:** collected on 2015/11/02 at 0800 by not given

**Receipt:** received on 2015/11/03 at 1230 by MC

**Containers:** received 2 x 1 L bottle at 8 °C, in good condition with no seals and no initials

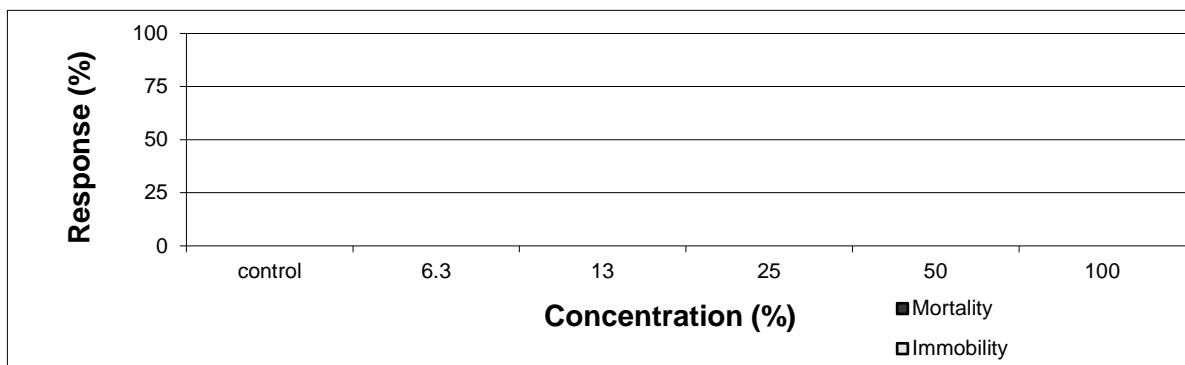
**Description:** type: water, collection method: not given

**Test:** started on 2015/11/04 ; ended on 2015/11/06

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

## Test Conditions

Client: ALS106  
Reference: 15-1527-01-DAD

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 0%

**Culture brood data:** 12 days to first brood

16 neonates per average brood

**Sample initial chemistry:** pH: 7.7; EC: 1452 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 10.6 (mg/L); temperature: 14 °C  
hardness (mg CaCO<sub>3</sub>/L): 586; colour: colourless; odour: odourless

**Sample holding time:** 2 days (must be  $\leq$  5 days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 20 minutes (rate of 37.5  $\pm$  12.5 mL/min.L-1)  
The hardness of the sample was not adjusted (mg CaCO<sub>3</sub>/L) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and Na<sub>2</sub>SeO<sub>3</sub> (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 95 mg CaCO<sub>3</sub>/L

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 20  $\pm$  2°C

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1527-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated October 23, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.78 (0.76-0.81) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.70-0.84) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

## Test Data

Client: ALS106
Reference: 15-1527-01-DAD

### Test Log:

Date	Day	Time	Technician
2015/11/04	0	1530	NM/HKS
2015/11/05	1	0850	JK
2015/11/06	2	0940	JK

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		
pH (units)								
Day								
0	7.7	7.7	7.7	7.8	7.9	7.9		
2	7.4	7.4	7.6	7.7	7.8	7.8		
Conductivity (µS/cm @ 25°C)								
0	184	262	328	461	714	1245		
2	204	268	342	468	735	1274		
Dissolved Oxygen (mg/L)								
0	8.0	8.0	8.0	8.1	8.1	8.0		
2	8.1	8.2	8.1	7.8	7.8	8.0		
Temperature (°C)								
0	19	19	19	19	19	19		
2	18	19	19	18	19	19		

### Biology:

Conc. (%)	control	6.3	13	25	50	100		
Number Alive and Behavior (behavior is in brackets)								
Day								
1	10	10	10	10	10	10		
2	10	10	10	10	10	10		
Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;								
Mortality (%)								
2	0	0	0	0	0	0		
Immobility (%)								
2	0	0	0	0	0	0		



## Comments/Statistics

Client: ALS106 Reference: 15-1527-01-DAD
---

### Test Result Comments:

None

### Data Analysis:

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

### Protocol Deviations:

None

## GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated into and form part of the Chain of Custody between HydroQual Laboratories Ltd. ("HydroQual") and the party named in the Chain of Custody (the "Client").

1. **Definitions:** Capitalized terms shall have the definition ascribed as such in these General Terms and Conditions and the Chain of Custody.
2. **The Services:** HydroQual will provide the Services to the Client as listed and described in the Chain of Custody.
3. **Prices:** HydroQual may review and change all prices, fees, surcharges or other charges as set out in proposals and/or price quotations if there are changes to HydroQual's cost beyond HydroQual's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding condition 3, all quotations are reviewed and updated on a yearly basis.
4. **Payment Terms:** The Client shall pay HydroQual within 30 days of the invoice date as provided by HydroQual. HydroQual may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. **Quotation Numbers:** The Client shall provide the proposal and/or price quotation number to HydroQual (where applicable) to ensure correct pricing.
6. **Taxes:** Applicable taxes are not included in prices, surcharges and additional fees and will be added at the time of invoicing.
7. **No Guarantee of Results:** The Client is responsible for informing itself on the limitation of the results and acknowledges that the results are not guaranteed.
8. **Standard of Care:** HydroQual will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested, subject to that level of care and skill ordinarily exercised by other laboratories currently practicing under similar conditions in the same locality, subject to the time limits and financial, physical or other constraints applicable to the Services. No warranty, express or implied, is made.
9. **Storage:** Where possible, HydroQual will store samples until a final report is issued to the Client, after which time HydroQual may discard the sample.
10. **Holds:** If the Client requests a sample be placed on hold, HydroQual will store the sample for the mutually agreed upon written time and price, after which HydroQual will invoice the Client and discard the sample.
11. **Archives:** If the Client requests a sample be archived, HydroQual will store the sample for a mutually agreed upon written time frame and price, after which HydroQual will invoice the Client and discard the sample.
12. **Handling Protocol:** Legal sample handling protocol must be arranged, and provided in writing, before samples are collected. HydroQual will provide a price quotation for legal sample protocol. Samples processed under legal protocol are stored indefinitely, subject to a storage charge as advised by HydroQual.
13. **Samples:** The quality, condition, content and source of samples stored and tested are not known to HydroQual except as declared and described on the Chain of Custody completed and submitted by the Client and accompanying the sample.
14. **Risk of Loss:** HydroQual will use reasonable care to protect samples during storage, however, all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the client forever releases HydroQual from any and all claims the Client may have for any loss or damage to the sample.
15. **Environmental:** the Client must comply with all applicable environmental legislation, including labeling all hazardous samples to comply with Canada's *Workplace Hazardous Materials Information System* and the Alberta *Transfer of Dangerous Goods* regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client shall defend, indemnify and hold harmless HydroQual for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
16. **Hazardous Materials Disposal:** HydroQual may return, at the Client's cost, hazardous material to the Client for disposal.
17. **Hazardous Materials Surcharge:** HydroQual may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials ("NORM"), such as and including without limitation, H<sub>2</sub>S and CN.
18. **Sample Containers:** HydroQual may ship sample containers to the Client's location by the most cost effective means using HydroQual's preferred courier suppliers, within the specified project timeline. Shipping will be charged back to the Client.
19. **Additional Charges:** HydroQual may charge the Client:
  - (a) for pick-up and delivery services when provided subject in each instance to a minimum charge of \$50.00; and,
  - (b) for rush service (processing samples and/or reporting).
20. **Large Bottle Orders:** The Client shall provide HydroQual with not less than 24 hours' notice for large bottle orders.
21. **Re-Tests:** HydroQual reserves the right to re-test any samples that remain in HydroQual's possession. Re-tests requested by the Client may be charged to Client and Client agrees to pay for such charges.
22. **Waiver:** The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any and all claims against HydroQual that the Client may have against HydroQual as a result of the interpretation of the results provided to the Client. The Client shall defend, indemnify and save harmless HydroQual for any and all claims made by any third party against HydroQual in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.



November 10, 2015

Lyudmyla Shvets  
ALS Laboratories Group  
2559 29 Street NE  
Calgary, AB T1Y 7B5

Dear Lyudmyla:

On November 5, 2015, Pollutech EnviroQuatics Limited personnel received a water sample (SP21 Outfall L1697035-2) from ALS Laboratories in Winnipeg. The following acute toxicity test was performed on this sample observing Environment Canada methods:

- Rainbow trout 96-hour LC50 toxicity test according to criteria outlined in "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout", Second Edition, Method Development and Applications Centre, Ottawa, Ontario, Report EPS 1/RM/13, 2000 (with 2007 Amendments).

The result of the acute toxicity test is summarized in the following table.

**Summary of LC50 Toxicity Results for SP21 Outfall L1697035-2 Water Sample Collected November 2, 2015**

Sample Name and Sample #	Toxicity Test	Endpoint	Effect	Result <sup>1</sup>
SP21 Outfall L1697035-2 #873815201	Rainbow Trout	96-Hour LC50 (95% Confidence)	Mortality	Non-lethal

1 - Results relate only to the sample tested

Toxicity Test Endpoint Descriptions

**LC50**            The estimated concentration which causes acute lethality to 50% of the test organisms.

The following pages contain the required details for reporting of the acute lethality toxicity tests. If there are any further details which you require, please do not hesitate to contact us.

Sincerely,  
**Pollutech EnviroQuatics Limited**

Rachel (Abma) Giacomini, M.Sc.  
QA/QC Leader  
File ID: \bioassay\2015\8000\8738\8738nv1 T LC50

**bringing clarity to your environment**

## Rainbow Trout 96-Hour LC50 Toxicity Test

**METHOD:** Environment Canada, "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout", Second Edition, Method Development and Applications Section, Ottawa, ON., Report EPS 1/RM/13, 2000 (with 2007 amendments) Pollutech Test Method RT-LC-R12.10.

### Test Material

**Client Name/Location:** ALS Laboratories Group, Winnipeg, MB

<b>Sample #:</b>	873815201	<b>Sample Name:</b>	SP21 Outfall L1697035-2
<b>Sample Method:</b>	Grab	<b>Collected by:</b>	N/A
<b>Date/Time Collected:</b>	November 2, 2015; 08:00	<b>Arrival Temp.:</b>	12.3°C
<b>Date/Time Received:</b>	November 5, 2015; 11:30	<b>Sample Description:</b>	Clear, light green
<b>Sample Point Description:</b>	Other	<b>Sample Type:</b>	Effluent
<b>Transportation:</b>	Road/Air		
<b>Storage:</b>	None		

N/A – not available

### Test Organisms

<b>Species:</b>	Rainbow Trout ( <i>Oncorhynchus mykiss</i> )				
<b>Source:</b>	Rainbow Springs Hatchery				
<b>Culture Temp.:</b>	15 ± 2°C	<b>Batch Number:</b>	RS091815-2		
<b>Water Source:</b>	Dechlorinated municipal drinking water				
<b>Mean Weight:</b>	0.60 g	<b>Min:</b>	0.34 g	<b>Max:</b>	0.98 g
<b>Mean Fork Length:</b>	40 mm	<b>Min:</b>	38 mm	<b>Max:</b>	45 mm
<b>Loading Density:</b>	0.3 g/L	<b>Sample Size:</b>	10 fish		
<b>Life Stage:</b>	Fry				
<b>Number Dead Daily In Previous 7 Days For Fish Culture:</b>	0+0+0+0+0+0+0=0				
<b>Previous 7-Day Holding Mortalities For Fish Culture:</b>	0%				

**Rainbow Trout 96-Hour LC50 Toxicity Test - Continued**

**Sample Number:** 873815201

**Sample Name:** SP21 Outfall L1697035-2

Test Conditions

**Date/Time Started:** November 5, 2015; 15:45

**Test Volume:** 20 L/Vessel      **Number of Fish Per Vessel:** 10

**# of Vessels Per Conc.:** 1      **Test Temperature:** 15 ± 1°C

**Pre-aeration:** Yes      **Duration of Pre-aeration:** 45 minutes

**Pre-aeration Rate:** 6.5 ± 0.26 ml/min·L<sup>-1</sup>      **Aeration Rate During Test:** 6.5 ± 0.26 ml/min·L<sup>-1</sup>

**Sample Adjustment:** No      **Sample pH Adjustment:** No

**Test Method Deviations:** None

Test Facilities



**CALA**  
Testing  
Accreditation No. A1225

**Testing Laboratory:**

Pollutech EnviroQuatics Limited, 704 Mara St.,  
Suite 122, Point Edward, Ontario, N7V 1X4

This laboratory is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). The test included in this report is within the scope of this laboratory.

**Test Performed By:**

B. Steven/ E. Pasiak/ M. Long

Initial Measurement of Variables in Unadjusted Sample

**Cond:** 1164 µmhos      **DO:** 10.6 mg/L      **pH:** 7.6      **Temp:** 14.8 °C

Test Results

Conc'n (% Volume)	NUMBER OF MORTALITIES			
	Time (hours)			
	24	48	72	96
Control	0	0	0	0
6.25	0	0	0	0
12.5	0	0	0	0
25	0	0	0	0
50	0	0	0	0
100	0	0	0	0

**Number of Control Fish Showing Atypical/Stressed Behaviour:** 0

**Rainbow Trout 96-Hour LC50 Toxicity Test - Continued**

**Sample Number:** 873815201

**Sample Name:** SP21 Outfall L1697035-2

Test Results

**TOXICITY TEST VARIABLES**

Conc'n (% Volume)	Variables	Time (hours)				
		0	24	48	72	96
Control	Cond. ( $\mu$ mhos)	186				n/r
	DO (mg/L)	9.6				9.2
	pH (units)	7.8				8.0
	Temp. (°C)	14.4				14.9
6.25	Cond. ( $\mu$ mhos)	248				n/r
	DO (mg/L)	10.1				9.2
	pH (units)	7.8				8.0
	Temp. (°C)	14.3				14.5
12.5	Cond. ( $\mu$ mhos)	288				n/r
	DO (mg/L)	10.1				9.5
	pH (units)	7.7				8.1
	Temp. (°C)	14.3				14.3
25	Cond. ( $\mu$ mhos)	414				n/r
	DO (mg/L)	10.4				9.6
	pH (units)	7.9				8.1
	Temp. (°C)	14.2				14.2
50	Cond. ( $\mu$ mhos)	714				n/r
	DO (mg/L)	10.3				9.6
	pH (units)	7.9				8.3
	Temp. (°C)	15.2				14.2
100	Cond. ( $\mu$ mhos)	1137				n/r
	DO (mg/L)	10.3				9.7
	pH (units)	7.8				8.4
	Temp. (°C)	14.0				14.2

n/r = not required

## Rainbow Trout 96-Hour LC50 Toxicity Test - Continued

---

**Sample Number:** 873815201

**Sample Name:** SP21 Outfall L1697035-2

### Summary of Test Results

**96-Hour LC50:** Non-lethal

**95% Confidence Limits:** Not Applicable

**Analysis Method:** No Mortality

**Test Results Verified By:** R. C. Ferguson

### Reference Toxicant Results

**Reference Chemical:** Phenol

**Date Test Initiated:** 10/09/15

**Fish Lot #:** RS091815

**Method:** Spearman-Kärber ( $\alpha = 0\%$ )

**96-Hour LC50 (95% Confidence Limits):** 9.33 mg/L (7.53 mg/L; 11.57 mg/L)

**95% Historic Geometric Mean LC50:  
(Historic Warning Limits) ( $\pm 2$  Standard Deviations)** 8.35 mg/L (5.89 mg/L; 11.85 mg/L)



**ATTN: Lyudmyla Shvets**  
ALS Laboratory Group  
2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/11/10  
Report Date: 2015/11/23  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1557  
**Billing:** L1700416

A handwritten signature in cursive script, reading "Jacquelyn Rose".

---

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1**  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)



**Result Summary**

Client: ALS106 Reference: 15-1557-01-TRD
---

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1700416-2 SP21 - OUTFALL

**Collection:** collected on 2015/11/09 at 0800 by not given

**Receipt:** received on 2015/11/10 at 1240 by MC

**Containers:** received 2 x 20 L carboy/ 2 x 1 L bottle at 8 °C, in good condition with no seals and no initials

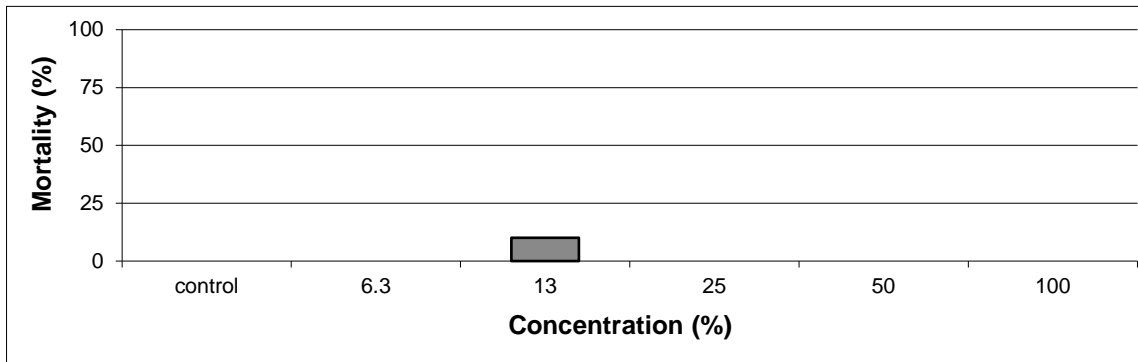
**Description:** type: water, collection method: not given

**Test:** started on 2015/11/12 ; ended on 2015/11/16

**Result:**

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute:	LC50	>100		could not be calculated
(mortality)	LC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

## Test Conditions

Client: ALS106 Reference: 15-1557-01-TRD
---

**Method:** Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

**Test type:** Trout 96-h Static Acute Test (WTR-ME-041)

**Species:** *Oncorhynchus mykiss*

**Organism source:** Rainbow Springs (Batch 20151028TR)

**Acclimation:** 15 days (must be  $\geq 2$  weeks)

**Stock mortality:** 0.08% (seven days preceding testing)

**Sample initial chemistry:** pH: 7.7; EC: 1498 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 8.6 (mg/L); temperature: 16 °C  
hardness (mg CaCO<sub>3</sub>/L): 668; colour: colourless; odour: odourless

**Sample holding time:** 3 days (must be  $\leq 5$  days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** The test was conducted in 22 L plastic pails with polyethylene liners

**Test volume:** 20 Litres (depth of solution in each test vessel  $\geq 15\text{cm}$ )

**Sample pre-treatment:** All test solutions and controls were pre-aerated for 120 minutes at 6.5  $\pm$  1 mL/min/L  
Dissolved oxygen in 100 % sample was 8.9 mg/L after pre-aeration  
The sample was not filtered or pH adjusted prior to or during testing

**Loading density:** 0.18 g/Litre (must be  $\leq 0.5$  g/Litre)

**Control/dilution water:** Dechlorinated City of Calgary water acclimated to test conditions

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment; 10 fish per replicate

**Feeding:** Fish are not fed 24 hours before test initiation and no feeding during test

**Measurements:** pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination

**Aeration:** All treatments aerated at 6.5  $\pm$  1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones

**Lighting:** Overhead full spectrum fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 15  $\pm$  1°C

**Endpoint:** Mortality, 96-h LC50 (with 95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq 90\%$ )

The control had 0 percent (%) stressed behaviour (must  $\leq 10\%$ )

**Reference toxicant:** 96-h test with Potassium Chloride (KCl) initiated November 18, 2015; current result:  
(96-h LC50 and 95% confidence limits) = 0.51 (0.42-0.58) log (g/L KCl)  
historical results:  
(96-h LC50 and 95% confidence limits) = 0.57 (0.50-0.64) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

## Test Data

Client: ALS106
Reference: 15-1557-01-TRD

### Test Log:

Date	Day	Time	Technician
2015/11/12	0	1200	CQ
2015/11/13	1	0820	JN
2015/11/14	2	0855	JN
2015/11/15	3	1100	ML
2015/11/16	4	1005	NM

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	pH (units)					
0	7.3	7.3	7.3	7.4	7.5	7.6
4	8.2	8.2	8.2	8.1	8.2	8.2

Day	Conductivity ( $\mu\text{S}/\text{cm}$ @ 25°C)					
0	422	488	559	748	1042	1604
4	405	483	560	740	1038	1609

Day	Dissolved Oxygen (mg/L)					
0	8.9	8.9	8.9	8.9	8.9	8.9
4	8.1	8.3	8.4	8.1	8.2	8.4

Day	Temperature (°C)					
0	15	15	15	15	15	15
4	16	16	16	16	16	16

### Number Alive (In brackets number stressed):

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	Number Alive (In brackets number stressed)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	10	9	10	10	10

Day	Mortality (%)					
4	0	0	10	0	0	0

Day	Stressed (%)					
4	0	0	0	0	0	0

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**Biology Summary Tables:**

Control Fish	Length (cm)	Wet Weight(g)
1	3.1	0.4
2	3.2	0.4
3	3.4	0.4
4	3.2	0.4
5	3.3	0.4
6	2.9	0.2
7	3.0	0.3
8	2.9	0.3
9	3.2	0.5
10	2.8	0.3

average	3.1	0.4
sd	0.2	0.1
cv(%)	6.3	23.4

Notes: nd, not done; na, not applicable;  
 sd, standard deviation; cv(%), coefficient  
 of variation

**Test Data**

Conc. (%)	Group Wet Weight (g)
control	3.6
6.3	4.9
13	3.5
25	4.6
50	3.9
100	4.0

Client: ALS106
Reference: 15-1557-01-TRD

## Comments/Statistics

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

**Protocol Deviations:**

None

**Result Summary**

Client: ALS106 Reference: 15-1557-01-DAD
---

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1700416-2 SP21 - OUTFALL

**Collection:** collected on 2015/11/09 at 0800 by not given

**Receipt:** received on 2015/11/10 at 1240 by MC

**Containers:** received 2 x 20 L carboy/ 2 x 1 L bottle at 8 °C, in good condition with no seals and no initials

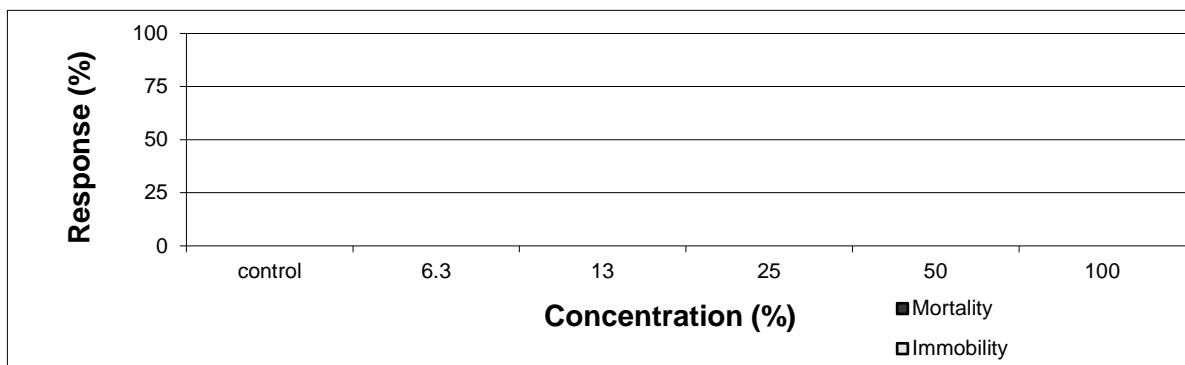
**Description:** type: water, collection method: not given

**Test:** started on 2015/11/11 ; ended on 2015/11/13

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

## Test Conditions

Client: ALS106  
Reference: 15-1557-01-DAD

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 0%

**Culture brood data:** 12 days to first brood

16 neonates per average brood

**Sample initial chemistry:** pH: 7.7; EC: 1498 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 8.6 (mg/L); temperature: 16 °C  
hardness (mg  $\text{CaCO}_3/\text{L}$ ): 668; colour: colourless; odour: odourless

**Sample holding time:** 2 days (must be  $\leq$  5 days)

**Sample storage:**  $4 \pm 2^\circ\text{C}$  in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 20 minutes (rate of  $37.5 \pm 12.5$  mL/min.L-1)  
The hardness of the sample was not adjusted (mg  $\text{CaCO}_3/\text{L}$ ) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and  $\text{Na}_2\text{SeO}_3$  (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 91 mg  $\text{CaCO}_3/\text{L}$

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:**  $20 \pm 2^\circ\text{C}$

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1557-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated November 4, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.80 (0.78-0.82) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.70-0.84) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

## Test Data

Client: ALS106
Reference: 15-1557-01-DAD

### Test Log:

Date	Day	Time	Technician
2015/11/11	0	1220	HS
2015/11/12	1	1005	HS
2015/11/13	2	0805	HS

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		

Day

pH (units)

0	8.1	8.2	8.2	8.2	8.2	8.1		
2	7.8	7.9	7.9	7.9	8.0	8.1		

Conductivity (µS/cm @ 25°C)

0	193	292	390	574	951	1552		
2	170	252	346	514	813	1359		

Dissolved Oxygen (mg/L)

0	8.1	8.2	8.1	8.1	8.1	8.1		
2	7.8	7.9	7.9	7.9	8.0	8.0		

Temperature (°C)

0	19	19	19	19	19	19		
2	18	18	18	18	18	18		

### Biology:

Conc. (%)	control	6.3	13	25	50	100		

Day

Number Alive and Behavior (behavior is in brackets)

1	10	10	10	10	10	10		
2	10	10	10	10	10	10		

Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;

Mortality (%)

2	0	0	0	0	0	0		
---	---	---	---	---	---	---	--	--

Immobility (%)

2	0	0	0	0	0	0		
---	---	---	---	---	---	---	--	--



**Comments/Statistics**

Client: ALS106 Reference: 15-1557-01-DAD
---

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

**Protocol Deviations:**

None

## GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated into and form part of the Chain of Custody between HydroQual Laboratories Ltd. ("HydroQual") and the party named in the Chain of Custody (the "Client").

1. **Definitions:** Capitalized terms shall have the definition ascribed as such in these General Terms and Conditions and the Chain of Custody.
2. **The Services:** HydroQual will provide the Services to the Client as listed and described in the Chain of Custody.
3. **Prices:** HydroQual may review and change all prices, fees, surcharges or other charges as set out in proposals and/or price quotations if there are changes to HydroQual's cost beyond HydroQual's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding condition 3, all quotations are reviewed and updated on a yearly basis.
4. **Payment Terms:** The Client shall pay HydroQual within 30 days of the invoice date as provided by HydroQual. HydroQual may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. **Quotation Numbers:** The Client shall provide the proposal and/or price quotation number to HydroQual (where applicable) to ensure correct pricing.
6. **Taxes:** Applicable taxes are not included in prices, surcharges and additional fees and will be added at the time of invoicing.
7. **No Guarantee of Results:** The Client is responsible for informing itself on the limitation of the results and acknowledges that the results are not guaranteed.
8. **Standard of Care:** HydroQual will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested, subject to that level of care and skill ordinarily exercised by other laboratories currently practicing under similar conditions in the same locality, subject to the time limits and financial, physical or other constraints applicable to the Services. No warranty, express or implied, is made.
9. **Storage:** Where possible, HydroQual will store samples until a final report is issued to the Client, after which time HydroQual may discard the sample.
10. **Holds:** If the Client requests a sample be placed on hold, HydroQual will store the sample for the mutually agreed upon written time and price, after which HydroQual will invoice the Client and discard the sample.
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12. **Handling Protocol:** Legal sample handling protocol must be arranged, and provided in writing, before samples are collected. HydroQual will provide a price quotation for legal sample protocol. Samples processed under legal protocol are stored indefinitely, subject to a storage charge as advised by HydroQual.
13. **Samples:** The quality, condition, content and source of samples stored and tested are not known to HydroQual except as declared and described on the Chain of Custody completed and submitted by the Client and accompanying the sample.
14. **Risk of Loss:** HydroQual will use reasonable care to protect samples during storage, however, all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the client forever releases HydroQual from any and all claims the Client may have for any loss or damage to the sample.
15. **Environmental:** the Client must comply with all applicable environmental legislation, including labeling all hazardous samples to comply with Canada's *Workplace Hazardous Materials Information System* and the Alberta *Transfer of Dangerous Goods* regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client shall defend, indemnify and hold harmless HydroQual for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
16. **Hazardous Materials Disposal:** HydroQual may return, at the Client's cost, hazardous material to the Client for disposal.
17. **Hazardous Materials Surcharge:** HydroQual may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials ("NORM"), such as and including without limitation, H<sub>2</sub>S and CN.
18. **Sample Containers:** HydroQual may ship sample containers to the Client's location by the most cost effective means using HydroQual's preferred courier suppliers, within the specified project timeline. Shipping will be charged back to the Client.
19. **Additional Charges:** HydroQual may charge the Client:
  - (a) for pick-up and delivery services when provided subject in each instance to a minimum charge of \$50.00; and,
  - (b) for rush service (processing samples and/or reporting).
20. **Large Bottle Orders:** The Client shall provide HydroQual with not less than 24 hours' notice for large bottle orders.
21. **Re-Tests:** HydroQual reserves the right to re-test any samples that remain in HydroQual's possession. Re-tests requested by the Client may be charged to Client and Client agrees to pay for such charges.
22. **Waiver:** The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any and all claims against HydroQual that the Client may have against HydroQual as a result of the interpretation of the results provided to the Client. The Client shall defend, indemnify and save harmless HydroQual for any and all claims made by any third party against HydroQual in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.



**ATTN: Lyudmyla Shvets**  
ALS Laboratory Group  
2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/11/17  
Report Date: 2015/11/25  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1593  
**Billing:** L1703083

A handwritten signature in cursive script that reads "Jacquelyn Poole".

---

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)

## Result Summary

 Client: ALS106  
 Reference: 15-1593-01-DAD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1703083-2 SP21-OUTFALL

**Collection:** collected on 2015/11/16 at not given by not given

**Receipt:** received on 2015/11/17 at 1200 by MC

**Containers:** received 2 x 1 L bottle at 8 °C, in good condition with no seals and no initials

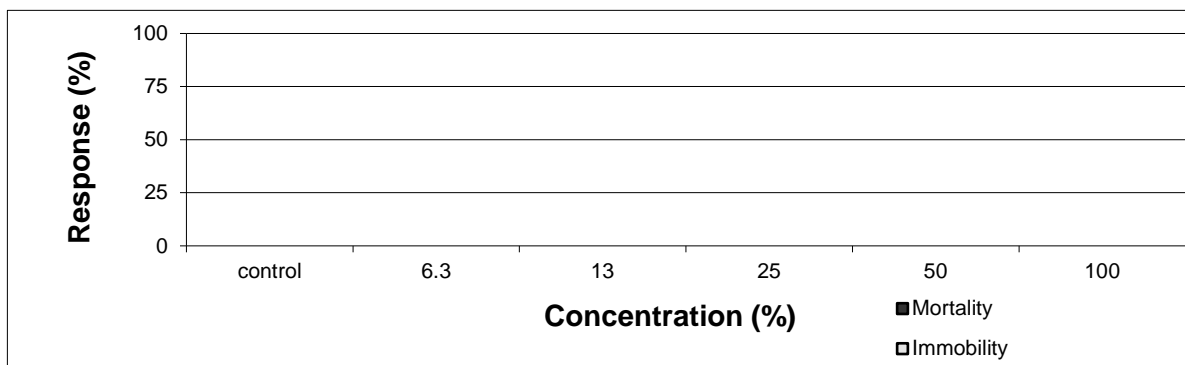
**Description:** type: water, collection method: not given

**Test:** started on 2015/11/17 ; ended on 2015/11/19

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

## Test Conditions

Client: ALS106 Reference: 15-1593-01-DAD
---

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 0%

**Culture brood data:** 11 days to first brood

20 neonates per average brood

**Sample initial chemistry:** pH: 7.8; EC: 1822 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 7.9 (mg/L); temperature: 19 °C  
hardness (mg CaCO<sub>3</sub>/L): 772; colour: colourless; odour: odourless

**Sample holding time:** 1 day (must be  $\leq$  5 days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was filtered with a 110  $\mu\text{m}$  nitrex screen prior to testing

The sample was not pH adjusted prior to or during testing

The sample was pre-aerated for 20 minutes (rate of 37.5  $\pm$  12.5 mL/min.L-1)

The hardness of the sample was not adjusted (mg CaCO<sub>3</sub>/L) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and Na<sub>2</sub>SeO<sub>3</sub> (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 87 mg CaCO<sub>3</sub>/L

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 20  $\pm$  2°C

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1593-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated November 17, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.80 (0.78-0.83) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.71-0.83) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

### Test Data

Client: ALS106
Reference: 15-1593-01-DAD

#### Test Log:

Date	Day	Time	Technician
2015/11/17	0	1430	HS/ML
2015/11/18	1	0835	JK
2015/11/19	2	0855	JK

#### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		
pH (units)								
Day								
0	7.9	8.0	8.0	8.0	8.1	8.0		
2	8.0	8.1	8.1	8.2	8.3	8.3		
Conductivity (µS/cm @ 25°C)								
0	197	305	422	635	1033	1672		
2	191	290	410	621	1031	1633		
Dissolved Oxygen (mg/L)								
0	8.2	8.1	8.1	8.1	8.0	7.9		
2	8.1	8.1	8.1	8.0	8.1	8.1		
Temperature (°C)								
0	18	19	19	19	19	19		
2	18	18	18	18	18	19		

#### Biology:

Conc. (%)	control	6.3	13	25	50	100		
Number Alive and Behavior (behavior is in brackets)								
Day								
1	10	10	10	10	10	10		
2	10	10	10	10	10	10		
Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;								
Mortality (%)								
2	0	0	0	0	0	0		
Immobility (%)								
2	0	0	0	0	0	0		

**Comments/Statistics**

Client: ALS106 Reference: 15-1593-01-DAD
---

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

**Protocol Deviations:**

None



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23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.



November 26, 2015

Lyudmyla Shvets  
ALS Laboratories Group  
2559 29 Street NE  
Calgary, AB T1Y 7B5

Dear Lyudmyla:

On November 20, 2015, Pollutech EnviroQuatics Limited personnel received a water sample (SP21 L1703083-2) from ALS Laboratories in Winnipeg. The following acute toxicity test was performed on this sample observing Environment Canada methods:

- Rainbow trout 96-hour LC50 toxicity test according to criteria outlined in "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout", Second Edition, Method Development and Applications Centre, Ottawa, Ontario, Report EPS 1/RM/13, 2000 (with 2007 Amendments).

The result of the acute toxicity test is summarized in the following table.

**Summary of LC50 Toxicity Results for SP21 L1703083-2 Water Sample Collected November 16, 2015**

Sample Name and Sample #	Toxicity Test	Endpoint	Effect	Result <sup>1</sup>
SP21 L1703083-2 #873815213	Rainbow Trout	96-Hour LC50 (95% Confidence)	Mortality	Non-lethal

1 - Results relate only to the sample tested

Toxicity Test Endpoint Descriptions

LC50            The estimated concentration which causes acute lethality to 50% of the test organisms.

The following pages contain the required details for reporting of the acute lethality toxicity tests. If there are any further details which you require, please do not hesitate to contact us.

Sincerely,  
**Pollutech EnviroQuatics Limited**

Rachel (Abma) Giacomini, M.Sc.  
QA/QC Leader  
File ID: \bioassay\2015\8000\8738\8738nv2 T LC50

**bringing clarity to your environment**

## Rainbow Trout 96-Hour LC50 Toxicity Test

**METHOD:** Environment Canada, "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout", Second Edition, Method Development and Applications Section, Ottawa, ON., Report EPS 1/RM/13, 2000 (with 2007 amendments) Pollutech Test Method RT-LC-R12.10.

### Test Material

**Client Name/Location:** ALS Laboratories Group, Winnipeg, MB

**Sample #:** 873815213      **Sample Name:** SP21 L1703083-2

**Sample Method:** Grab      **Collected by:** N/A

**Date/Time Collected:** November 16, 2015; 10:30      **Arrival Temp.:** 6.5°C

**Date/Time Received:** November 20, 2015; 11:30      **Sample Description:** Clear, colourless

**Sample Point Description:** Other      **Sample Type:** Effluent

**Transportation:** Road/Air

**Storage:** None

N/A – not available

### Test Organisms

**Species:** Rainbow Trout (*Oncorhynchus mykiss*)

**Source:** Rainbow Springs Hatchery

**Culture Temp.:** 15 ± 2°C      **Batch Number:** RS102115

**Water Source:** Dechlorinated municipal drinking water

**Mean Weight:** 0.56 g      **Min:** 0.33 g      **Max:** 0.91 g

**Mean Fork Length:** 39.2 mm      **Min:** 33 mm      **Max:** 46 mm

**Loading Density:** 0.28 g/L      **Sample Size:** 10 fish

**Life Stage:** Fry

**Number Dead Daily In Previous 7 Days For Fish Culture:** 0+0+0+0+0+0+0=0

**Previous 7-Day Holding Mortalities For Fish Culture:** 0%

**Rainbow Trout 96-Hour LC50 Toxicity Test - Continued**

**Sample Number:** 873815213

**Sample Name:** SP21 L1703083-2

Test Conditions

**Date/Time Started:** November 20, 2015; 15:50

**Test Volume:** 20 L/Vessel      **Number of Fish Per Vessel:** 10

**# of Vessels Per Conc.:** 1      **Test Temperature:** 15 ± 1°C

**Pre-aeration:** Yes      **Duration of Pre-aeration:** 120 minutes

**Pre-aeration Rate:** 6.5 ± 0.26 ml/min·L<sup>-1</sup>      **Aeration Rate During Test:** 6.5 ± 0.26 ml/min·L<sup>-1</sup>

**Sample Adjustment:** No      **Sample pH Adjustment:** No

**Test Method Deviations:** None

Test Facilities



**CALA**  
Testing  
Accreditation No. A1225

**Testing Laboratory:**

Pollutech EnviroQuatics Limited, 704 Mara St.,  
Suite 122, Point Edward, Ontario, N7V 1X4

This laboratory is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). The test included in this report is within the scope of this laboratory.

**Test Performed By:**

E. Pasiak/ M. Long/ B. Steven/ K. Ferguson

Initial Measurement of Variables in Unadjusted Sample

**Cond:** 1482 µmhos      **DO:** 11.0 mg/L      **pH:** 7.8      **Temp:** 14.0 °C

Test Results

Conc'n (% Volume)	NUMBER OF MORTALITIES			
	Time (hours)			
	24	48	72	96
Control	0	0	0	0
6.25	0	0	0	0
12.5	0	0	0	0
25	0	0	0	0
50	0	0	0	0
100	0	0	0	0

**Number of Control Fish Showing Atypical/Stressed Behaviour:** 0

**Rainbow Trout 96-Hour LC50 Toxicity Test - Continued**

**Sample Number:** 873815213

**Sample Name:** SP21 L1703083-2

Test Results

**TOXICITY TEST VARIABLES**

Conc'n (% Volume)	Variables	Time (hours)				
		0	24	48	72	96
Control	Cond. ( $\mu$ mhos)	194				n/r
	DO (mg/L)	10.0				10.1
	pH (units)	7.6				8.4
	Temp. (°C)	15.3				15.2
6.25	Cond. ( $\mu$ mhos)	255				n/r
	DO (mg/L)	10.3				10.3
	pH (units)	7.6				8.4
	Temp. (°C)	14.6				14.9
12.5	Cond. ( $\mu$ mhos)	354				n/r
	DO (mg/L)	10.4				10.2
	pH (units)	7.6				8.3
	Temp. (°C)	14.4				14.7
25	Cond. ( $\mu$ mhos)	535				n/r
	DO (mg/L)	10.4				10.3
	pH (units)	7.7				8.3
	Temp. (°C)	14.3				14.7
50	Cond. ( $\mu$ mhos)	909				n/r
	DO (mg/L)	10.4				10.3
	pH (units)	7.7				8.3
	Temp. (°C)	14.4				14.7
100	Cond. ( $\mu$ mhos)	1489				n/r
	DO (mg/L)	10.6				9.9
	pH (units)	7.8				8.3
	Temp. (°C)	14.4				14.8

n/r = not required

Rainbow Trout 96-Hour LC50 Toxicity Test - Continued

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**Sample Number:** 873815213

**Sample Name:** SP21 L1703083-2

Summary of Test Results

**96-Hour LC50:** Non-lethal

**95% Confidence Limits:** Not Applicable

**Analysis Method:** No Mortality

**Test Results Verified By:** R. C. Ferguson

Reference Toxicant Results

**Reference Chemical:** Zinc

**Date Test Initiated:** 11/13/15

**Fish Lot #:** RS102115

**Method:** Spearman-Kärber ( $\alpha = 0\%$ )

**96-Hour LC50 (95% Confidence Limits):** 0.37 mg/L (0.30 mg/L; 0.45 mg/L)

**95% Historic Geometric Mean LC50:  
(Historic Warning Limits) ( $\pm 2$  Standard Deviations)** 0.36 mg/L (0.21 mg/L; 0.61 mg/L)



**ATTN: Lyudmyla Shvets**  
ALS Laboratory Group  
2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/11/24  
Report Date: 2015/12/03  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1627  
**Billing:** L1706028

A handwritten signature in cursive script, appearing to read "Jacquelyn Poole".

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Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1**  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)

## Result Summary

Client: ALS106
Reference: 15-1627-01-TRD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1706028-2 SP21 - OUTFALL

**Collection:** collected on 2015/11/23 at not given by not given

**Receipt:** received on 2015/11/24 at 1420 by ML

**Containers:** received 2x1L bottles, 2 x 20L carboys at 4 °C, in good condition with no seals and no initials

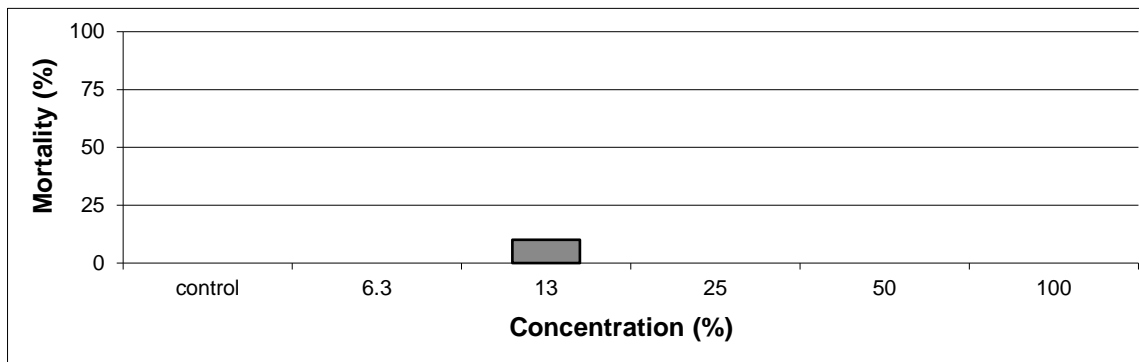
**Description:** type: water , collection method: not given

**Test:** started on 2015/11/26 ; ended on 2015/11/30

**Result:**

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%)		Method Calculated
			lower	upper	
Acute:	LC50	>100			could not be calculated
(mortality)	LC25	>100			could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.



## Test Conditions

Client: ALS106 Reference: 15-1627-01-TRD
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**Method:** Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

**Test type:** Trout 96-h Static Acute Test (WTR-ME-041)

**Species:** *Oncorhynchus mykiss*

**Organism source:** Rainbow Springs (Batch 20151028TR)

**Acclimation:** 29 days (must be  $\geq 2$  weeks)

**Stock mortality:** 0.18% (seven days preceding testing)

**Sample initial chemistry:** pH: 7.8; EC: 1750 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.5 (mg/L); temperature: 16 °C  
hardness (mg CaCO<sub>3</sub>/L): 923; colour: colorless; odour: organic

**Sample holding time:** 3 days (must be  $\leq 5$  days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** The test was conducted in 22 L plastic pails with polyethylene liners

**Test volume:** 20 Litres (depth of solution in each test vessel  $\geq 15\text{cm}$ )

**Sample pre-treatment:** All test solutions and controls were pre-aerated for 120 minutes at 6.5  $\pm$  1 mL/min/L  
Dissolved oxygen in 100 % sample was 9.2 mg/L after pre-aeration  
The sample was not filtered or pH adjusted prior to or during testing

**Loading density:** 0.165 g/Litre (must be  $\leq 0.5$  g/Litre)

**Control/dilution water:** Dechlorinated City of Calgary water acclimated to test conditions

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment; 10 fish per replicate

**Feeding:** Fish are not fed 24 hours before test initiation and no feeding during test

**Measurements:** pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination

**Aeration:** All treatments aerated at 6.5  $\pm$  1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones

**Lighting:** Overhead full spectrum fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 15  $\pm$  1°C

**Endpoint:** Mortality, 96-h LC50 (with 95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq 90\%$ )

The control had 0 percent (%) stressed behaviour (must  $\leq 10\%$ )

**Reference toxicant:** 96-h test with Potassium Chloride (KCl) initiated November 18, 2015; current results (96-h LC50 and 95% confidence limits) = 0.51 (0.42-0.58) log (g/L KCl)  
historical results:

(96-h LC50 and 95% confidence limits) = 0.57 (0.50-0.64) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

## Test Data

Client: ALS106
Reference: 15-1627-01-TRD

### Test Log:

Date	Day	Time	Technician
2015/11/26	0	1300	ML
2015/11/27	1	0830	HS
2015/11/28	2	0935	JN
2015/11/29	3	0910	JK
2015/11/30	4	0925	JN

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100
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Day	pH (units)					
0	7.6	7.7	7.8	7.9	8.0	8.1
4	8.2	7.9	8.3	7.8	7.8	7.9

Day	Conductivity ( $\mu\text{S/cm}$ @ 25°C)					
0	439	520	599	829	1179	1815
4	459	558	634	852	1225	1883

Day	Dissolved Oxygen (mg/L)					
0	9.2	9.2	9.1	9.1	9.1	9.2
4	8.9	8.9	9.0	8.9	8.9	9.0

Day	Temperature (°C)					
0	15	15	15	15	15	15
4	15	14	14	15	14	15

### Number Alive (In brackets number stressed):

Conc. (%)	control	6.3	13	25	50	100
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Day	Number Alive (In brackets number stressed)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	9	10	10	10
3	10	10	9	10	10	10
4	10	10	9	10	10	10

Day	Mortality (%)					
4	0	0	10	0	0	0

Day	Stressed (%)					
4	0	0	0	0	0	0

**Biology Summary Tables:**

Control Fish	Length (cm)	Wet Weight(g)
1	2.5	0.2
2	2.8	0.3
3	3.3	0.4
4	2.9	0.3
5	2.8	0.3
6	3.0	0.4
7	3.4	0.5
8	3.1	0.4
9	2.8	0.3
10	2.6	0.2

average	2.9	0.3
sd	0.3	0.1
cv(%)	9.8	28.7

Notes: nd, not done; na, not applicable;  
 sd, standard deviation; cv(%), coefficient  
 of variation

**Test Data**

Conc. (%)	Group Wet Weight (g)
control	3.3
6.3	3.2
13	2.8
25	3.8
50	3.5
100	2.8

Client: ALS106
Reference: 15-1627-01-TRD

## Comments/Statistics

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

**Protocol Deviations:**

None

**Result Summary**

Client: ALS106 Reference: 15-1627-01-DAD
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**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1706028-2 SP21 - OUTFALL

**Collection:** collected on 2015/11/23 at not given by not given

**Receipt:** received on 2015/11/24 at 1420 by ML

**Containers:** received 2x1L bottles, 2 x 20L carboys at 4 °C, in good condition with no seals and no initials

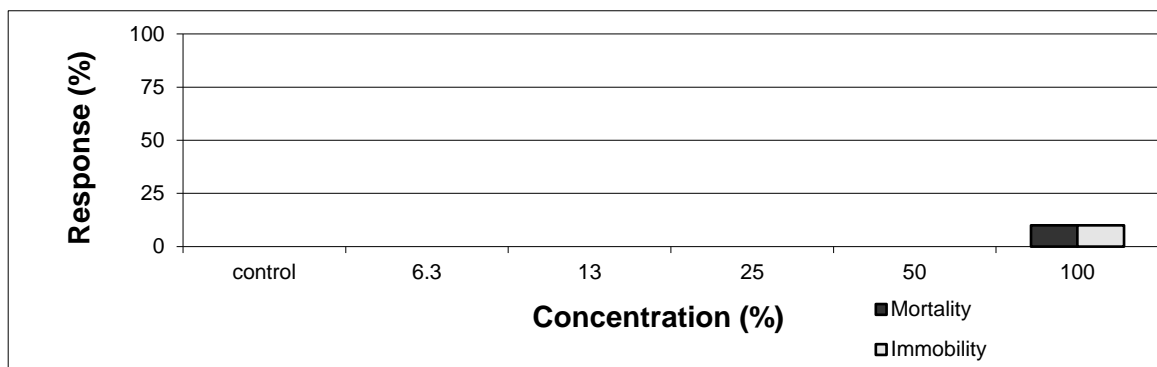
**Description:** type: water , collection method: not given

**Test:** started on 2015/11/25 ; ended on 2015/11/27

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower      upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

## Test Conditions

Client: ALS106  
Reference: 15-1627-01-DAD

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 0%

**Culture brood data:** 11 days to first brood

20 neonates per average brood

**Sample initial chemistry:** pH: 7.8; EC: 1750 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.5 (mg/L); temperature: 16 °C  
hardness (mg CaCO<sub>3</sub>/L): 923; colour: colorless; odour: organic

**Sample holding time:** 2 days (must be  $\leq$  5 days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 0 minutes (rate of 37.5  $\pm$  12.5 mL/min.L-1)  
The hardness of the sample was not adjusted (mg CaCO<sub>3</sub>/L) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard reconstituted water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and Na<sub>2</sub>SeO<sub>3</sub> (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 80 mg CaCO<sub>3</sub>/L

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 20  $\pm$  2°C

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1627-01-DAD
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**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated November 17, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.80 (0.78-0.83) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.71-0.83) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

### Test Data

Client: ALS106
Reference: 15-1627-01-DAD

#### Test Log:

Date	Day	Time	Technician
2015/11/25	0	1515	NM/HS
2015/11/26	1	0905	JK
2015/11/27	2	0950	JK

#### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		

Day

pH (units)

0	7.8	7.8	7.9	7.9	8.0	8.0		
2	8.1	8.1	8.2	8.2	8.3	8.4		

Conductivity ( $\mu\text{S/cm}$  @ 25°C)

0	189	306	412	613	1009	1748		
2	199	333	438	641	1048	1739		

Dissolved Oxygen (mg/L)

0	8.1	8.1	8.2	8.3	8.3	8.3		
2	7.9	7.8	7.9	7.9	7.9	7.9		

Temperature (°C)

0	18	18	18	18	18	18		
2	20	20	20	21	21	21		

#### Biology:

Conc. (%)	control	6.3	13	25	50	100		

Day

Number Alive and Behavior (behavior is in brackets)

1	10	10	10	10	10	10		
2	10	10	10	10	10	9		

Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;

Mortality (%)

2	0	0	0	0	0	10		
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Immobility (%)

2	0	0	0	0	0	10		
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## Comments/Statistics

Client: ALS106 Reference: 15-1627-01-DAD
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**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

**Protocol Deviations:**

None



## GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated into and form part of the Chain of Custody between HydroQual Laboratories Ltd. ("HydroQual") and the party named in the Chain of Custody (the "Client").

1. **Definitions:** Capitalized terms shall have the definition ascribed as such in these General Terms and Conditions and the Chain of Custody.
2. **The Services:** HydroQual will provide the Services to the Client as listed and described in the Chain of Custody.
3. **Prices:** HydroQual may review and change all prices, fees, surcharges or other charges as set out in proposals and/or price quotations if there are changes to HydroQual's cost beyond HydroQual's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding condition 3, all quotations are reviewed and updated on a yearly basis.
4. **Payment Terms:** The Client shall pay HydroQual within 30 days of the invoice date as provided by HydroQual. HydroQual may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. **Quotation Numbers:** The Client shall provide the proposal and/or price quotation number to HydroQual (where applicable) to ensure correct pricing.
6. **Taxes:** Applicable taxes are not included in prices, surcharges and additional fees and will be added at the time of invoicing.
7. **No Guarantee of Results:** The Client is responsible for informing itself on the limitation of the results and acknowledges that the results are not guaranteed.
8. **Standard of Care:** HydroQual will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested, subject to that level of care and skill ordinarily exercised by other laboratories currently practicing under similar conditions in the same locality, subject to the time limits and financial, physical or other constraints applicable to the Services. No warranty, express or implied, is made.
9. **Storage:** Where possible, HydroQual will store samples until a final report is issued to the Client, after which time HydroQual may discard the sample.
10. **Holds:** If the Client requests a sample be placed on hold, HydroQual will store the sample for the mutually agreed upon written time and price, after which HydroQual will invoice the Client and discard the sample.
11. **Archives:** If the Client requests a sample be archived, HydroQual will store the sample for a mutually agreed upon written time frame and price, after which HydroQual will invoice the Client and discard the sample.
12. **Handling Protocol:** Legal sample handling protocol must be arranged, and provided in writing, before samples are collected. HydroQual will provide a price quotation for legal sample protocol. Samples processed under legal protocol are stored indefinitely, subject to a storage charge as advised by HydroQual.
13. **Samples:** The quality, condition, content and source of samples stored and tested are not known to HydroQual except as declared and described on the Chain of Custody completed and submitted by the Client and accompanying the sample.
14. **Risk of Loss:** HydroQual will use reasonable care to protect samples during storage, however, all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the client forever releases HydroQual from any and all claims the Client may have for any loss or damage to the sample.
15. **Environmental:** the Client must comply with all applicable environmental legislation, including labeling all hazardous samples to comply with Canada's *Workplace Hazardous Materials Information System* and the Alberta *Transfer of Dangerous Goods* regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client shall defend, indemnify and hold harmless HydroQual for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
16. **Hazardous Materials Disposal:** HydroQual may return, at the Client's cost, hazardous material to the Client for disposal.
17. **Hazardous Materials Surcharge:** HydroQual may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials ("NORM"), such as and including without limitation, H<sub>2</sub>S and CN.
18. **Sample Containers:** HydroQual may ship sample containers to the Client's location by the most cost effective means using HydroQual's preferred courier suppliers, within the specified project timeline. Shipping will be charged back to the Client.
19. **Additional Charges:** HydroQual may charge the Client:
  - (a) for pick-up and delivery services when provided subject in each instance to a minimum charge of \$50.00; and,
  - (b) for rush service (processing samples and/or reporting).
20. **Large Bottle Orders:** The Client shall provide HydroQual with not less than 24 hours' notice for large bottle orders.
21. **Re-Tests:** HydroQual reserves the right to re-test any samples that remain in HydroQual's possession. Re-tests requested by the Client may be charged to Client and Client agrees to pay for such charges.
22. **Waiver:** The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any and all claims against HydroQual that the Client may have against HydroQual as a result of the interpretation of the results provided to the Client. The Client shall defend, indemnify and save harmless HydroQual for any and all claims made by any third party against HydroQual in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.



**ATTN: Lyudmyla Shvets**  
ALS Laboratory Group  
2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/12/02  
Report Date: 2015/12/10  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1647  
**Billing:** L1709196

A handwritten signature in cursive script that reads "Jacquyn Poole".

---

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1**  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)

## Result Summary

Client: ALS106
Reference: 15-1647-01-TRD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1709196-2 LC\_WTF\_OUT\_WS\_2015-12-01\_N

**Collection:** collected on 2015/12/01 at not given by not given

**Receipt:** received on 2015/12/02 at 1130 by MC

**Containers:** received 2 x 20 L carboys / 2 x 1 L bottle at 6 °C, in good condition with no seals and no initials

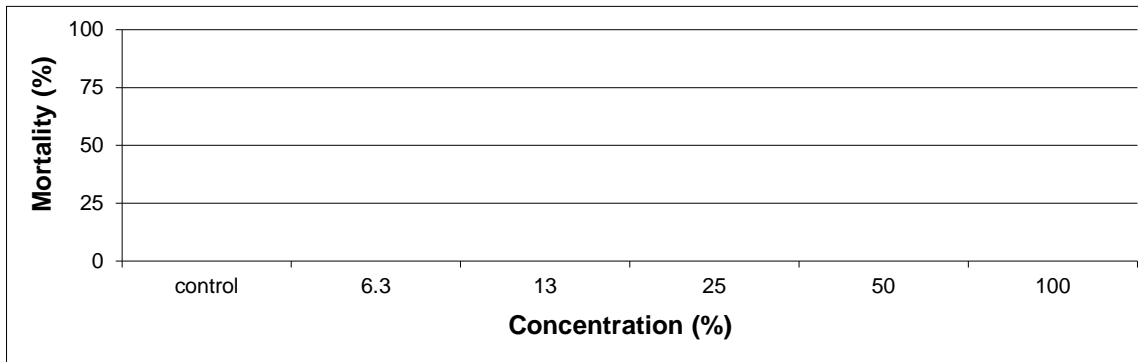
**Description:** type: water, collection method: not given

**Test:** started on 2015/12/03 ; ended on 2015/12/07

**Result:**

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%)		Method Calculated
			lower	upper	
Acute:	LC50	>100			could not be calculated
(mortality)	LC25	>100			could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

## Test Conditions

Client: ALS106 Reference: 15-1647-01-TRD
---

**Method:** Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

**Test type:** Trout 96-h Static Acute Test (WTR-ME-041)

**Species:** *Oncorhynchus mykiss*

**Organism source:** Rainbow Springs (Batch 20151028TR)

**Acclimation:** 36 days (must be  $\geq 2$  weeks)

**Stock mortality:** 0.10% (seven days preceding testing)

**Sample initial chemistry:** pH: 7.9; EC: 1481 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.9 (mg/L); temperature: 12 °C  
hardness (mg CaCO<sub>3</sub>/L): 787; colour: colourless; odour: odourless

**Sample holding time:** 2 days (must be  $\leq 5$  days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** The test was conducted in 22 L plastic pails with polyethylene liners

**Test volume:** 20 Litres (depth of solution in each test vessel  $\geq 15\text{cm}$ )

**Sample pre-treatment:** All test solutions and controls were pre-aerated for 120 minutes at 6.5  $\pm$  1 mL/min/L  
Dissolved oxygen in 100 % sample was 9.3 mg/L after pre-aeration  
The sample was not filtered or pH adjusted prior to or during testing

**Loading density:** 0.17 g/Litre (must be  $\leq 0.5$  g/Litre)

**Control/dilution water:** Dechlorinated City of Calgary water acclimated to test conditions

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment; 10 fish per replicate

**Feeding:** Fish are not fed 24 hours before test initiation and no feeding during test

**Measurements:** pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination

**Aeration:** All treatments aerated at 6.5  $\pm$  1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones

**Lighting:** Overhead full spectrum fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 15  $\pm$  1°C

**Endpoint:** Mortality, 96-h LC50 (with 95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq 90\%$ )

The control had 0 percent (%) stressed behaviour (must  $\leq 10\%$ )

**Reference toxicant:** 96-h test with Potassium Chloride (KCl) initiated November 18, 2015; current results (96-h LC50 and 95% confidence limits) = 0.51 (0.42-0.58) log (g/L KCl)  
historical results:

(96-h LC50 and 95% confidence limits) = 0.57 (0.50-0.64) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

**Test Data**

Client: ALS106
Reference: 15-1647-01-TRD

**Test Log:**

Date	Day	Time	Technician
2015/12/03	0	1100	ML/HS
2015/12/04	1	0800	ML/HS
2015/12/05	2	0945	ML/HS
2015/12/06	3	0935	JK
2015/12/07	4	0900	JK/DS

**Chemistry:**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	pH (units)					
0	7.3	7.2	7.3	7.3	7.5	7.6
4	8.0	8.0	8.0	8.1	8.1	8.1

Day	Conductivity ( $\mu\text{S}/\text{cm}$ @ 25°C)					
0	439	504	566	722	972	1449
4	453	512	568	729	977	1431

Day	Dissolved Oxygen (mg/L)					
0	9.1	9.2	9.2	9.1	9.1	9.3
4	8.6	8.7	8.7	8.7	8.7	8.7

Day	Temperature (°C)					
0	14	14	14	14	14	14
4	14	14	14	14	14	14

**Number Alive (In brackets number stressed):**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	Number Alive					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	10	10	10	10	10

Day	Mortality (%)					
4	0	0	0	0	0	0

Day	Stressed (%)					
4	0	0	0	0	0	0

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**Biology Summary Tables:**

Control Fish	Length (cm)	Wet Weight(g)
1	3.4	0.5
2	2.7	0.2
3	2.9	0.3
4	2.7	0.2
5	3.1	0.4
6	3.1	0.4
7	3.0	0.3
8	2.9	0.3
9	3.0	0.3
10	3.5	0.5

average	3.0	0.3
sd	0.3	0.1
cv(%)	8.7	31.6

Notes: nd, not done; na, not applicable;  
 sd, standard deviation; cv(%), coefficient  
 of variation

**Test Data**

Conc. (%)	Group Wet Weight (g)
control	3.4
6.3	4.6
13	3.8
25	4.4
50	4.8
100	4.1

Client: ALS106
Reference: 15-1647-01-TRD

## Comments/Statistics

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

**Protocol Deviations:**

None

## Result Summary

 Client: ALS106  
 Reference: 15-1647-01-DAD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1709196-2 LC\_WTF\_OUT\_WS\_2015-12-01\_N

**Collection:** collected on 2015/12/01 at not given by not given

**Receipt:** received on 2015/12/02 at 1130 by MC

**Containers:** received 2 x 20 L carboys / 2 x 1 L bottle at 6 °C, in good condition with no seals and no initials

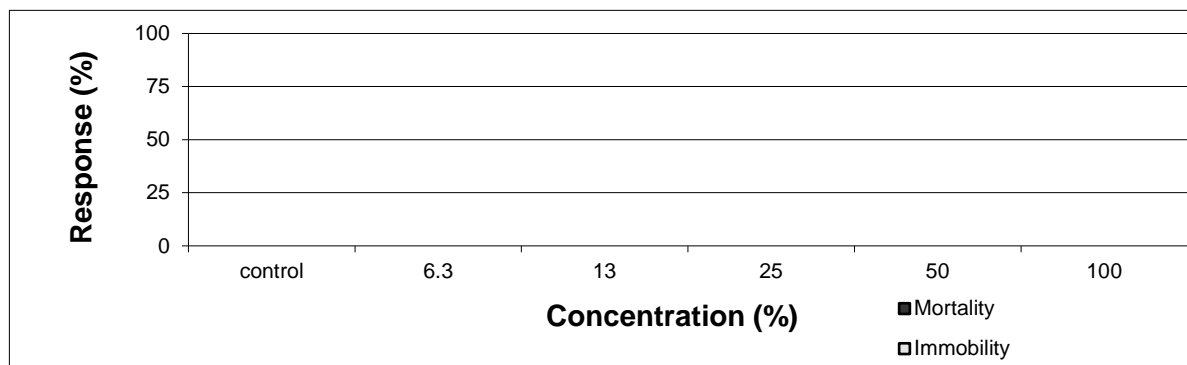
**Description:** type: water, collection method: not given

**Test:** started on 2015/12/02 ; ended on 2015/12/04

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

## Test Conditions

Client: ALS106  
Reference: 15-1647-01-DAD

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 0%

**Culture brood data:** 11 days to first brood

20 neonates per average brood

**Sample initial chemistry:** pH: 7.9; EC: 1481 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.9 (mg/L); temperature: 12 °C  
hardness (mg  $\text{CaCO}_3/\text{L}$ ): 787; colour: colourless; odour: odourless

**Sample holding time:** 1 day (must be  $\leq 5$  days)

**Sample storage:**  $4 \pm 2^\circ\text{C}$  in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 20 minutes (rate of  $37.5 \pm 12.5$  mL/min.L-1)  
The hardness of the sample was not adjusted (mg  $\text{CaCO}_3/\text{L}$ ) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq 1$  organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and  $\text{Na}_2\text{SeO}_3$  (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 97 mg  $\text{CaCO}_3/\text{L}$

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:**  $20 \pm 2^\circ\text{C}$

Note: Outlined sections are protocol deviations explained on the comment page



## Test Conditions

Client: ALS106 Reference: 15-1647-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated November 30, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.72 (0.70-0.76) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.71-0.84) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

## Test Data

Client: ALS106
Reference: 15-1647-01-DAD

### Test Log:

Date	Day	Time	Technician
2015/12/02	0	1220	HS/NM
2015/12/03	1	0925	JK
2015/12/04	2	0845	DS

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		
pH (units)								
Day								
0	8.0	8.0	8.0	8.0	8.0	8.0		
2	8.1	8.1	8.2	8.2	8.3	8.2		
Conductivity (µS/cm @ 25°C)								
0	199	278	363	518	825	1344		
2	194	276	364	551	838	1421		
Dissolved Oxygen (mg/L)								
0	7.8	7.8	7.8	7.8	7.9	8.4		
2	7.7	7.7	7.7	7.7	7.8	7.8		
Temperature (°C)								
0	20	20	20	20	20	19		
2	21	21	21	21	21	20		

### Biology:

Conc. (%)	control	6.3	13	25	50	100		
Number Alive and Behavior (behavior is in brackets)								
Day								
1	10	10	10	10	10	10		
2	10	10	10	10	10	10		
Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;								
Mortality (%)								
2	0	0	0	0	0	0		
Immobility (%)								
2	0	0	0	0	0	0		

## Comments/Statistics

Client: ALS106 Reference: 15-1647-01-DAD
---

### Test Result Comments:

None

### Data Analysis:

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

### Protocol Deviations:

None

## GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated into and form part of the Chain of Custody between HydroQual Laboratories Ltd. ("HydroQual") and the party named in the Chain of Custody (the "Client").

1. **Definitions:** Capitalized terms shall have the definition ascribed as such in these General Terms and Conditions and the Chain of Custody.
2. **The Services:** HydroQual will provide the Services to the Client as listed and described in the Chain of Custody.
3. **Prices:** HydroQual may review and change all prices, fees, surcharges or other charges as set out in proposals and/or price quotations if there are changes to HydroQual's cost beyond HydroQual's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding condition 3, all quotations are reviewed and updated on a yearly basis.
4. **Payment Terms:** The Client shall pay HydroQual within 30 days of the invoice date as provided by HydroQual. HydroQual may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. **Quotation Numbers:** The Client shall provide the proposal and/or price quotation number to HydroQual (where applicable) to ensure correct pricing.
6. **Taxes:** Applicable taxes are not included in prices, surcharges and additional fees and will be added at the time of invoicing.
7. **No Guarantee of Results:** The Client is responsible for informing itself on the limitation of the results and acknowledges that the results are not guaranteed.
8. **Standard of Care:** HydroQual will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested, subject to that level of care and skill ordinarily exercised by other laboratories currently practicing under similar conditions in the same locality, subject to the time limits and financial, physical or other constraints applicable to the Services. No warranty, express or implied, is made.
9. **Storage:** Where possible, HydroQual will store samples until a final report is issued to the Client, after which time HydroQual may discard the sample.
10. **Holds:** If the Client requests a sample be placed on hold, HydroQual will store the sample for the mutually agreed upon written time and price, after which HydroQual will invoice the Client and discard the sample.
11. **Archives:** If the Client requests a sample be archived, HydroQual will store the sample for a mutually agreed upon written time frame and price, after which HydroQual will invoice the Client and discard the sample.
12. **Handling Protocol:** Legal sample handling protocol must be arranged, and provided in writing, before samples are collected. HydroQual will provide a price quotation for legal sample protocol. Samples processed under legal protocol are stored indefinitely, subject to a storage charge as advised by HydroQual.
13. **Samples:** The quality, condition, content and source of samples stored and tested are not known to HydroQual except as declared and described on the Chain of Custody completed and submitted by the Client and accompanying the sample.
14. **Risk of Loss:** HydroQual will use reasonable care to protect samples during storage, however, all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the client forever releases HydroQual from any and all claims the Client may have for any loss or damage to the sample.
15. **Environmental:** the Client must comply with all applicable environmental legislation, including labeling all hazardous samples to comply with Canada's *Workplace Hazardous Materials Information System* and the Alberta *Transfer of Dangerous Goods* regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client shall defend, indemnify and hold harmless HydroQual for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
16. **Hazardous Materials Disposal:** HydroQual may return, at the Client's cost, hazardous material to the Client for disposal.
17. **Hazardous Materials Surcharge:** HydroQual may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials ("NORM"), such as and including without limitation, H<sub>2</sub>S and CN.
18. **Sample Containers:** HydroQual may ship sample containers to the Client's location by the most cost effective means using HydroQual's preferred courier suppliers, within the specified project timeline. Shipping will be charged back to the Client.
19. **Additional Charges:** HydroQual may charge the Client:
  - (a) for pick-up and delivery services when provided subject in each instance to a minimum charge of \$50.00; and,
  - (b) for rush service (processing samples and/or reporting).
20. **Large Bottle Orders:** The Client shall provide HydroQual with not less than 24 hours' notice for large bottle orders.
21. **Re-Tests:** HydroQual reserves the right to re-test any samples that remain in HydroQual's possession. Re-tests requested by the Client may be charged to Client and Client agrees to pay for such charges.
22. **Waiver:** The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any and all claims against HydroQual that the Client may have against HydroQual as a result of the interpretation of the results provided to the Client. The Client shall defend, indemnify and save harmless HydroQual for any and all claims made by any third party against HydroQual in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.



**ATTN: Lyudmyla Shvets**  
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2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/12/08  
Report Date: 2015/12/21  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1674  
**Billing:** L1711625

A handwritten signature in black ink, appearing to read "D. Lopez", is positioned above a horizontal line.

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1**  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)

**Result Summary**

Client: ALS106 Reference: 15-1674-01-TRD
---

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1711625-2 LC\_WTF\_OUT\_WS\_2015-12-07\_N

**Collection:** collected on 2015/12/07 at not given by not given

**Receipt:** received on 2015/12/08 at 1620 by MC

**Containers:** received 2 x 20 L carboy / 2 x 1 L bottle at 9 °C, in good condition with no seals and no initials

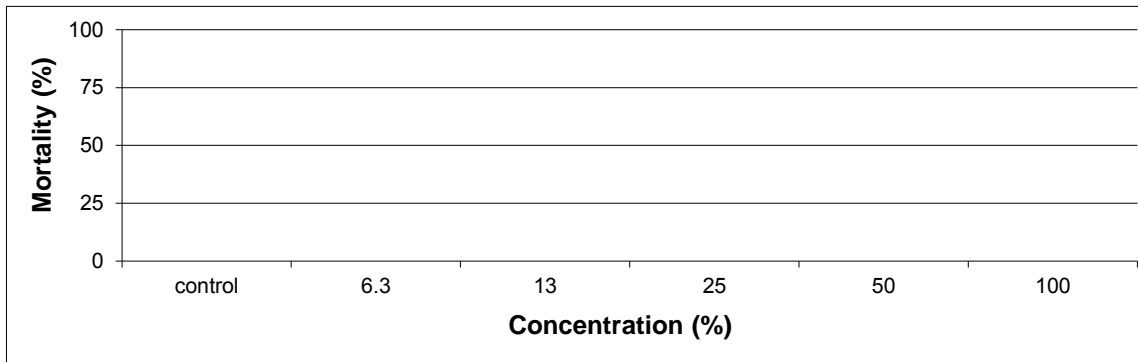
**Description:** type: water, collection method: not given

**Test:** started on 2015/12/10 ; ended on 2015/12/14

**Result:**

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%)		Method Calculated
			lower	upper	
Acute:	LC50	>100			could not be calculated
(mortality)	LC25	>100			could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

## Test Conditions

Client: ALS106  
Reference: 15-1674-01-TRD

**Method:** Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

**Test type:** Trout 96-h Static Acute Test (WTR-ME-041)

**Species:** *Oncorhynchus mykiss*

**Organism source:** Miracle Springs (Batch 20151112TR)

**Acclimation:** 28 days (must be  $\geq 2$  weeks)

**Stock mortality:** 0.48% (seven days preceding testing)

**Sample initial chemistry:** pH: 7.7; EC: 1487 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 8.8 (mg/L); temperature: 17 °C  
hardness (mg CaCO<sub>3</sub>/L): 899; colour: colourless; odour: odourless

**Sample holding time:** 3 days (must be  $\leq 5$  days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** The test was conducted in 22 L plastic pails with polyethylene liners

**Test volume:** 20 Litres (depth of solution in each test vessel  $\geq 15\text{cm}$ )

**Sample pre-treatment:** All test solutions and controls were pre-aerated for 120 minutes at 6.5  $\pm$  1 mL/min/L  
Dissolved oxygen in 100 % sample was 8.9 mg/L after pre-aeration  
The sample was not filtered or pH adjusted prior to or during testing

**Loading density:** 0.155 g/Litre (must be  $\leq 0.5$  g/Litre)

**Control/dilution water:** Dechlorinated City of Calgary water acclimated to test conditions

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment; 10 fish per replicate

**Feeding:** Fish are not fed 24 hours before test initiation and no feeding during test

**Measurements:** pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination

**Aeration:** All treatments aerated at 6.5  $\pm$  1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones

**Lighting:** Overhead full spectrum fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 15  $\pm$  1°C

**Endpoint:** Mortality, 96-h LC50 (with 95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq 90\%$ )

The control had 0 percent (%) stressed behaviour (must  $\leq 10\%$ )

**Reference toxicant:** 96-h test with Potassium Chloride (KCl) initiated November 26, 2015; current results  
(96-h LC50 and 95% confidence limits) = 0.49 (0.41-0.54) log (g/L KCl)  
historical results:  
(96-h LC50 and 95% confidence limits) = 0.57 (0.49-0.64) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

**Test Data**

Client: ALS106
Reference: 15-1674-01-TRD

**Test Log:**

Date	Day	Time	Technician
2015/12/10	0	1015	CQ
2015/12/11	1	0830	ML
2015/12/12	2	0930	ML
2015/12/13	3	1005	JK
2015/12/14	4	1000	CQ/NM/EP

**Chemistry:**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	pH (units)					
0	7.4	7.5	7.7	7.8	7.8	7.9
4	8.0	8.0	8.0	8.0	8.0	7.9

Day	Conductivity ( $\mu\text{S/cm}$ @ 25°C)					
0	407	464	539	729	999	1521
4	423	473	548	728	1011	1496

Day	Dissolved Oxygen (mg/L)					
0	8.8	8.7	8.9	9.0	8.9	8.9
4	8.8	8.8	8.7	8.9	8.8	8.8

Day	Temperature (°C)					
0	14	14	14	14	14	14
4	14	14	14	14	14	14

**Number Alive (In brackets number stressed):**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	Number Alive					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	10	10	10	10	10

Day	Mortality (%)					
4	0	0	0	0	0	0

Day	Stressed (%)					
4	0	0	0	0	0	0

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.



**Biology Summary Tables:**

Control Fish	Length (cm)	Wet Weight(g)
1	2.8	0.3
2	3.3	0.4
3	2.6	0.2
4	2.5	0.3
5	3.2	0.4
6	2.9	0.3
7	3.1	0.4
8	3.1	0.4
9	2.7	0.2
10	2.6	0.2

average	2.9	0.3
sd	0.3	0.1
cv(%)	9.8	28.2

Notes: nd, not done; na, not applicable;  
 sd, standard deviation; cv(%), coefficient  
 of variation

**Test Data**

Conc. (%)	Group Wet Weight (g)
control	3.1
6.3	3.8
13	4.9
25	3.7
50	5.3
100	3.5

Client: ALS106
Reference: 15-1674-01-TRD

## Comments/Statistics

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

**Protocol Deviations:**

None

**Result Summary**

Client: ALS106 Reference: 15-1674-01-DAD
---

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1711625-2 LC\_WTF\_OUT\_WS\_2015-12-07\_N

**Collection:** collected on 2015/12/07 at not given by not given

**Receipt:** received on 2015/12/08 at 1620 by MC

**Containers:** received 2 x 20 L carboy / 2 x 1 L bottle at 9 °C, in good condition with no seals and no initials

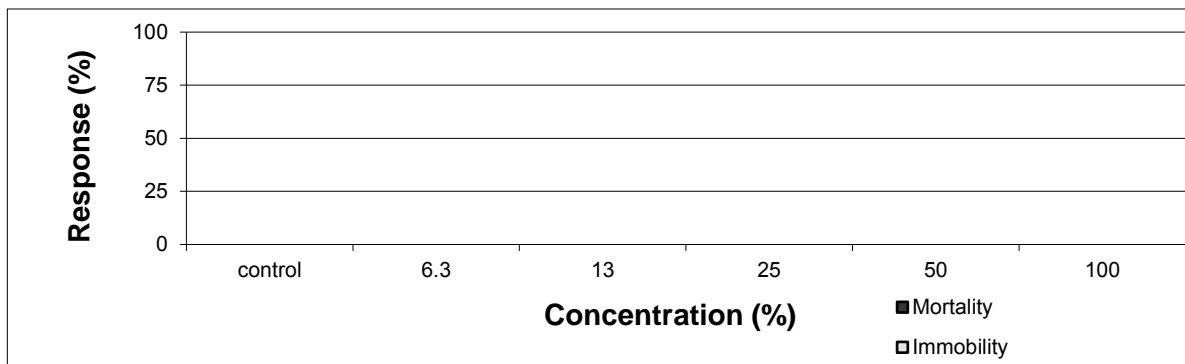
**Description:** type: water, collection method: not given

**Test:** started on 2015/12/10 ; ended on 2015/12/12

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

## Test Conditions

Client: ALS106  
Reference: 15-1674-01-DAD

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 0%

**Culture brood data:** 11 days to first brood  
20 neonates per average brood

**Sample initial chemistry:** pH: 7.7; EC: 1487 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 8.8 (mg/L); temperature: 17 °C  
hardness (mg CaCO<sub>3</sub>/L): 899; colour: colourless; odour: odourless

**Sample holding time:** 3 days (must be  $\leq$  5 days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 20 minutes (rate of 37.5  $\pm$  12.5 mL/min.L-1)  
The hardness of the sample was not adjusted (mg CaCO<sub>3</sub>/L) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and Na<sub>2</sub>SeO<sub>3</sub> (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 101 mg CaCO<sub>3</sub>/L

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 20  $\pm$  2°C

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1674-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated November 30, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.72 (0.70-0.76) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.71-0.84) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

## Test Data

Client: ALS106
Reference: 15-1674-01-DAD

### Test Log:

Date	Day	Time	Technician
2015/12/10	0	1530	ML/JK
2015/12/11	1	0930	ML
2015/12/12	2	0915	HS

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		

Day

pH (units)

0	7.9	8.0	8.0	8.0	8.0	8.0		
2	7.7	7.8	8.0	8.1	8.2	8.2		

 Conductivity ( $\mu\text{S}/\text{cm}$  @ 25°C)

0	191	298	392	576	902	1496		
2	199	290	382	567	892	1462		

Dissolved Oxygen (mg/L)

0	7.6	7.7	7.7	7.7	7.7	7.8		
2	7.8	7.8	7.8	7.8	7.8	7.8		

Temperature (°C)

0	20	21	21	21	21	20		
2	21	21	21	21	21	21		

### Biology:

Conc. (%)	control	6.3	13	25	50	100		

Day

Number Alive and Behavior (behavior is in brackets)

1	10	10	10	10	10	10		
2	10	10	10	10	10	10		

Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;

Mortality (%)

2	0	0	0	0	0	0		
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Immobility (%)

2	0	0	0	0	0	0		
---	---	---	---	---	---	---	--	--

## Comments/Statistics

Client: ALS106 Reference: 15-1674-01-DAD
---

### Test Result Comments:

None

### Data Analysis:

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

### Protocol Deviations:

None

## GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated into and form part of the Chain of Custody between HydroQual Laboratories Ltd. ("HydroQual") and the party named in the Chain of Custody (the "Client").

1. **Definitions:** Capitalized terms shall have the definition ascribed as such in these General Terms and Conditions and the Chain of Custody.
2. **The Services:** HydroQual will provide the Services to the Client as listed and described in the Chain of Custody.
3. **Prices:** HydroQual may review and change all prices, fees, surcharges or other charges as set out in proposals and/or price quotations if there are changes to HydroQual's cost beyond HydroQual's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding condition 3, all quotations are reviewed and updated on a yearly basis.
4. **Payment Terms:** The Client shall pay HydroQual within 30 days of the invoice date as provided by HydroQual. HydroQual may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. **Quotation Numbers:** The Client shall provide the proposal and/or price quotation number to HydroQual (where applicable) to ensure correct pricing.
6. **Taxes:** Applicable taxes are not included in prices, surcharges and additional fees and will be added at the time of invoicing.
7. **No Guarantee of Results:** The Client is responsible for informing itself on the limitation of the results and acknowledges that the results are not guaranteed.
8. **Standard of Care:** HydroQual will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested, subject to that level of care and skill ordinarily exercised by other laboratories currently practicing under similar conditions in the same locality, subject to the time limits and financial, physical or other constraints applicable to the Services. No warranty, express or implied, is made.
9. **Storage:** Where possible, HydroQual will store samples until a final report is issued to the Client, after which time HydroQual may discard the sample.
10. **Holds:** If the Client requests a sample be placed on hold, HydroQual will store the sample for the mutually agreed upon written time and price, after which HydroQual will invoice the Client and discard the sample.
11. **Archives:** If the Client requests a sample be archived, HydroQual will store the sample for a mutually agreed upon written time frame and price, after which HydroQual will invoice the Client and discard the sample.
12. **Handling Protocol:** Legal sample handling protocol must be arranged, and provided in writing, before samples are collected. HydroQual will provide a price quotation for legal sample protocol. Samples processed under legal protocol are stored indefinitely, subject to a storage charge as advised by HydroQual.
13. **Samples:** The quality, condition, content and source of samples stored and tested are not known to HydroQual except as declared and described on the Chain of Custody completed and submitted by the Client and accompanying the sample.
14. **Risk of Loss:** HydroQual will use reasonable care to protect samples during storage, however, all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the client forever releases HydroQual from any and all claims the Client may have for any loss or damage to the sample.
15. **Environmental:** the Client must comply with all applicable environmental legislation, including labeling all hazardous samples to comply with Canada's *Workplace Hazardous Materials Information System* and the Alberta *Transfer of Dangerous Goods* regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client shall defend, indemnify and hold harmless HydroQual for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
16. **Hazardous Materials Disposal:** HydroQual may return, at the Client's cost, hazardous material to the Client for disposal.
17. **Hazardous Materials Surcharge:** HydroQual may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials ("NORM"), such as and including without limitation, H<sub>2</sub>S and CN.
18. **Sample Containers:** HydroQual may ship sample containers to the Client's location by the most cost effective means using HydroQual's preferred courier suppliers, within the specified project timeline. Shipping will be charged back to the Client.
19. **Additional Charges:** HydroQual may charge the Client:
  - (a) for pick-up and delivery services when provided subject in each instance to a minimum charge of \$50.00; and,
  - (b) for rush service (processing samples and/or reporting).
20. **Large Bottle Orders:** The Client shall provide HydroQual with not less than 24 hours' notice for large bottle orders.
21. **Re-Tests:** HydroQual reserves the right to re-test any samples that remain in HydroQual's possession. Re-tests requested by the Client may be charged to Client and Client agrees to pay for such charges.
22. **Waiver:** The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any and all claims against HydroQual that the Client may have against HydroQual as a result of the interpretation of the results provided to the Client. The Client shall defend, indemnify and save harmless HydroQual for any and all claims made by any third party against HydroQual in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.



**ATTN: Lyudmyla Shvets**  
ALS Laboratory Group  
2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/12/12  
Report Date: 2015/12/31  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1700  
**Billing:** L1713856

A handwritten signature in cursive script, reading "Jacquelyn Poole".

---

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1**  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)



**Result Summary**

Client: ALS106 Reference: 15-1700-01-TRD
---

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1713856-2 LC\_WTF\_OUT\_WS\_2015-12-11\_N

**Collection:** collected on 2015/12/11 at not given by not given

**Receipt:** received on 2015/12/12 at 1000 by HS

**Containers:** received 2x20L carboys/2x1L containers at 8 °C, in good condition with no seals and no initials

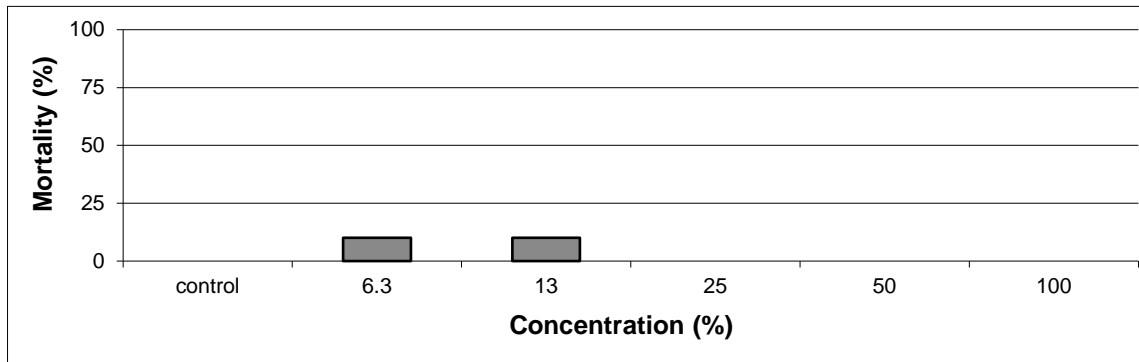
**Description:** type: water , collection method: not given

**Test:** started on 2015/12/15 ; ended on 2015/12/19

**Result:**

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute:	LC50	>100		could not be calculated
(mortality)	LC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

## Test Conditions

Client: ALS106  
Reference: 15-1700-01-TRD

**Method:** Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

**Test type:** Trout 96-h Static Acute Test (WTR-ME-041)

**Species:** *Oncorhynchus mykiss*

**Organism source:** Miracle Springs (Batch 20151112TR)

**Acclimation:** 33 days (must be  $\geq 2$  weeks)

**Stock mortality:** 0.07% (seven days preceding testing)

**Sample initial chemistry:** pH: 7.6; EC: 1590 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 10.2 (mg/L); temperature: 18 °C  
hardness (mg CaCO<sub>3</sub>/L): 1100; colour: colourless; odour: odourless

**Sample holding time:** 4 days (must be  $\leq 5$  days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** The test was conducted in 22 L plastic pails with polyethylene liners

**Test volume:** 20 Litres (depth of solution in each test vessel  $\geq 15\text{cm}$ )

**Sample pre-treatment:** All test solutions and controls were pre-aerated for 90 minutes at 6.5  $\pm$  1 mL/min/L  
Dissolved oxygen in 100 % sample was 8.9 mg/L after pre-aeration  
The sample was not filtered or pH adjusted prior to or during testing

**Loading density:** 0.16 g/Litre (must be  $\leq 0.5$  g/Litre)

**Control/dilution water:** Dechlorinated City of Calgary water acclimated to test conditions

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment; 10 fish per replicate

**Feeding:** Fish are not fed 24 hours before test initiation and no feeding during test

**Measurements:** pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination

**Aeration:** All treatments aerated at 6.5  $\pm$  1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones

**Lighting:** Overhead full spectrum fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 15  $\pm$  1°C

**Endpoint:** Mortality, 96-h LC50 (with 95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq 90\%$ )

The control had 0 percent (%) stressed behaviour (must  $\leq 10\%$ )

**Reference toxicant:** 96-h test with Potassium Chloride (KCl) initiated November 26, 2015; current results  
(96-h LC50 and 95% confidence limits) = 0.49 (0.41-0.54) log (g/L KCl)  
historical results:

(96-h LC50 and 95% confidence limits) = 0.57 (0.49-0.64) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

**Test Data**

Client: ALS106
Reference: 15-1700-01-TRD

**Test Log:**

Date	Day	Time	Technician
2015/12/15	0	1240	NM/DS
2015/12/16	1	1220	JK
2015/12/17	2	0845	ML
2015/12/18	3	0930	HS
2015/12/19	4	0845	ML/EP

**Chemistry:**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	pH (units)					
0	7.6	7.6	7.6	7.7	7.7	7.8
4	7.5	7.5	7.7	7.7	7.7	7.6

Day	Conductivity (µS/cm @ 25°C)					
0	499	551	595	782	1094	1612
4	189	563	620	804	1119	1640

Day	Dissolved Oxygen (mg/L)					
0	9.0	9.0	9.0	9.0	9.0	8.9
4	8.8	8.9	8.9	9.0	8.9	9.0

Day	Temperature (°C)					
0	14	14	14	14	14	14
4	14	14	14	14	14	14

**Number Alive (In brackets number stressed):**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	Number Alive (In brackets number stressed)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	9	9	10	10	10

Day	Mortality (%)					
4	0	10	10	0	0	0

Day	Stressed (%)					
4	0	0	0	0	0	0

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**Biology Summary Tables:**

Control Fish	Length (cm)	Wet Weight(g)
1	2.2	0.2
2	2.7	0.3
3	2.6	0.2
4	3.2	0.3
5	3.3	0.4
6	2.9	0.6
7	2.8	0.3
8	3.2	0.3
9	2.6	0.4
10	2.7	0.2

average	2.8	0.3
sd	0.3	0.1
cv(%)	12.0	38.4

Notes: nd, not done; na, not applicable;  
 sd, standard deviation; cv(%), coefficient  
 of variation

**Test Data**

Conc. (%)	Group Wet Weight (g)
control	3.2
6.3	3.2
13	3.7
25	2.5
50	3.1
100	3.3

Client: ALS106
Reference: 15-1700-01-TRD

## Comments/Statistics

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

**Protocol Deviations:**

None

## Result Summary

 Client: ALS106  
 Reference: 15-1700-01-DAD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1713856-2 LC\_WTF\_OUT\_WS\_2015-12-11\_N

**Collection:** collected on 2015/12/11 at not given by not given

**Receipt:** received on 2015/12/12 at 1000 by HS

**Containers:** received 2x20L carboys/2x1L containers at 8 °C, in good condition with no seals and no initials

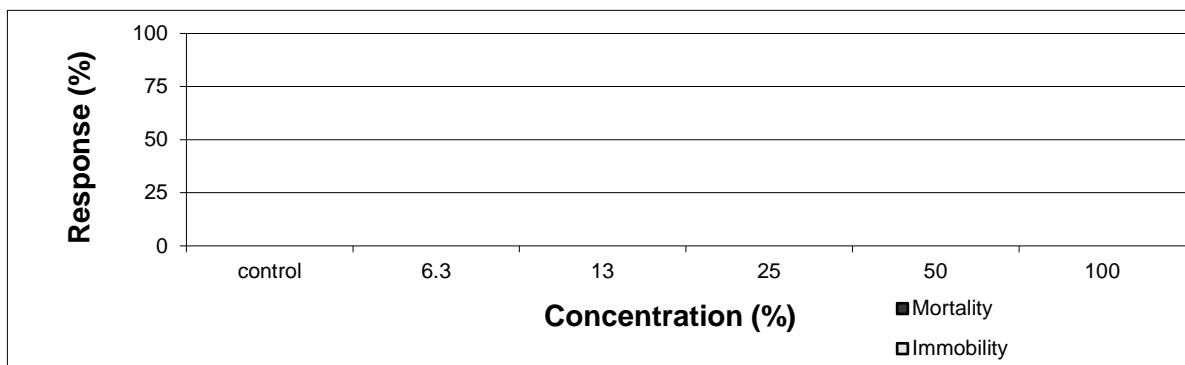
**Description:** type: water , collection method: not given

**Test:** started on 2015/12/12 ; ended on 2015/12/14

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower      upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

## Test Conditions

Client: ALS106  
Reference: 15-1700-01-DAD

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 0%

**Culture brood data:** 11 days to first brood

20 neonates per average brood

**Sample initial chemistry:** pH: 7.6; EC: 1590 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 10.2 (mg/L); temperature: 18 °C  
hardness (mg CaCO<sub>3</sub>/L): 1100; colour: colourless; odour: odourless

**Sample holding time:** 1 day (must be  $\leq$  5 days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 20 minutes (rate of 37.5  $\pm$  12.5 mL/min.L-1)  
The hardness of the sample was not adjusted (mg CaCO<sub>3</sub>/L) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and Na<sub>2</sub>SeO<sub>3</sub> (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 123 mg CaCO<sub>3</sub>/L

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 20  $\pm$  2°C

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1700-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated December 15, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.79 (0.77-0.81) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.70-0.84) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

## Test Data

Client: ALS106
Reference: 15-1700-01-DAD

### Test Log:

Date	Day	Time	Technician
2015/12/12	0	1525	HS
2015/12/13	1	1025	JK
2015/12/14	2	0950	NM

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		

Day

pH (units)

0	8.2	8.1	8.1	8.1	8.1	8.1		
2	8.1	8.2	8.3	8.4	8.3	8.2		

Conductivity (µS/cm @ 25°C)

0	201	311	421	617	969	1551		
2	206	306	415	617	943	1493		

Dissolved Oxygen (mg/L)

0	7.7	7.8	7.8	7.8	7.9	8.2		
2	7.2	7.3	7.7	7.8	7.9	7.9		

Temperature (°C)

0	20	21	21	21	21	19		
2	19	20	20	20	20	21		

### Biology:

Conc. (%)	control	6.3	13	25	50	100		

Day

Number Alive and Behavior (behavior is in brackets)

1	10(1F)	10	10	10	10(1F)	10		
2	10	10	10	10	10	10		

Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;

Mortality (%)

2	0	0	0	0	0	0		
---	---	---	---	---	---	---	--	--

Immobility (%)

2	0	0	0	0	0	0		
---	---	---	---	---	---	---	--	--



**Comments/Statistics**

Client: ALS106 Reference: 15-1700-01-DAD
---

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

**Protocol Deviations:**

None

## GENERAL TERMS AND CONDITIONS:

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23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.



**ATTN: Lyudmyla Shvets**  
ALS Laboratory Group  
2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/12/12  
Report Date: 2015/12/31  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1701  
**Billing:** L1713856

A handwritten signature in cursive script, reading "Jacquelyn Poole".

---

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)

**Result Summary**

Client: ALS106 Reference: 15-1701-01-TRD
---

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1713856-4 WS\_2015-12-11\_FD\_002

**Collection:** collected on 2015/12/11 at not given by not given

**Receipt:** received on 2015/12/12 at 1000 by HS

**Containers:** received 2x20L carboys/2x1L containers at 8 °C, in good condition with no seals and no initials

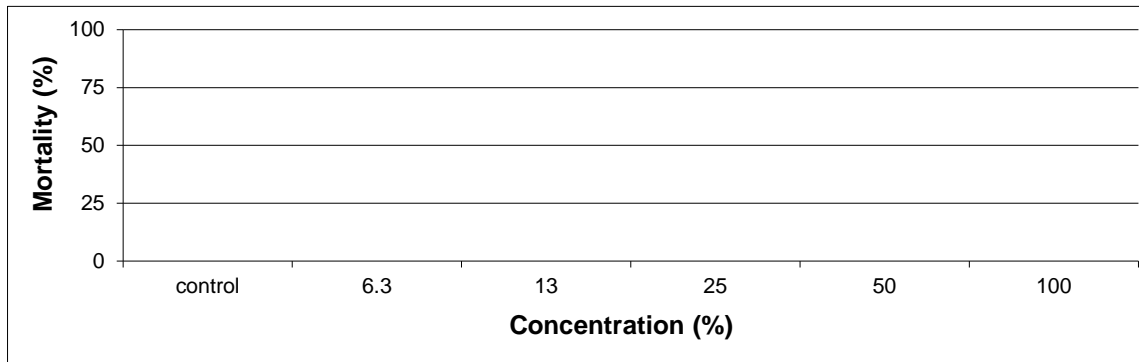
**Description:** type: water , collection method: not given

**Test:** #REF!

**Result:**

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute:	LC50	>100		could not be calculated
(mortality)	LC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

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## Test Conditions

Client: ALS106  
Reference: 15-1701-01-TRD

**Method:** Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

**Test type:** Trout 96-h Static Acute Test (WTR-ME-041)

**Species:** *Oncorhynchus mykiss*

**Organism source:** Miracle Springs (Batch 20151112TR)

**Acclimation:** 33 days (must be  $\geq 2$  weeks)

**Stock mortality:** 0.07% (seven days preceding testing)

**Sample initial chemistry:** pH: 7.6; EC: 1580 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 10.2 (mg/L); temperature: 17 °C  
hardness (mg CaCO<sub>3</sub>/L): 1021; colour: colourless; odour: odourless

**Sample holding time:** 4 days (must be  $\leq 5$  days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** The test was conducted in 22 L plastic pails with polyethylene liners

**Test volume:** 20 Litres (depth of solution in each test vessel  $\geq 15\text{cm}$ )

**Sample pre-treatment:** All test solutions and controls were pre-aerated for 90 minutes at 6.5  $\pm$  1 mL/min/L  
Dissolved oxygen in 100 % sample was 8.9 mg/L after pre-aeration  
The sample was not filtered or pH adjusted prior to or during testing

**Loading density:** 0.16 g/Litre (must be  $\leq 0.5$  g/Litre)

**Control/dilution water:** Dechlorinated City of Calgary water acclimated to test conditions

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment; 10 fish per replicate

**Feeding:** Fish are not fed 24 hours before test initiation and no feeding during test

**Measurements:** pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination

**Aeration:** All treatments aerated at 6.5  $\pm$  1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones

**Lighting:** Overhead full spectrum fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 15  $\pm$  1°C

**Endpoint:** Mortality, 96-h LC50 (with 95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq 90\%$ )

The control had 0 percent (%) stressed behaviour (must  $\leq 10\%$ )

**Reference toxicant:** 96-h test with Potassium Chloride (KCl) initiated November 26, 2015; current results  
(96-h LC50 and 95% confidence limits) = 0.49 (0.41-0.54) log (g/L KCl)  
historical results:

(96-h LC50 and 95% confidence limits) = 0.57 (0.49-0.64) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

## Test Data

Client: ALS106
Reference: 15-1701-01-TRD

### Test Log:

Date	Day	Time	Technician
2015/12/15	0	1240	NM/DS
2015/12/16	1	1220	JK
2015/12/17	2	0845	ML
2015/12/18	3	0930	HS
2015/12/19	4	0845	ML/EP

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100
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Day	pH (units)					
0	7.4	7.5	7.6	7.6	7.7	7.8
4	7.8	7.9	7.9	7.9	7.9	7.8

Day	Conductivity ( $\mu\text{S}/\text{cm}$ @ 25°C)					
0	474	532	615	780	1077	1591
4	472	551	634	795	1114	1606

Day	Dissolved Oxygen (mg/L)					
0	9.0	9.0	9.0	9.0	9.0	8.9
4	8.4	8.6	8.7	8.8	8.8	8.8

Day	Temperature (°C)					
0	14	14	14	14	14	14
4	15	15	14	14	14	15

### Number Alive (In brackets number stressed):

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	Number Alive (In brackets number stressed)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	10	10	10	10	10

Day	Mortality (%)					
4	0	0	0	0	0	0

Day	Stressed (%)					
4	0	0	0	0	0	0

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**Biology Summary Tables:**

Control Fish	Length (cm)	Wet Weight(g)
1	3.0	0.3
2	2.6	0.2
3	3.0	0.4
4	3.3	0.3
5	2.8	0.3
6	2.9	0.5
7	3.4	0.3
8	3.0	0.3
9	2.7	0.4
10	2.8	0.2

average	3.0	0.3
sd	0.3	0.1
cv(%)	8.5	28.7

Notes: nd, not done; na, not applicable;  
sd, standard deviation; cv(%), coefficient of variation

**Test Data**

Conc. (%)	Group Wet Weight (g)
control	3.2
6.3	3.2
13	3.0
25	3.5
50	2.8
100	3.6

Client: ALS106
Reference: 15-1701-01-TRD

**Comments/Statistics**

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

**Protocol Deviations:**

None

**Result Summary**

Client: ALS106 Reference: 15-1701-01-DAD
---

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1713856-4 WS\_2015-12-11\_FD\_002

**Collection:** collected on 2015/12/11 at not given by not given

**Receipt:** received on 2015/12/12 at 1000 by HS

**Containers:** received 2x20L carboys/2x1L containers at 8 °C, in good condition with no seals and no initials

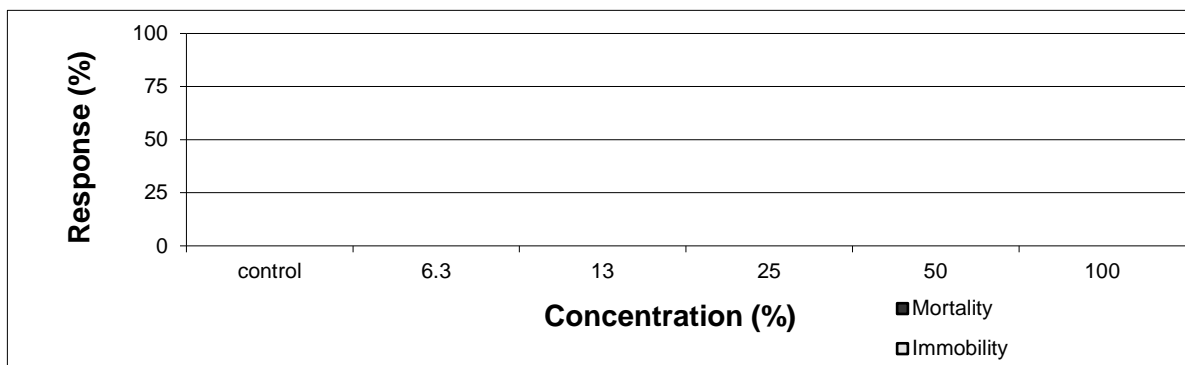
**Description:** type: water , collection method: not given

**Test:** started on 2015/12/15 ; ended on 2015/12/17

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier



## Test Conditions

Client: ALS106  
Reference: 15-1701-01-DAD

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 0%

**Culture brood data:** 11 days to first brood

20 neonates per average brood

**Sample initial chemistry:** pH: 7.6; EC: 1580 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 10.2 (mg/L); temperature: 17 °C  
hardness (mg  $\text{CaCO}_3/\text{L}$ ): 1021; colour: colourless; odour: odourless

**Sample holding time:** 4 days (must be  $\leq$  5 days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 20 minutes (rate of 37.5  $\pm$  12.5 mL/min.L-1)  
The hardness of the sample was not adjusted (mg  $\text{CaCO}_3/\text{L}$ ) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and  $\text{Na}_2\text{SeO}_3$  (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 88 mg  $\text{CaCO}_3/\text{L}$

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 20  $\pm$  2°C

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1701-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated December 15, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.79 (0.77-0.81) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.70-0.84) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

### Test Data

Client: ALS106
Reference: 15-1701-01-DAD

#### Test Log:

Date	Day	Time	Technician
2015/12/15	0	1525	ML/HS
2015/12/16	1	1025	JK
2015/12/17	2	0950	JK

#### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		
pH (units)								
Day								
0	8.2	8.2	8.2	8.2	8.2	8.1		
2	7.9	8.0	8.0	8.1	8.2	8.1		
Conductivity (µS/cm @ 25°C)								
0	194	295	393	571	897	1526		
2	208	315	415	643	991	1755		
Dissolved Oxygen (mg/L)								
0	7.8	7.9	7.8	7.8	7.6	7.7		
2	8.0	8.0	7.9	8.0	8.0	8.0		
Temperature (°C)								
0	20	20	20	20	20	20		
2	20	20	20	20	20	20		

#### Biology:

Conc. (%)	control	6.3	13	25	50	100		
Number Alive and Behavior (behavior is in brackets)								
Day								
1	10	10	10	10	10	10		
2	10	10	10	10	10	10		
Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;								
Mortality (%)								
2	0	0	0	0	0	0		
Immobility (%)								
2	0	0	0	0	0	0		

**Comments/Statistics**

Client: ALS106 Reference: 15-1701-01-DAD
---

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

**Protocol Deviations:**

None

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21. **Re-Tests:** HydroQual reserves the right to re-test any samples that remain in HydroQual's possession. Re-tests requested by the Client may be charged to Client and Client agrees to pay for such charges.
22. **Waiver:** The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any and all claims against HydroQual that the Client may have against HydroQual as a result of the interpretation of the results provided to the Client. The Client shall defend, indemnify and save harmless HydroQual for any and all claims made by any third party against HydroQual in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.



**ATTN: Lyudmyla Shvets**  
ALS Laboratory Group  
2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/12/15  
Report Date: 2015/12/29  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1710  
**Billing:** L1714465

A handwritten signature in black ink, appearing to read "D. Lopez", is positioned above a horizontal line.

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1**  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)

## Result Summary

Client: ALS106
Reference: 15-1710-01-TRD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1714465-2 LC\_WTF\_OUT\_WS\_2015-12-14\_N

**Collection:** collected on 2015/12/14 at not given by not given

**Receipt:** received on 2015/12/15 at 1100 by MC

**Containers:** received 2 x 20 L carboys/ 2 x 1 L bottles at 7 °C, in good condition with no seals and no initials

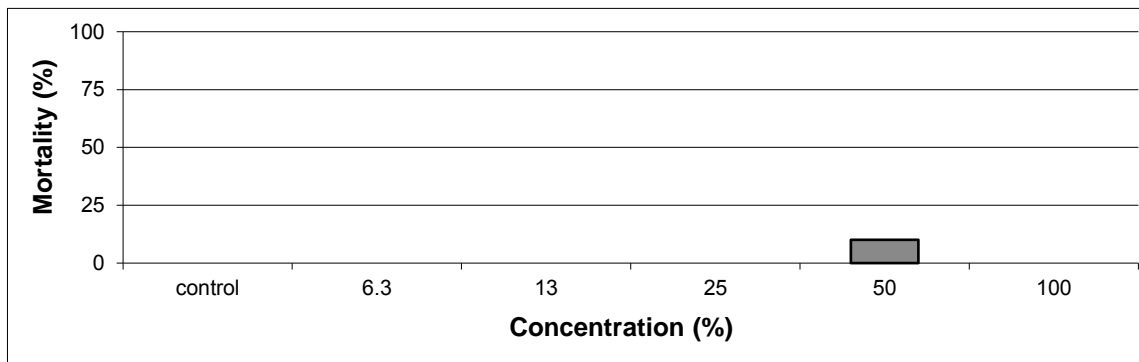
**Description:** type: water, collection method: not given

**Test:** started on 2015/12/17 ; ended on 2015/12/21

**Result:**

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute:	LC50	>100		could not be calculated
(mortality)	LC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

## Test Conditions

Client: ALS106  
Reference: 15-1710-01-TRD

**Method:** Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

**Test type:** Trout 96-h Static Acute Test (WTR-ME-041)

**Species:** *Oncorhynchus mykiss*

**Organism source:** Miracle Springs (Batch 20151112TR)

**Acclimation:** 35 days (must be  $\geq 2$  weeks)

**Stock mortality:** 0.07% (seven days preceding testing)

**Sample initial chemistry:** pH: 7.8; EC: 1773 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.4 (mg/L); temperature: 18 °C  
hardness (mg CaCO<sub>3</sub>/L): 1328; colour: colourless; odour: odourless

**Sample holding time:** 3 days (must be  $\leq 5$  days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** The test was conducted in 22 L plastic pails with polyethylene liners

**Test volume:** 20 Litres (depth of solution in each test vessel  $\geq 15\text{cm}$ )

**Sample pre-treatment:** All test solutions and controls were pre-aerated for 120 minutes at 6.5  $\pm$  1 mL/min/L  
Dissolved oxygen in 100 % sample was 9.2 mg/L after pre-aeration  
The sample was not filtered or pH adjusted prior to or during testing

**Loading density:** 0.175 g/Litre (must be  $\leq 0.5$  g/Litre)

**Control/dilution water:** Dechlorinated City of Calgary water acclimated to test conditions

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment; 10 fish per replicate

**Feeding:** Fish are not fed 24 hours before test initiation and no feeding during test

**Measurements:** pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination

**Aeration:** All treatments aerated at 6.5  $\pm$  1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones

**Lighting:** Overhead full spectrum fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 15  $\pm$  1°C

**Endpoint:** Mortality, 96-h LC50 (with 95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq 90\%$ )

The control had 0 percent (%) stressed behaviour (must  $\leq 10\%$ )

**Reference toxicant:** 96-h test with Potassium Chloride (KCl) initiated November 26, 2015; current results  
(96-h LC50 and 95% confidence limits) = 0.49 (0.41-0.54) log (g/L KCl)  
historical results:

(96-h LC50 and 95% confidence limits) = 0.57 (0.49-0.64) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume



**Test Data**

Client: ALS106
Reference: 15-1710-01-TRD

**Test Log:**

Date	Day	Time	Technician
2015/12/17	0	1000	ML
2015/12/18	1	0930	HS
2015/12/19	2	0845	ML
2015/12/20	3	1020	JK
2015/12/21	4	0830	CQ/NM/EP

**Chemistry:**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	pH (units)					
0	7.9	7.9	7.9	7.9	7.9	8.0
4	8.0	8.1	8.1	8.1	8.1	8.0

Day	Conductivity ( $\mu\text{S/cm @ } 25^\circ\text{C}$ )					
0	471	577	655	840	1186	1805
4	462	583	668	852	1210	1835

Day	Dissolved Oxygen (mg/L)					
0	9.0	9.1	9.0	9.2	9.1	9.2
4	7.8	8.0	8.0	8.4	8.6	8.8

Day	Temperature ( $^\circ\text{C}$ )					
0	14	14	14	14	14	14
4	14	14	14	14	14	14

**Number Alive (In brackets number stressed):**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	Number Alive (In brackets number stressed)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	9	10
4	10	10	10	10	9	10

Day	Mortality (%)					
4	0	0	0	0	10	0

Day	Stressed (%)					
4	0	0	0	0	0	0

**Biology Summary Tables:**

Control Fish	Length (cm)	Wet Weight(g)
1	3.1	0.4
2	3.2	0.4
3	2.9	0.3
4	2.8	0.3
5	3.3	0.5
6	3.1	0.4
7	3.0	0.3
8	3.2	0.4
9	3.0	0.3
10	2.6	0.2

average	3.0	0.4
sd	0.2	0.1
cv(%)	6.9	24.3

Notes: nd, not done; na, not applicable;  
 sd, standard deviation; cv(%), coefficient  
 of variation

**Test Data**

Conc. (%)	Group Wet Weight (g)
control	3.5
6.3	4.3
13	3.9
25	3.9
50	3.3
100	3.9

Client: ALS106
Reference: 15-1710-01-TRD

## Comments/Statistics

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

**Protocol Deviations:**

None

**Result Summary**

Client: ALS106 Reference: 15-1710-01-DAD
---

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1714465-2 LC\_WTF\_OUT\_WS\_2015-12-14\_N

**Collection:** collected on 2015/12/14 at not given by not given

**Receipt:** received on 2015/12/15 at 1100 by MC

**Containers:** received 2 x 20 L carboys/ 2 x 1 L bottles at 7 °C, in good condition with no seals and no initials

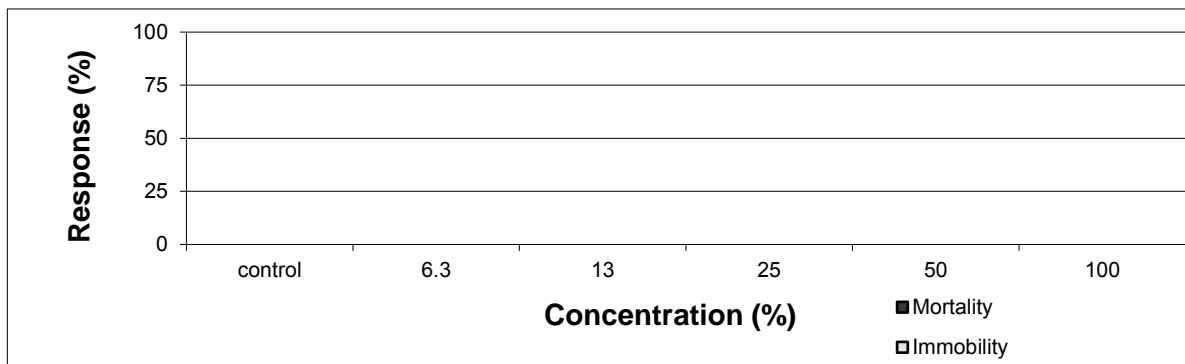
**Description:** type: water, collection method: not given

**Test:** started on 2015/12/19 ; ended on 2015/12/21

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

## Test Conditions

Client: ALS106 Reference: 15-1710-01-DAD
---

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 0%

**Culture brood data:** 9 days to first brood  
15 neonates per average brood

**Sample initial chemistry:** pH: 7.8; EC: 1773 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.4 (mg/L); temperature: 18 °C  
hardness (mg CaCO<sub>3</sub>/L): 1328; colour: colourless; odour: odourless

**Sample holding time:** 5 days (must be  $\leq$  5 days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** 250 mL glass beaker

**Test volume:** 200 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 0 minutes (rate of 37.5  $\pm$  12.5 mL/min.L-1)  
The hardness of the sample was not adjusted (mg CaCO<sub>3</sub>/L) prior to or during testing

**Loading density:** One daphnid/20 mL (must  $\leq$  1 organism/20 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and Na<sub>2</sub>SeO<sub>3</sub> (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 96 mg CaCO<sub>3</sub>/L

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 20  $\pm$  2°C

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1710-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated December 14, 2015; current results  
(48-h LC50 and 95% confidence limits) = 3.7 (3.2-4.2) (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 4.2 (3.3-5.4) (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

## Test Data

Client: ALS106
Reference: 15-1710-01-DAD

### Test Log:

Date	Day	Time	Technician
2015/12/19	0	1115	AWD
2015/12/20	1	1100	AWD
2015/12/21	2	1100	AWD

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		
pH (units)								
Day								
0	7.9	7.9	7.9	7.9	7.8	7.8		
2	7.7	7.7	7.9	7.9	8.0	8.0		
Conductivity (µS/cm @ 25°C)								
0	328	407	532	729	1225	1802		
2	342	416	543	743	1172	1795		
Dissolved Oxygen (mg/L)								
0	8.9	8.8	8.8	8.8	8.8	8.6		
2	8.6	8.7	8.8	8.8	8.8	8.9		
Temperature (°C)								
0	18	18	18	19	19	19		
2	18	18	18	18	18	18		

### Biology:

Conc. (%)	control	6.3	13	25	50	100		
Number Alive and Behavior (behavior is in brackets)								
Day								
1	10	10	10	10	10	10		
2	10	10	10	10	10	10		
Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;								
Mortality (%)								
2	0	0	0	0	0	0		
Immobility (%)								
2	0	0	0	0	0	0		

**Comments/Statistics**

Client: ALS106 Reference: 15-1710-01-DAD
---

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

**Protocol Deviations:**

None



**ATTN: Lyudmyla Shvets**  
ALS Laboratory Group  
2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/12/22  
Report Date: 2015/12/29  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1735  
**Billing:** L1717226

A handwritten signature in black ink, appearing to read "DK Lopez", is positioned above a horizontal line.

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1**  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)



**Result Summary**

Client: ALS106
Reference: 15-1735-01-TRD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1717226-2 LC\_WTF\_OUT\_WS\_2015-12-21\_N

**Collection:** collected on 2015/12/21 at not given by not given

**Receipt:** received on 2015/12/22 at 1330 by MC

**Containers:** received 2 x 20 L carboys / 2 x 1 L bottle at 4 °C, in good condition with no seals and no initials

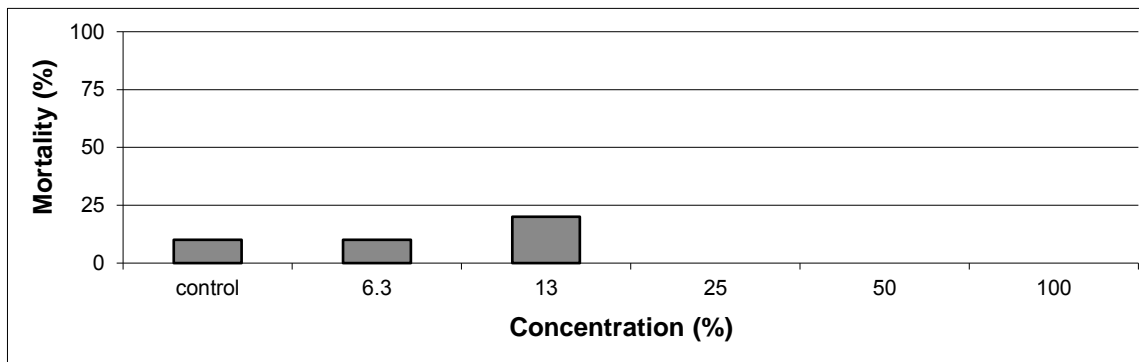
**Description:** type: water, collection method: not given

**Test:** started on 2015/12/23 ; ended on 2015/12/27

**Result:**

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute:	LC50	>100		could not be calculated
(mortality)	LC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

## Test Conditions

Client: ALS106  
Reference: 15-1735-01-TRD

**Method:** Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

**Test type:** Trout 96-h Static Acute Test (WTR-ME-041)

**Species:** *Oncorhynchus mykiss*

**Organism source:** Miracle Springs (Batch 20151112TR)

**Acclimation:** 40 days (must be  $\geq 2$  weeks)

**Stock mortality:** 0% (seven days preceding testing)

**Sample initial chemistry:** pH: 7.2; EC: 2180 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.5 (mg/L); temperature: 14 °C  
hardness (mg CaCO<sub>3</sub>/L): 1154; colour: colourless; odour: odourless

**Sample holding time:** 2 days (must be  $\leq 5$  days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** The test was conducted in 22 L plastic pails with polyethylene liners

**Test volume:** 20 Litres (depth of solution in each test vessel  $\geq 15\text{cm}$ )

**Sample pre-treatment:** All test solutions and controls were pre-aerated for 120 minutes at 6.5  $\pm$  1 mL/min/L  
Dissolved oxygen in 100 % sample was 14 mg/L after pre-aeration  
The sample was not filtered or pH adjusted prior to or during testing

**Loading density:** 0.185 g/Litre (must be  $\leq 0.5$  g/Litre)

**Control/dilution water:** Dechlorinated City of Calgary water acclimated to test conditions

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment; 10 fish per replicate

**Feeding:** Fish are not fed 24 hours before test initiation and no feeding during test

**Measurements:** pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination

**Aeration:** All treatments aerated at 6.5  $\pm$  1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones

**Lighting:** Overhead full spectrum fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 15  $\pm$  1°C

**Endpoint:** Mortality, 96-h LC50 (with 95% confidence limits)

**Test validity:** The control had 90% survival (must  $\geq 90\%$ )

The control had 0 percent (%) stressed behaviour (must  $\leq 10\%$ )

**Reference toxicant:** 96-h test with Potassium Chloride (KCl) initiated November 26, 2015; current results  
(96-h LC50 and 95% confidence limits) = 0.49 (0.41-0.54) log (g/L KCl)  
historical results:

(96-h LC50 and 95% confidence limits) = 0.57 (0.49-0.64) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

**Test Data**

Client: ALS106
Reference: 15-1735-01-TRD

**Test Log:**

Date	Day	Time	Technician
2015/12/23	0	1030	HS
2015/12/24	1	0830	DS
2015/12/25	2	0945	DS
2015/12/26	3	0920	DS
2015/12/27	4	0910	JN

**Chemistry:**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	pH (units)					
0	7.5	7.5	7.6	7.7	7.7	7.7
4	8.0	8.0	8.0	7.0	7.0	6.9

Day	Conductivity ( $\mu\text{S}/\text{cm}$ @ 25°C)					
0	451	514	626	894	1289	1980
4	459	528	640	897	1289	2050

Day	Dissolved Oxygen (mg/L)					
0	9.0	9.1	9.2	9.1	9.2	14.0
4	9.0	9.0	8.9	8.9	9.0	14.0

Day	Temperature (°C)					
0	14	14	14	14	14	14
4	14	14	14	14	14	14

**Number Alive (In brackets number stressed):**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	Number Alive (In brackets number stressed)					
0	10	10	10	10	10	10
1	10	9	10	10	10	10
2	10	9	9	10	10	10
3	9	9	8	10	10	10
4	9	9	7*	8*	10	10

Day	Mortality (%)					
4	10	10	20	0	0	0

Day	Stressed (%)					
4	0	0	0	0	0	0

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**Biology Summary Tables:**

Control Fish	Length (cm)	Wet Weight(g)
1	2.6	0.2
2	3.1	0.3
3	3.2	0.4
4	2.8	0.3
5	3.5	0.4
6	2.6	0.2
7	3.4	0.4
8	3.3	0.4
9	3.5	0.5
10	3.6	0.6

average	3.2	0.4
sd	0.4	0.1
cv(%)	11.9	33.8

Notes: nd, not done; na, not applicable;  
 sd, standard deviation; cv(%), coefficient  
 of variation

**Test Data**

Conc. (%)	Group Wet Weight (g)
control	3.7
6.3	3.4
13	3.7
25	5.0
50	3.0
100	4.6

Client: ALS106
Reference: 15-1735-01-TRD

## Comments/Statistics

**Test Result Comments:**

One fish was partially eaten in the 12% and 2 fish in the 25% test vessel and are not included in the mortality calculations or group weights.

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

**Protocol Deviations:**

None

## Result Summary

 Client: ALS106  
 Reference: 15-1735-01-DAD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1717226-2 LC\_WTF\_OUT\_WS\_2015-12-21\_N

**Collection:** collected on 2015/12/21 at not given by not given

**Receipt:** received on 2015/12/22 at 1330 by MC

**Containers:** received 2 x 20 L carboys / 2 x 1 L bottle at 4 °C, in good condition with no seals and no initials

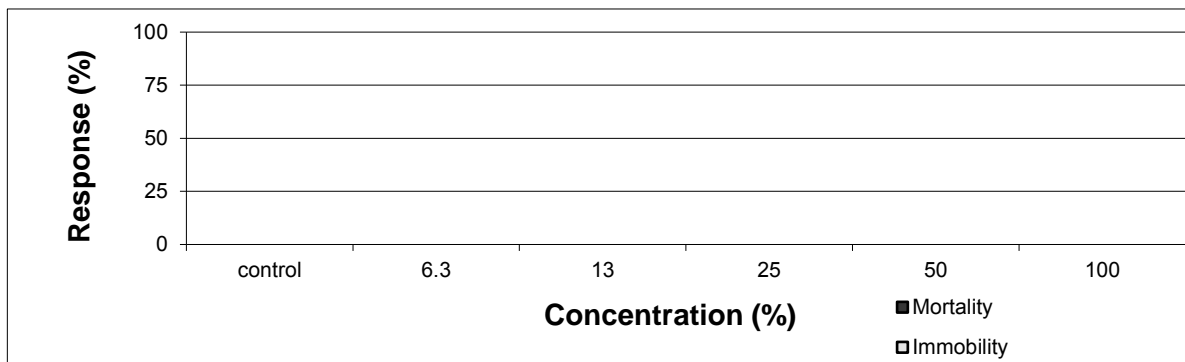
**Description:** type: water, collection method: not given

**Test:** started on 2015/12/22 ; ended on 2015/12/24

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

## Test Conditions

Client: ALS106 Reference: 15-1735-01-DAD
---

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 0%

**Culture brood data:** 11 days to first brood  
20 neonates per average brood

**Sample initial chemistry:** pH: 7.2; EC: 2180 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.5 (mg/L); temperature: 14 °C  
hardness (mg CaCO<sub>3</sub>/L): 1154; colour: colourless; odour: odourless

**Sample holding time:** 1 day (must be  $\leq$  5 days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 0 minutes (rate of 37.5  $\pm$  12.5 mL/min.L-1)  
The hardness of the sample was not adjusted (mg CaCO<sub>3</sub>/L) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and Na<sub>2</sub>SeO<sub>3</sub> (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 114 mg CaCO<sub>3</sub>/L

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 20  $\pm$  2°C

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1735-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated December 15, 2015; current results  
(48-h LC50 and 95% confidence limits) = 0.79 (0.77-0.81) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.70-0.84) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

## Test Data

Client: ALS106
Reference: 15-1735-01-DAD

### Test Log:

Date	Day	Time	Technician
2015/12/22	0	1520	NM
2015/12/23	1	0945	DS
2015/12/24	2	0905	HS

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		
pH (units)								
Day								
0	8.1	8.2	8.2	8.2	8.3	8.3		
2	8.0	8.1	8.1	8.1	8.2	8.2		
Conductivity (µS/cm @ 25°C)								
0	214	361	498	747	1202	1930		
2	222	373	510	770	1296	1916		
Dissolved Oxygen (mg/L)								
0	7.4	7.5	7.6	7.6	7.6	7.6		
2	8.3	8.3	8.2	8.2	8.1	8.2		
Temperature (°C)								
0	19	20	20	20	20	20		
2	18	18	18	18	18	18		

### Biology:

Conc. (%)	control	6.3	13	25	50	100		
Number Alive and Behavior (behavior is in brackets)								
Day								
1	10	10	10	10	10	10		
2	10	10	10	10	10	10		
Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;								
Mortality (%)								
2	0	0	0	0	0	0		
Immobility (%)								
2	0	0	0	0	0	0		



## Comments/Statistics

Client: ALS106 Reference: 15-1735-01-DAD
---

### Test Result Comments:

None

### Data Analysis:

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

### Protocol Deviations:

None

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3. **Prices:** HydroQual may review and change all prices, fees, surcharges or other charges as set out in proposals and/or price quotations if there are changes to HydroQual's cost beyond HydroQual's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding condition 3, all quotations are reviewed and updated on a yearly basis.
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15. **Environmental:** the Client must comply with all applicable environmental legislation, including labeling all hazardous samples to comply with Canada's *Workplace Hazardous Materials Information System* and the Alberta *Transfer of Dangerous Goods* regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client shall defend, indemnify and hold harmless HydroQual for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
16. **Hazardous Materials Disposal:** HydroQual may return, at the Client's cost, hazardous material to the Client for disposal.
17. **Hazardous Materials Surcharge:** HydroQual may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials ("NORM"), such as and including without limitation, H<sub>2</sub>S and CN.
18. **Sample Containers:** HydroQual may ship sample containers to the Client's location by the most cost effective means using HydroQual's preferred courier suppliers, within the specified project timeline. Shipping will be charged back to the Client.
19. **Additional Charges:** HydroQual may charge the Client:
  - (a) for pick-up and delivery services when provided subject in each instance to a minimum charge of \$50.00; and,
  - (b) for rush service (processing samples and/or reporting).
20. **Large Bottle Orders:** The Client shall provide HydroQual with not less than 24 hours' notice for large bottle orders.
21. **Re-Tests:** HydroQual reserves the right to re-test any samples that remain in HydroQual's possession. Re-tests requested by the Client may be charged to Client and Client agrees to pay for such charges.
22. **Waiver:** The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any and all claims against HydroQual that the Client may have against HydroQual as a result of the interpretation of the results provided to the Client. The Client shall defend, indemnify and save harmless HydroQual for any and all claims made by any third party against HydroQual in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.



**ATTN: Nelson Kwan/ Lyudmyla Shvets**  
ALS Laboratory Group  
2559 29th St. N.E.  
Calgary, Alberta  
Canada T1Y 7B5

Received: 2015/12/30  
Report Date: 2016/01/07  
Version: FINAL

## HydroQual Test Report

**Client:** ALS106  
**Reference:** 15-1748  
**Billing:** L1718816

A handwritten signature in cursive script, appearing to read "Jacklyn Pace".

---

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

**HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1**  
Tel (403) 253-7121 fax (403) 252-9363 [www.hydroqual.ca](http://www.hydroqual.ca)

## Result Summary

 Client: ALS106  
 Reference: 15-1748-01-TRD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1718816-2 LC\_WTF\_OUT\_WS\_2015-12-28\_N

**Collection:** collected on 2015/12/28 at not given by not given

**Receipt:** received on 2015/12/30 at 1230 by MC

**Containers:** received 2 x 20 L carboys / 2 x 1 L bottle at 10 °C, in good condition with no seals and no initials

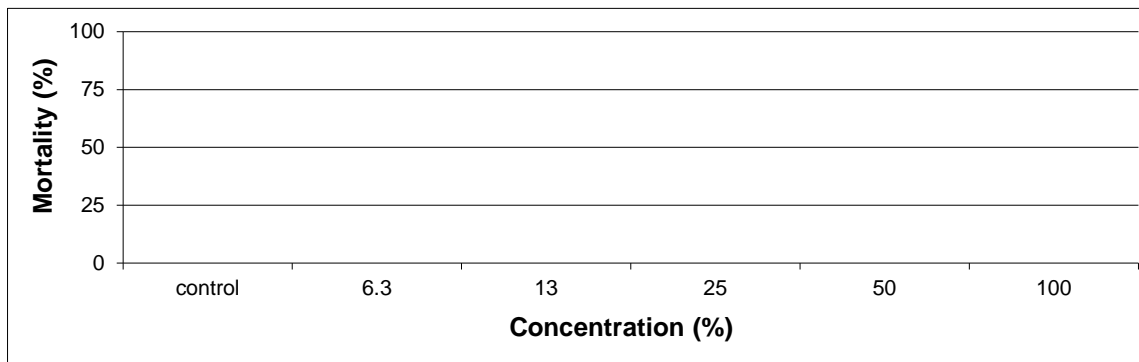
**Description:** type: water, collection method: not given

**Test:** started on 2015/12/31 ; ended on 2016/01/04

**Result:**

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute:	LC50	>100		could not be calculated
(mortality)	LC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier

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## Test Conditions

Client: ALS106 Reference: 15-1748-01-TRD
---

**Method:** Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

**Test type:** Trout 96-h Static Acute Test (WTR-ME-041)

**Species:** *Oncorhynchus mykiss*

**Organism source:** Sam Livingston (Batch 20151207TR)

**Acclimation:** 24 days (must be  $\geq 2$  weeks)

**Stock mortality:** 0% (seven days preceding testing)

**Sample initial chemistry:** pH: 7.9; EC: 1789 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.4 (mg/L); temperature: 16 °C  
hardness (mg CaCO<sub>3</sub>/L): 701; colour: colourless; odour: odourless

**Sample holding time:** 3 days (must be  $\leq 5$  days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** The test was conducted in 22 L plastic pails with polyethylene liners

**Test volume:** 20 Litres (depth of solution in each test vessel  $\geq 15\text{cm}$ )

**Sample pre-treatment:** All test solutions and controls were pre-aerated for 120 minutes at 6.5  $\pm$  1 mL/min/L  
Dissolved oxygen in 100 % sample was 9.5 mg/L after pre-aeration  
The sample was not filtered or pH adjusted prior to or during testing

**Loading density:** 0.155 g/Litre (must be  $\leq 0.5$  g/Litre)

**Control/dilution water:** Dechlorinated City of Calgary water acclimated to test conditions

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment; 10 fish per replicate

**Feeding:** Fish are not fed 24 hours before test initiation and no feeding during test

**Measurements:** pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination

**Aeration:** All treatments aerated at 6.5  $\pm$  1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones

**Lighting:** Overhead full spectrum fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 15  $\pm$  1°C

**Endpoint:** Mortality, 96-h LC50 (with 95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq 90\%$ )

The control had 0 percent (%) stressed behaviour (must  $\leq 10\%$ )

**Reference toxicant:** 96-h test with Potassium Chloride (KCl) initiated December 30, 2015; current result:  
(96-h LC50 and 95% confidence limits) = 0.58 (0.54-0.62) log (g/L KCl)  
historical results:  
(96-h LC50 and 95% confidence limits) = 0.56 (0.48-0.64) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

**Test Data**

Client: ALS106
Reference: 15-1748-01-TRD

**Test Log:**

Date	Day	Time	Technician
2015/12/31	0	1045	CQ/EP
2016/01/01	1	0900	JK
2016/01/02	2	1030	ML/JW
2016/01/03	3	0930	JN
2016/01/04	4	0915	HS/JW

**Chemistry:**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	pH (units)					
0	7.4	7.4	7.5	7.5	7.1	7.1
4	8.1	8.1	8.1	8.2	8.2	8.2

Day	Conductivity ( $\mu\text{S/cm}$ @ 25°C)					
0	420	502	575	767	1120	1754
4	436	522	600	813	1182	1873

Day	Dissolved Oxygen (mg/L)					
0	9.6	9.7	9.7	9.6	9.6	9.5
4	8.7	8.8	8.9	8.9	8.9	8.9

Day	Temperature (°C)					
0	14	14	14	14	14	14
4	14	14	14	14	14	14

**Number Alive (In brackets number stressed):**

Conc. (%)	control	6.3	13	25	50	100
-----------	---------	-----	----	----	----	-----

Day	Number Alive					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	10	10	10	10	10

Day	Mortality (%)					
4	0	0	0	0	0	0

Day	Stressed (%)					
4	0	0	0	0	0	0

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**Biology Summary Tables:**

Control Fish	Length (cm)	Wet Weight(g)
1	3.0	0.3
2	3.0	0.4
3	2.8	0.3
4	3.1	0.3
5	2.9	0.3
6	3.0	0.3
7	3.1	0.3
8	3.0	0.3
9	3.0	0.3
10	2.9	0.3

average	3.0	0.3
sd	0.1	0.0
cv(%)	3.1	10.2

Notes: nd, not done; na, not applicable;  
 sd, standard deviation; cv(%), coefficient  
 of variation

**Test Data**

Conc. (%)	Group Wet Weight (g)
control	3.1
6.3	2.8
13	2.8
25	2.6
50	2.5
100	3.4

Client: ALS106
Reference: 15-1748-01-TRD

## Comments/Statistics

**Test Result Comments:**

None

**Data Analysis:**

Endpoints for mortality could not be calculated. No effect occurred.

**Protocol Deviations:**

None

## Result Summary

 Client: ALS106  
 Reference: 15-1748-01-DAD

**Client:** ALS Laboratory Group; operation Calgary

**Sample:** L1718816-2 LC\_WTF\_OUT\_WS\_2015-12-28\_N

**Collection:** collected on 2015/12/28 at not given by not given

**Receipt:** received on 2015/12/30 at 1230 by MC

**Containers:** received 2 x 20 L carboys / 2 x 1 L bottle at 10 °C, in good condition with no seals and no initials

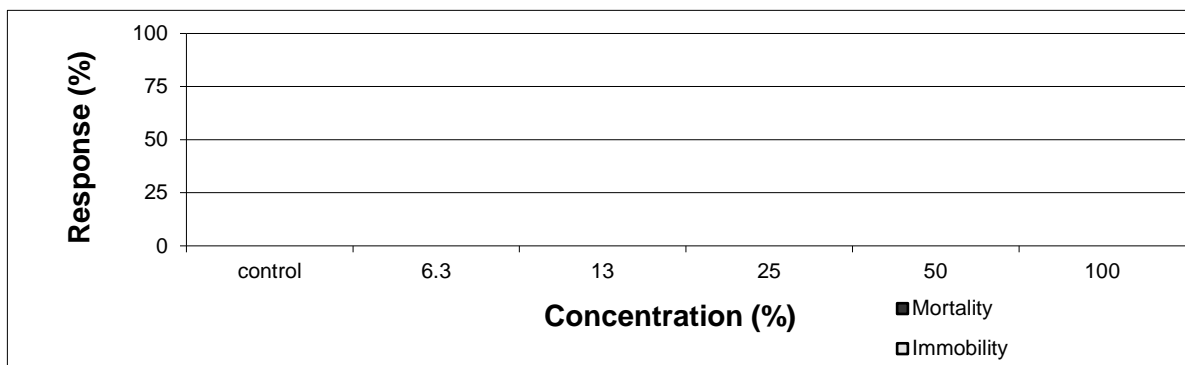
**Description:** type: water, collection method: not given

**Test:** started on 2015/12/31 ; ended on 2016/01/02

**Result:**

	Endpoint (48-hour)	Value (%)	Confidence Limits (95%) lower upper	Method Calculated
Acute: (mortality)	LC50	>100		could not be calculated
	LC25	>100		could not be calculated
Acute: (immobility)	EC50	>100		could not be calculated
	EC25	>100		could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.



Senior Verifier



## Test Conditions

Client: ALS106 Reference: 15-1748-01-DAD
---

**Method:** Biological Test method: Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, 2000. Environ. Can., EPS 1/RM/14. Second Edition.

**Test type:** *Daphnia* 48-h Static Acute Test (WTR-ME-015)

**Species:** *Daphnia magna*

**Age:** < 24 hours old

**Organism source:** in-house culture

**Stock mortality:** 0%

**Culture brood data:** 11 days to first brood

20 neonates per average brood

**Sample initial chemistry:** pH: 7.9; EC: 1789 ( $\mu\text{S}/\text{cm}$  @ 25°C); DO: 9.4 (mg/L); temperature: 16 °C  
hardness (mg CaCO<sub>3</sub>/L): 701; colour: colourless; odour: odourless

**Sample holding time:** 3 days (must be  $\leq$  5 days)

**Sample storage:** 4  $\pm$  2°C in darkness

**Test vessel:** 385 mL plastic vessels

**Test volume:** 150 mL

**Sample pre-treatment:** The sample was not filtered or pH adjusted prior to or during testing  
The sample was pre-aerated for 20 minutes (rate of 37.5  $\pm$  12.5 mL/min.L-1)  
The hardness of the sample was not adjusted (mg CaCO<sub>3</sub>/L) prior to or during testing

**Loading density:** One daphnid/15 mL (must  $\leq$  1 organism/15 mL)

**Control/dilution water:** Moderately hard water supplemented with vitamin B12 (2  $\mu\text{g}/\text{L}$ )  
and Na<sub>2</sub>SeO<sub>3</sub> (5  $\mu\text{g}/\text{L}$ )

The hardness of the control/dilution water was 89 mg CaCO<sub>3</sub>/L

**Test concentrations:** 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)

**Test replicates:** One replicate per treatment, 10 daphnids per replicate

**Feeding:** None

**Aeration:** None

**Measurements:** pH, conductivity, dissolved oxygen and temperature at test initiation and termination

**Lighting:** Cool white fluorescent lights

**Photoperiod:** 16h light:8h dark

**Test temperature:** 20  $\pm$  2°C

Note: Outlined sections are protocol deviations explained on the comment page

## Test Conditions

Client: ALS106 Reference: 15-1748-01-DAD
---

**Endpoint:** Mortality, 48-h LC50 (95% confidence limits)  
Immobility, 48-h EC50 (95% confidence limits)

**Test validity:** The control had 100% survival (must  $\geq$  90%)  
Control had 0 percent (%) abnormal behaviour (must  $\leq$  10%, immobility)

**Reference toxicant:** 48-h test with NaCl initiated January 2, 2016; current results  
(48-h LC50 and 95% confidence limits) = 0.68 (0.65-0.70) log (g/L NaCl)  
historical results:  
(48-h LC50 and 95% confidence limits) = 0.77 (0.70-0.84) log (g/L NaCl)

Note: Outlined sections are protocol deviations explained on the comment page

## Test Data

Client: ALS106
Reference: 15-1748-01-DAD

### Test Log:

Date	Day	Time	Technician
2015/12/31	0	1035	NM
2016/01/01	1	1100	JK
2016/01/02	2	1000	JK

### Chemistry:

Conc. (%)	control	6.3	13	25	50	100		
pH (units)								
Day								
0	7.9	7.9	7.9	7.9	7.8	7.8		
2	7.9	7.9	8.0	8.1	8.2	8.2		
Conductivity (µS/cm @ 25°C)								
0	199	306	421	632	1036	1730		
2	208	322	434	655	1036	1734		
Dissolved Oxygen (mg/L)								
0	8.1	8.2	8.1	8.2	8.2	8.2		
2	8.1	8.1	8.2	8.1	8.0	8.0		
Temperature (°C)								
0	19	20	20	20	20	20		
2	21	20	20	21	21	21		

### Biology:

Conc. (%)	control	6.3	13	25	50	100		
Number Alive and Behavior (behavior is in brackets)								
Day								
1	10	10	10	10	10	10		
2	10	10	10	10	10	10		
Notes: F, floating; I, immobile; B, stuck on bubble; D, caught in debris; nd, not done; na, not applicable;								
Mortality (%)								
2	0	0	0	0	0	0		
Immobility (%)								
2	0	0	0	0	0	0		

## Comments/Statistics

Client: ALS106 Reference: 15-1748-01-DAD
---

### Test Result Comments:

The result of the reference toxicant test initiated on 2016/01/02 was outside the warning limit. This is expected to happen 5% of the time. An investigation occurred and all testing and culturing procedures were followed appropriately.

### Data Analysis:

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for immobility could not be calculated. No effect occurred.

### Protocol Deviations:

None

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15. **Environmental:** the Client must comply with all applicable environmental legislation, including labeling all hazardous samples to comply with Canada's *Workplace Hazardous Materials Information System* and the Alberta *Transfer of Dangerous Goods* regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client shall defend, indemnify and hold harmless HydroQual for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
16. **Hazardous Materials Disposal:** HydroQual may return, at the Client's cost, hazardous material to the Client for disposal.
17. **Hazardous Materials Surcharge:** HydroQual may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials ("NORM"), such as and including without limitation, H<sub>2</sub>S and CN.
18. **Sample Containers:** HydroQual may ship sample containers to the Client's location by the most cost effective means using HydroQual's preferred courier suppliers, within the specified project timeline. Shipping will be charged back to the Client.
19. **Additional Charges:** HydroQual may charge the Client:
  - (a) for pick-up and delivery services when provided subject in each instance to a minimum charge of \$50.00; and,
  - (b) for rush service (processing samples and/or reporting).
20. **Large Bottle Orders:** The Client shall provide HydroQual with not less than 24 hours' notice for large bottle orders.
21. **Re-Tests:** HydroQual reserves the right to re-test any samples that remain in HydroQual's possession. Re-tests requested by the Client may be charged to Client and Client agrees to pay for such charges.
22. **Waiver:** The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any and all claims against HydroQual that the Client may have against HydroQual as a result of the interpretation of the results provided to the Client. The Client shall defend, indemnify and save harmless HydroQual for any and all claims made by any third party against HydroQual in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OF IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.

## **Appendix G – Surface Water Monitoring Program: Acute Toxicity Test Results (includes Biological Tests Reports)**

### Summary of Acute Toxicity Test Results Associated with the Surface Water Monitoring Program

EMS ID	Site ID	Date	Acute Toxicity Tests - Percent Survival	
			<i>Daphnia magna</i>	Rainbow Trout ( <i>Oncorhynchus mykiss</i> )
E206438	CM_CCPD	Mar 03 2015	100	100
E206438	CM_CCPD	Jun 03 2015	93	80
E206438	CM_CCPD	Sep 28 2015	100	100
E206438	CM_CCPD	Nov 05 2015	100	100
E258937	CM_MC2	Jun 03 2015	100	100
E298733	CM_PC2	Mar 16 2015	100	100
E298733	CM_PC2	Jun 03 2015	97	70
E102488	CM_SPD	Mar 03 2015	100	100
E102488	CM_SPD	Jun 03 2015	100	100
E102488	CM_SPD	Sep 28 2015	100	100
E102488	CM_SPD	Nov 04 2015	100	100
E210369	EV_AQ1	Mar 11 2015	100	100
E210369	EV_AQ1	May 05 2015	100	100
E210369	EV_AQ1	Sep 28 2015	97	-
E102685	EV_BC1	Mar 11 2015	100	100
E102685	EV_BC1	May 06 2015	100	100
E102685	EV_BC1	Jul 22 2015	100	-
E102685	EV_BC1	Oct 06 2015	100	100
E298590	EV_DC1	Feb 03 2015	100	100
E298590	EV_DC1	May 05 2015	100	100
E298590	EV_DC1	Jul 22 2015	100	-
E298590	EV_DC1	Oct 06 2015	100	100
0200097	EV_EC1	Feb 04 2015	100	100
0200097	EV_EC1	May 05 2015	100	100
0200097	EV_EC1	Jul 22 2015	100	-
0200097	EV_EC1	Oct 06 2015	100	100
E208043	EV_GC2	Feb 03 2015	100	100
E208043	EV_GC2	May 05 2015	100	100
E208043	EV_GC2	Jul 07 2015	100	100
E208043	EV_GC2	Oct 06 2015	100	100
E206231	EV_GT1	Feb 18 2015	100	90
E206231	EV_GT1	May 05 2015	100	100
E206231	EV_GT1	Jul 22 2015	100	-
E206231	EV_GT1	Oct 06 2015	100	100
E102682	EV_HC1	Feb 03 2015	97	100
E258135	EV_LC1	Feb 03 2015	100	100
E258135	EV_LC1	Feb 03 2015	100	100
E258135	EV_LC1	May 05 2015	100	100

### Summary of Acute Toxicity Test Results Associated with the Surface Water Monitoring Program

EMS ID	Site ID	Date	Acute Toxicity Tests - Percent Survival	
			<i>Daphnia magna</i>	Rainbow Trout ( <i>Oncorhynchus mykiss</i> )
E258135	EV_LC1	May 05 2015	100	100
E258135	EV_LC1	Jul 22 2015	100	-
E258135	EV_LC1	Jul 22 2015	100	-
E258135	EV_LC1	Oct 06 2015	100	100
E258135	EV_LC1	Oct 06 2015	100	100
E300091	EV_MC2	Feb 04 2015	100	100
E208057	EV_MG1	Mar 04 2015	100	100
E208057	EV_MG1	May 05 2015	100	100
E208057	EV_MG1	Jul 22 2015	100	-
E208057	EV_MG1	Oct 06 2015	100	100
E102679	EV_OC1	Feb 03 2015	100	100
E102679	EV_OC1	May 05 2015	100	100
E102679	EV_OC1	Jul 07 2015	100	100
E102679	EV_OC1	Oct 06 2015	100	100
E102681	EV_SM1	Feb 03 2015	100	100
E102681	EV_SM1	May 05 2015	100	100
E102681	EV_SM1	Jul 22 2015	100	-
E102681	EV_SM1	Oct 06 2015	100	100
E296311	EV_SP1	Feb 04 2015	67	100
E296311	EV_SP1	May 05 2015	100	100
E296311	EV_SP1	Jul 22 2015	100	-
E296311	EV_SP1	Oct 06 2015	100	100
E102481	FR_CC1	May 11 2015	100	100
E102481	FR_CC1	May 22 2015	97	100
E102481	FR_CC1	May 22 2015	97	100
E102481	FR_CC1	Jul 06 2015	100	100
E102481	FR_CC1	Oct 06 2015	100	100
E102480	FR_EC1	Jan 27 2015	100	100
E102480	FR_EC1	May 11 2015	100	100
E102480	FR_EC1	Sep 08 2015	100	100
E102480	FR_EC1	Sep 24 2015	100	100
E102480	FR_EC1	Oct 07 2015	100	100
E208394	FR_SKP1	May 11 2015	100	100
E208394	FR_SKP1	Aug 11 2015	100	100
E208395	FR_SKP2	Jun 02 2015	100	100
E261897	FR_SP1	Jan 12 2015	100	100
E261897	FR_SP1	Mar 11 2015	100	-
E261897	FR_SP1	May 11 2015	100	100



## Summary of Acute Toxicity Test Results Associated with the Surface Water Monitoring Program

EMS ID	Site ID	Date	Acute Toxicity Tests - Percent Survival	
			<i>Daphnia magna</i>	Rainbow Trout ( <i>Oncorhynchus mykiss</i> )
E261897	FR_SP1	Jul 22 2015	100	100
E261897	FR_SP1	Oct 06 2015	100	100
0200384	GH_CC1	Mar 02 2015	83	100
0200384	GH_CC1	Jun 01 2015	<b>10</b>	100
0200384	GH_CC1	Jul 27 2015	<b>30</b>	100
0200384	GH_CC1	Dec 07 2015	<b>23</b>	90
E287432	GH_COUGAR	Jun 02 2015	100	100
E300090	GH_ERC	Jun 02 2015	100	100
E300090	GH_ERC	Jul 28 2015	100	100
0200378	GH_FR1	Jun 02 2015	100	100
0200378	GH_FR1	Jul 28 2015	100	100
E102709	GH_GH1	Mar 02 2015	100	100
E102709	GH_GH1	Jul 27 2015	100	100
E102709	GH_GH1	Nov 02 2015	100	100
E257796	GH_LC1	Sep 14 2015	100	100
0200388	GH_MC1	Mar 03 2015	100	100
0200388	GH_MC1	Jun 02 2015	100	100
0200385	GH_PC1	Mar 02 2015	100	100
0200385	GH_PC1	Jun 01 2015	100	100
0200385	GH_PC1	Jul 27 2015	100	100
0200385	GH_PC1	Nov 02 2015	100	100
E105061	GH_SC2	Jun 01 2015	100	100
E105061	GH_SC2	Nov 02 2015	<b>0</b>	100
E102714	GH_TC1	Mar 03 2015	100	100
E102714	GH_TC1	Jun 02 2015	100	100
E102714	GH_TC1	Jul 28 2015	100	100
E102714	GH_TC1	Nov 03 2015	100	100
E207436	GH_TC2	Mar 03 2015	100	100
E207436	GH_TC2	Jun 02 2015	100	100
E207436	GH_TC2	Jul 28 2015	100	100
E207436	GH_TC2	Nov 03 2015	100	100
E287433	GH_WADE	Mar 03 2015	<b>27</b>	100
E287433	GH_WADE	Mar 11 2015	100	-
E287433	GH_WADE	Jun 02 2015	93	100
E287433	GH_WADE	Nov 03 2015	100	100
E257795	GH_WC1	Dec 07 2015	100	100
E216144	LC_LC7	Feb 02 2015	100	100
E216144	LC_LC7	Jun 23 2015	83	100

**Summary of Acute Toxicity Test Results Associated with the Surface Water Monitoring Program**

EMS ID	Site ID	Date	Acute Toxicity Tests - Percent Survival	
			<i>Daphnia magna</i>	Rainbow Trout ( <i>Oncorhynchus mykiss</i> )
E216144	LC_LC7	11-Aug-15	100	100
E216144	LC_LC7	2-Nov-15	100	100

- Note:
1. Grey shaded cells with bold font indicated failed tests.
  2. Blue shaded cells represent uncertain results as mortality was not confirmed via a dissecting microscope.

## **Appendix H – Maps**

Map 1: Fording River Operations Surface Water Sampling Sites

Map 2: Greenhills Operations Surface Water Sampling Sites

Map 3: Line Creek Operations Surface Water Sampling Sites

Map 4: Elkview Operations Surface Water Sampling Sites

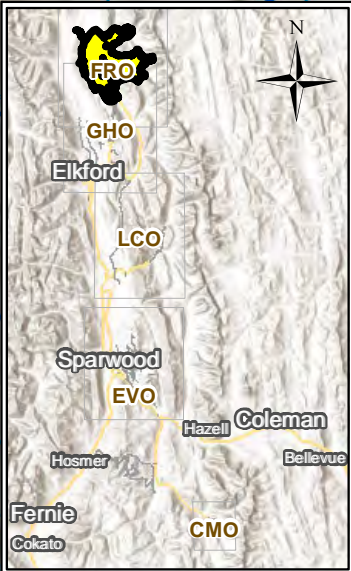
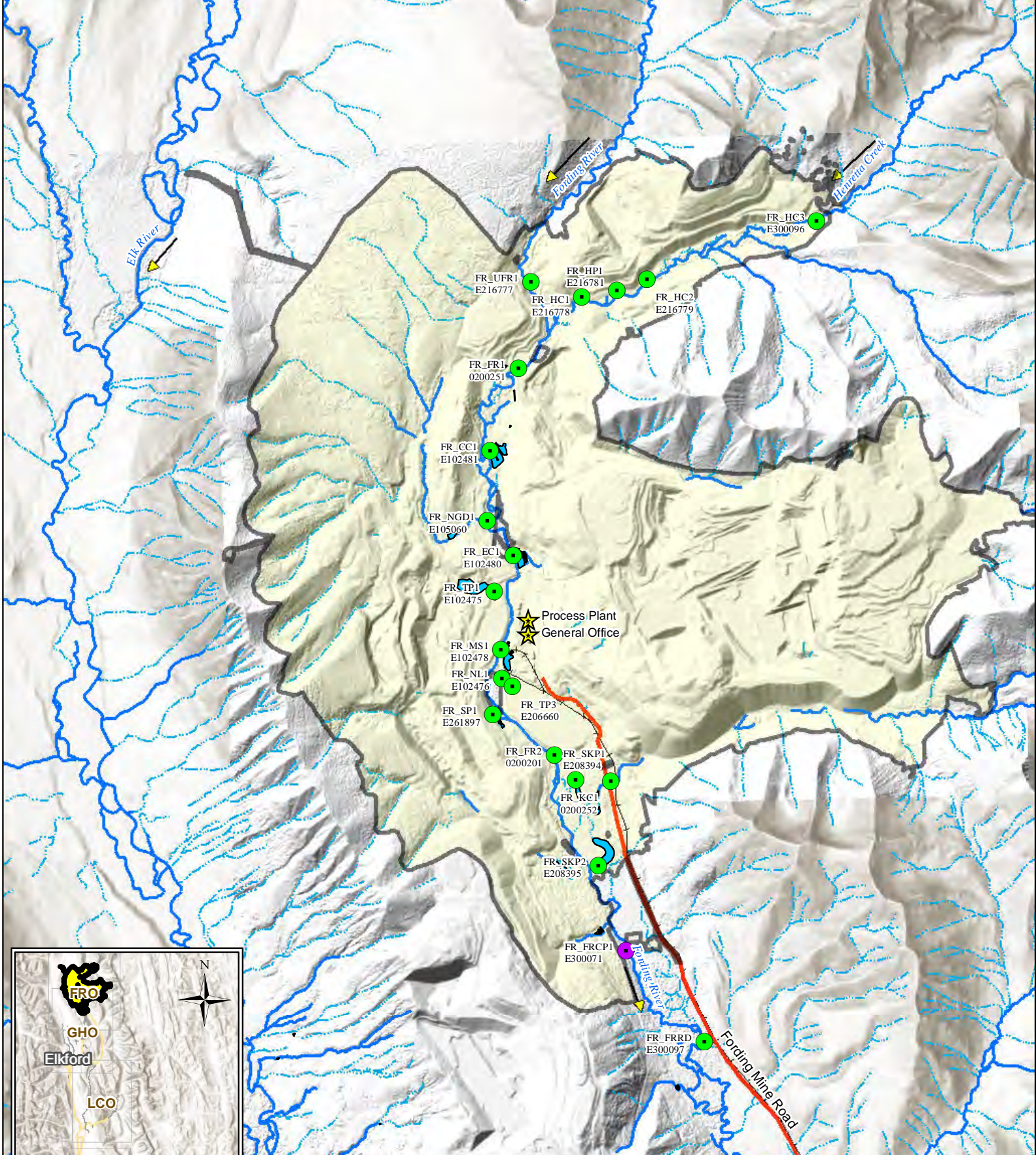
Map 5: Coal Mountain Operations Surface Water Sampling Sites

Map 6: Lake Koochanusa Surface Water Sampling Sites

Map 7: Compliance Points Surface Water Sampling Sites

Map 8: Order Stations Surface Water Sampling Sites





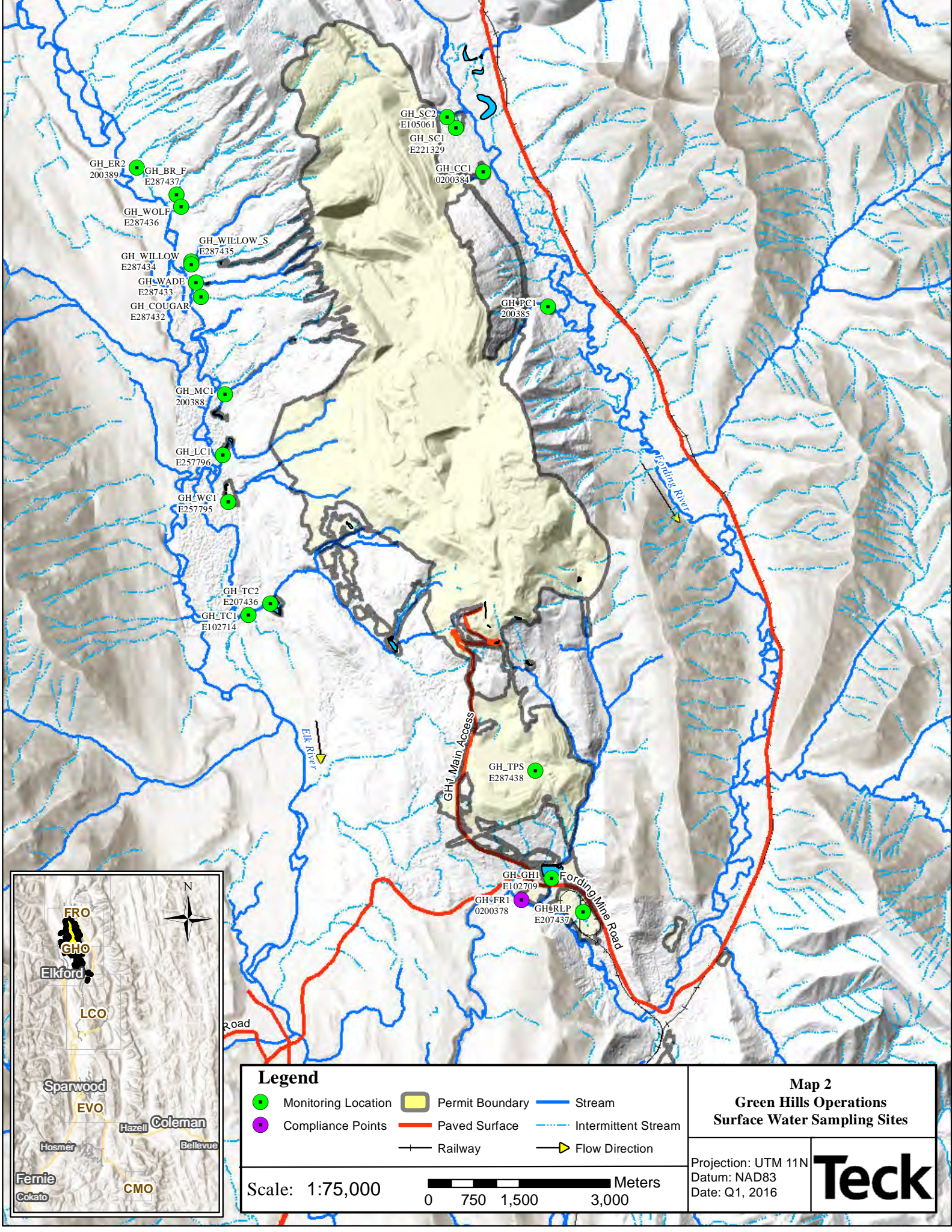
Legend		
	Monitoring Location	
	Compliance Point	
	Paved Surface	
	Railway	
		Stream
		Intermittent Stream
		Flow Direction

**Map 1.**  
**Fording River Operations**  
**-Surface Water Sampling Sites**

Scale: 1:70,000 Meters

Projection: UTM 11N  
 Datum: NAD83  
 Date: Q1, 2016





GH\_ER2  
200389

GH\_BR\_F  
E287437

GH\_WOLF  
E287436

GH\_WILLOW\_S  
E287435

GH\_WILLOW  
E287434

GH\_WADE  
E287433

GH\_COUGAR  
E287432

GH\_MCI  
200388

GH\_LCI  
E257796

GH\_WCI  
E257795

GH\_TC2  
E207436

GH\_TCI  
E102714

GH\_SC2  
E105061

GH\_SC1  
E221329

GH\_CC1  
0200384

GH\_PC1  
200385

GH\_TPS  
E287438

GH\_GH1  
E102709

GH\_FR1  
0200378

GH\_RLP  
E207437



Legend			
	Monitoring Location		Permit Boundary
	Compliance Points		Paved Surface
	Stream		Railway
	Intermittent Stream		Flow Direction

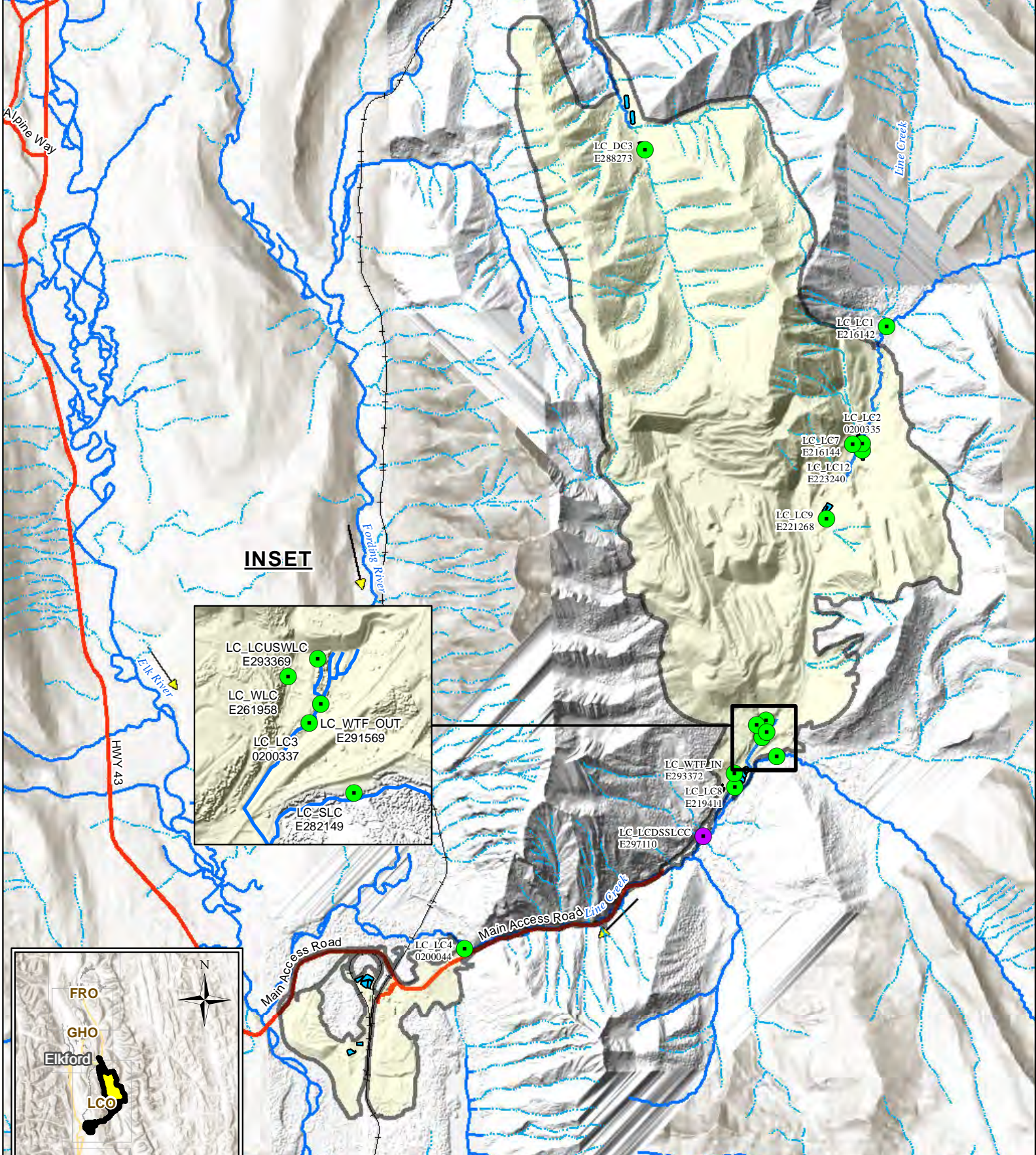
**Map 2**  
**Green Hills Operations**  
**Surface Water Sampling Sites**

Projection: UTM 11N  
 Datum: NAD83  
 Date: Q1, 2016

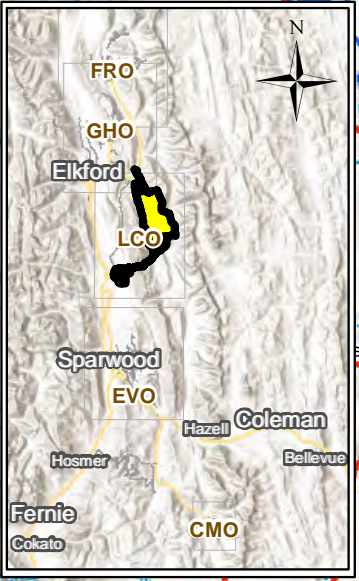
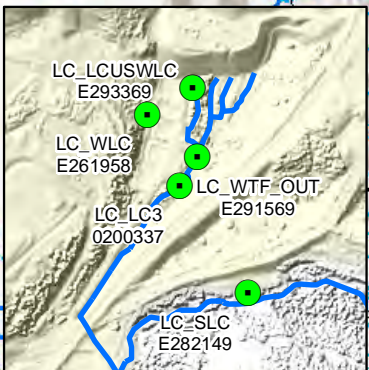


Scale: 1:75,000 Meters





**INSET**



Legend		
<span style="color: green;">●</span>	Monitoring Location	<span style="border: 1px solid black; background-color: yellow; width: 20px; height: 10px; display: inline-block;"></span> Permit Boundary
<span style="color: purple;">●</span>	Compliance Point	<span style="border-bottom: 2px solid red; width: 20px; display: inline-block;"></span> Paved Surface
<span style="color: blue;">—</span>	Stream	<span style="border-bottom: 1px dashed blue; width: 20px; display: inline-block;"></span> Intermittent Stream
<span style="border-bottom: 1px solid black; width: 20px; display: inline-block;"></span>	Railway	

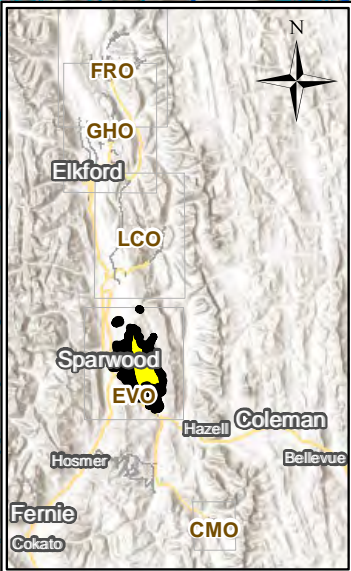
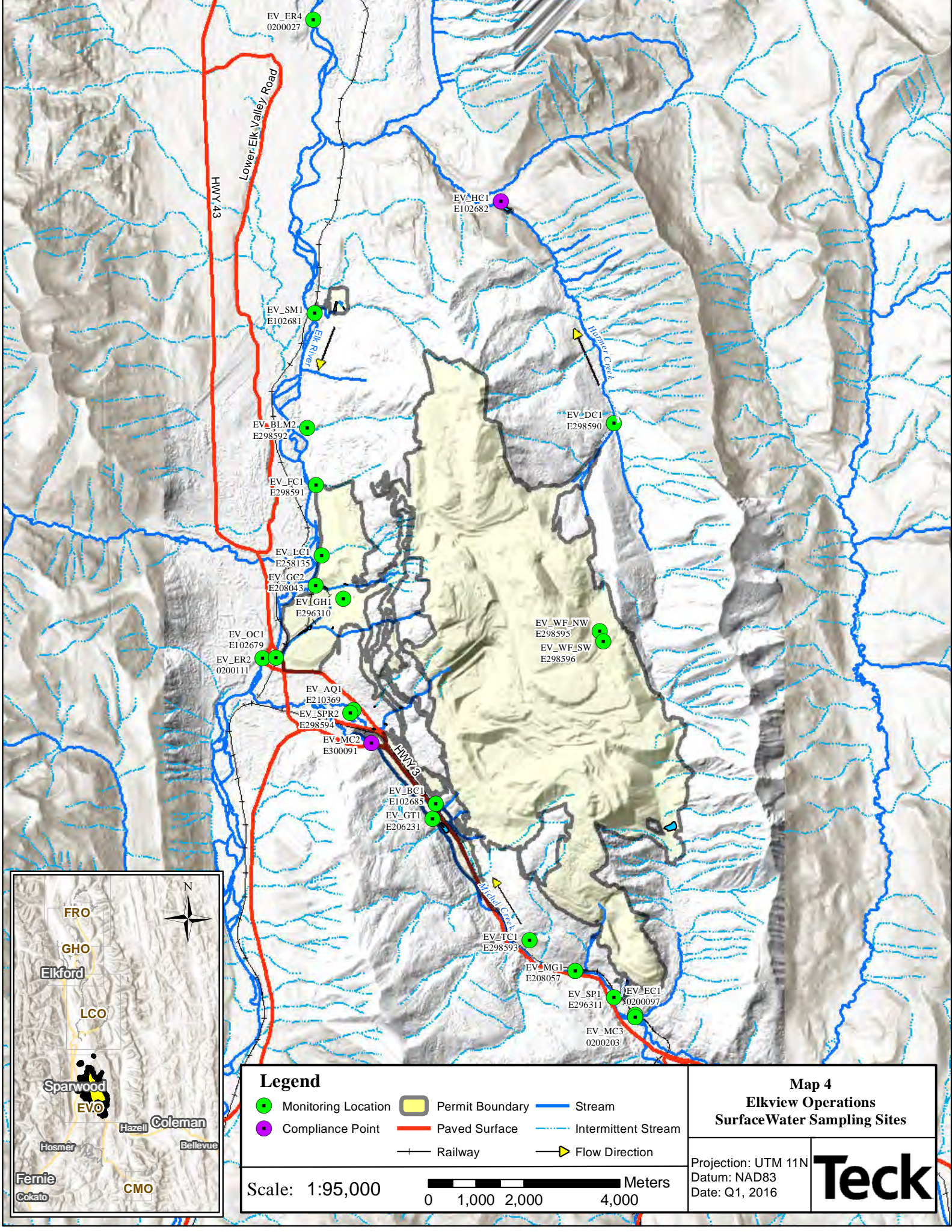
**Map 3**  
**Line Creek Operations**  
 Surface Water Sampling Sites

Scale: 1:75,000 
0
750
1,500
3,000
 Meters

Projection: UTM 11N  
 Datum: NAD83  
 Date: Q1, 2016







Legend		
<span style="color: green;">●</span> Monitoring Location	<span style="background-color: yellow; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Permit Boundary	<span style="color: blue;">—</span> Stream
<span style="color: purple;">●</span> Compliance Point	<span style="border-bottom: 2px solid red; width: 20px; display: inline-block;"></span> Paved Surface	<span style="color: blue; border-bottom: 1px dashed blue; width: 20px; display: inline-block;"></span> Intermittent Stream
<span style="border-bottom: 1px solid black; width: 20px; display: inline-block;"></span> Railway	<span style="color: yellow;">▶</span> Flow Direction	

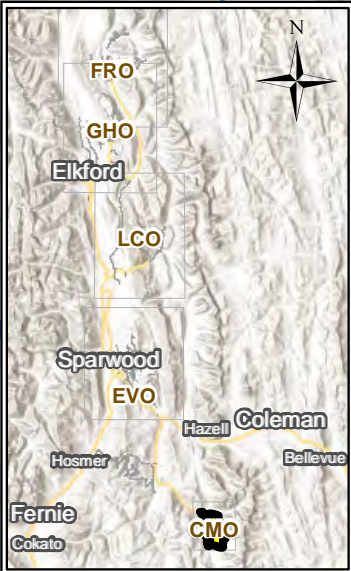
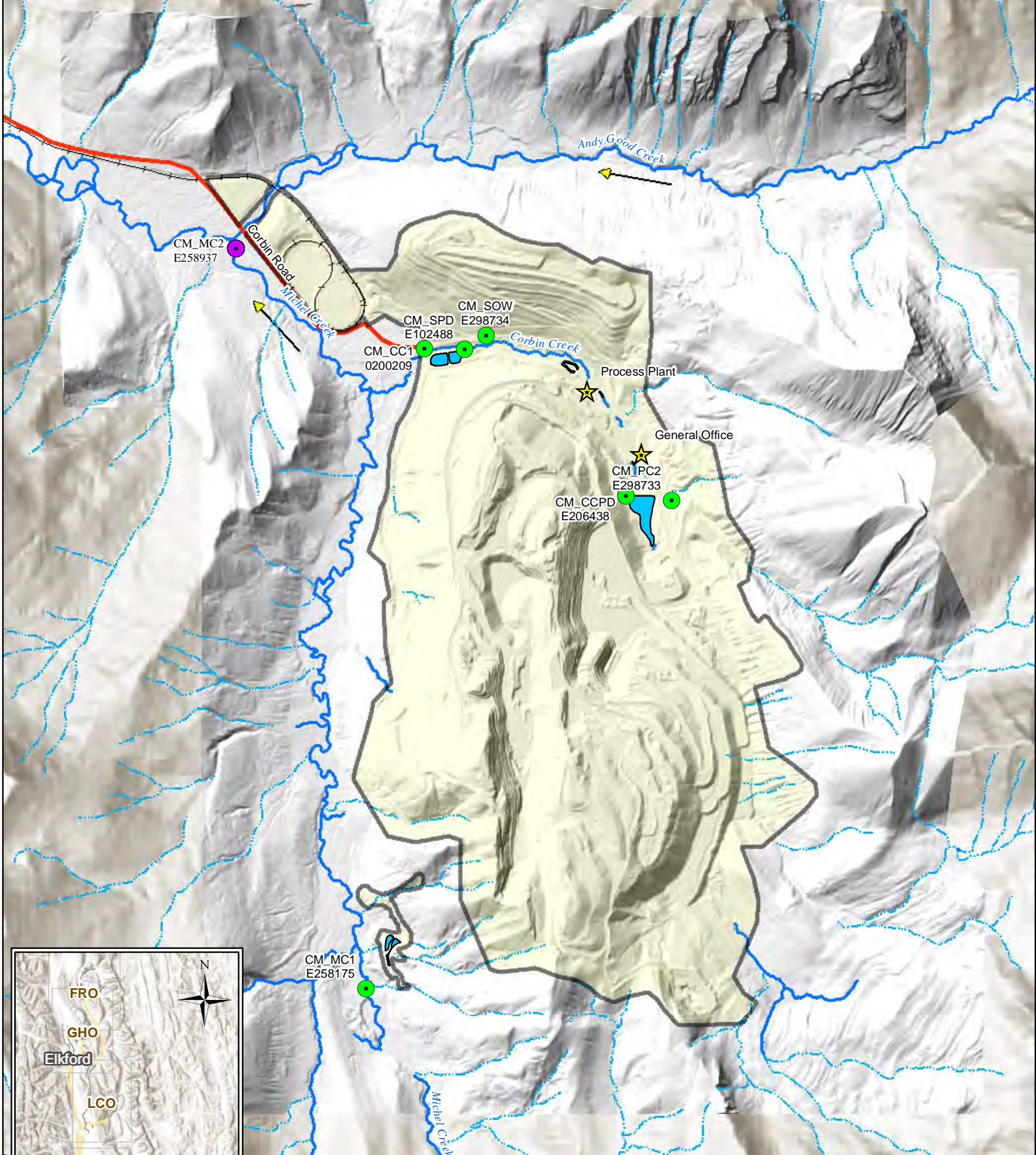
**Map 4**  
**Elkview Operations**  
**Surface Water Sampling Sites**

Projection: UTM 11N  
 Datum: NAD83  
 Date: Q1, 2016

Scale: 1:95,000

Meters



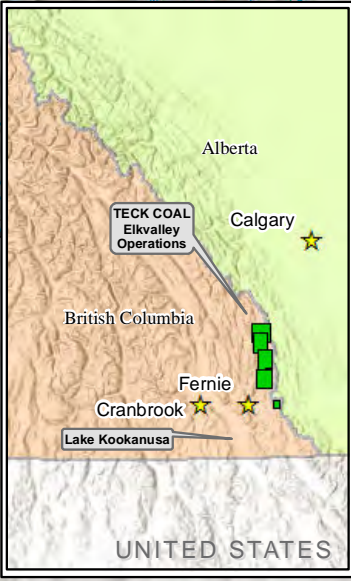
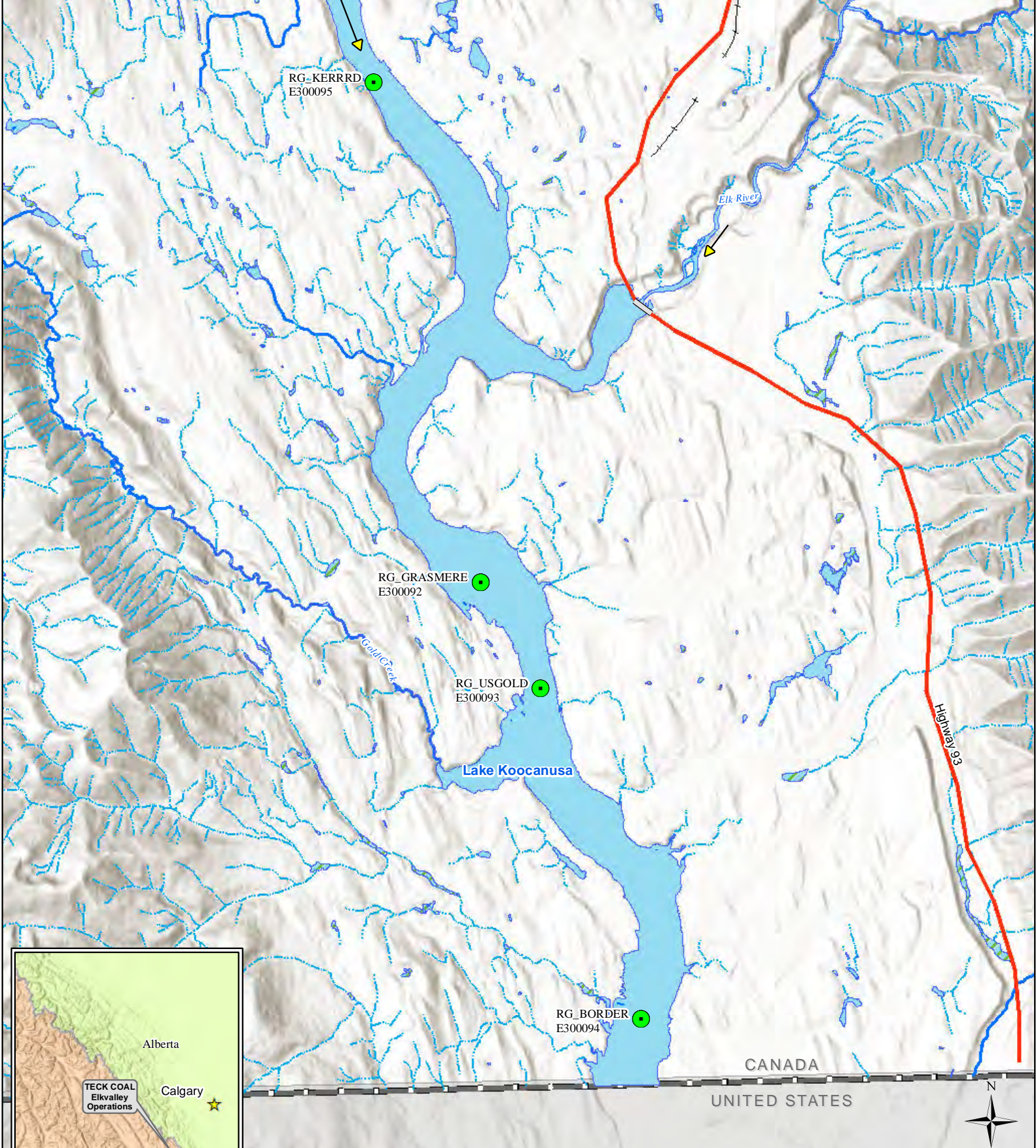


Legend		
	Monitoring Location	
	Compliance Point	
	Stream	
	Intermittent Stream	
	Railway	

Scale: 1:35,000 Meters

<b>Map 5</b> <b>Coal Mountain Operations</b> <b>Surface Water Sampling Sites</b>	
Projection: UTM 11N Datum: NAD83 Date: Q1, 2016	<b>Teck</b>

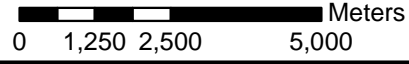




**Legend**

- Monitoring Location
- Paved Surface
- Stream
- Railway
- - - Intermittent Stream
- Flow Direction

Scale: 1:125,000

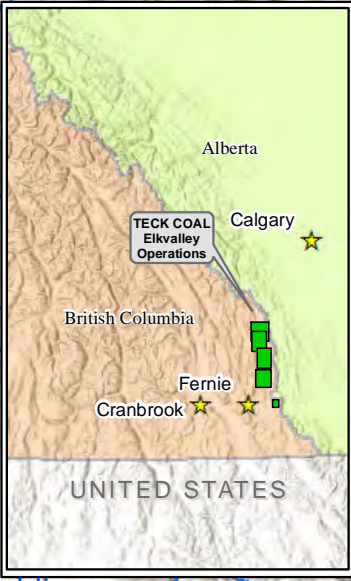
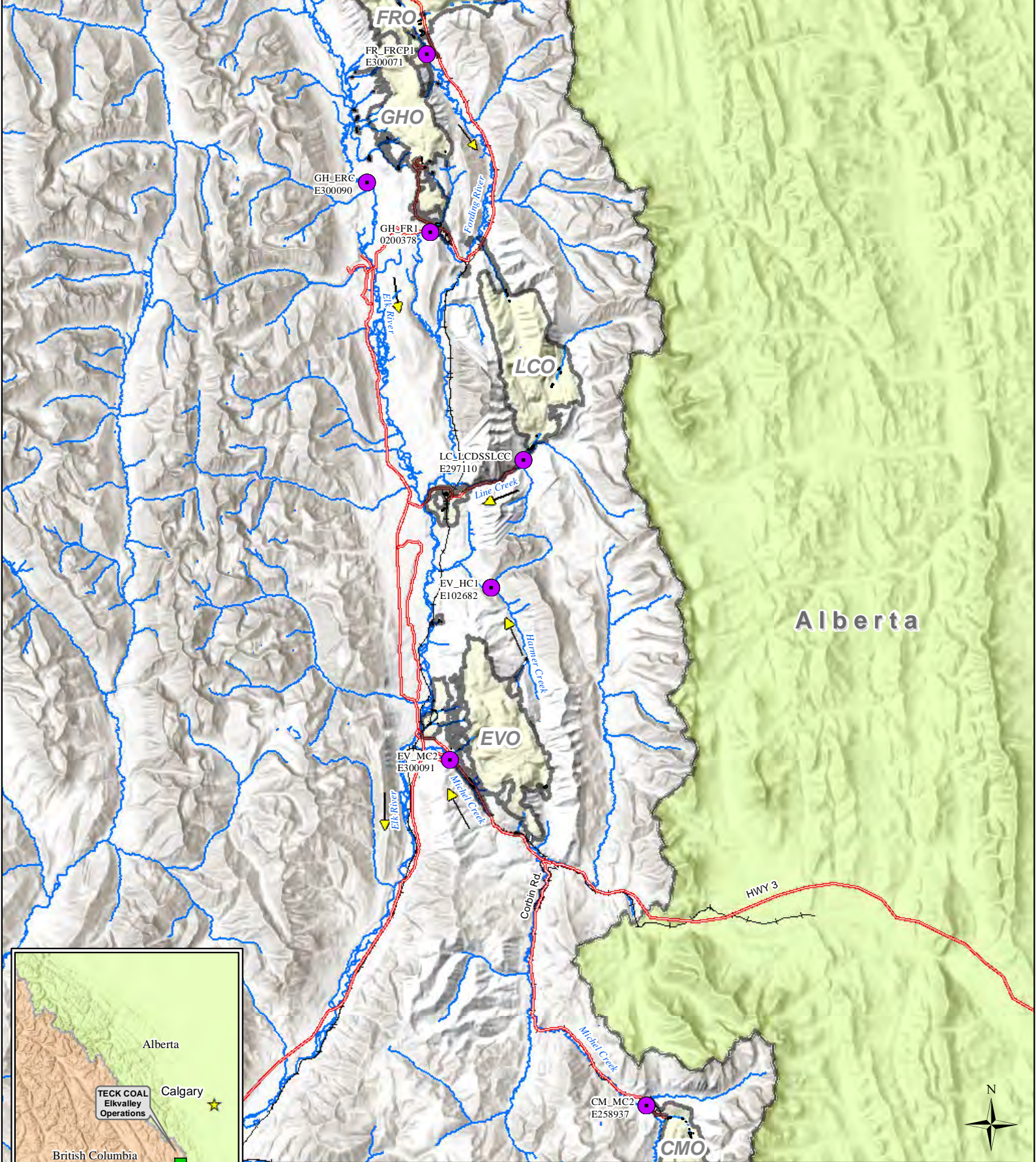


**Map 6**  
**Lake Koochanusa**  
**Surface Water Sampling Sites**

Projection: UTM 11N  
 Datum: NAD83  
 Date: Q1, 2016







**Legend**

- Monitoring Location
- Permit Boundary
- Stream
- Paved Surface
- ▶ Flow Direction
- Railway

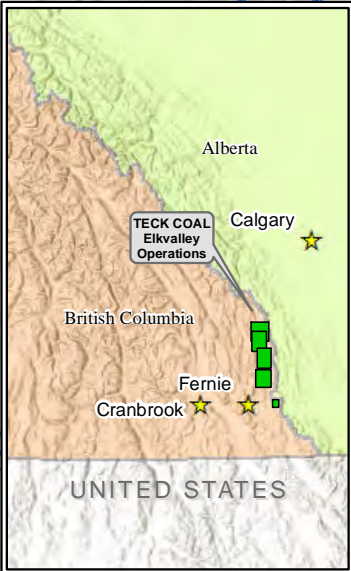
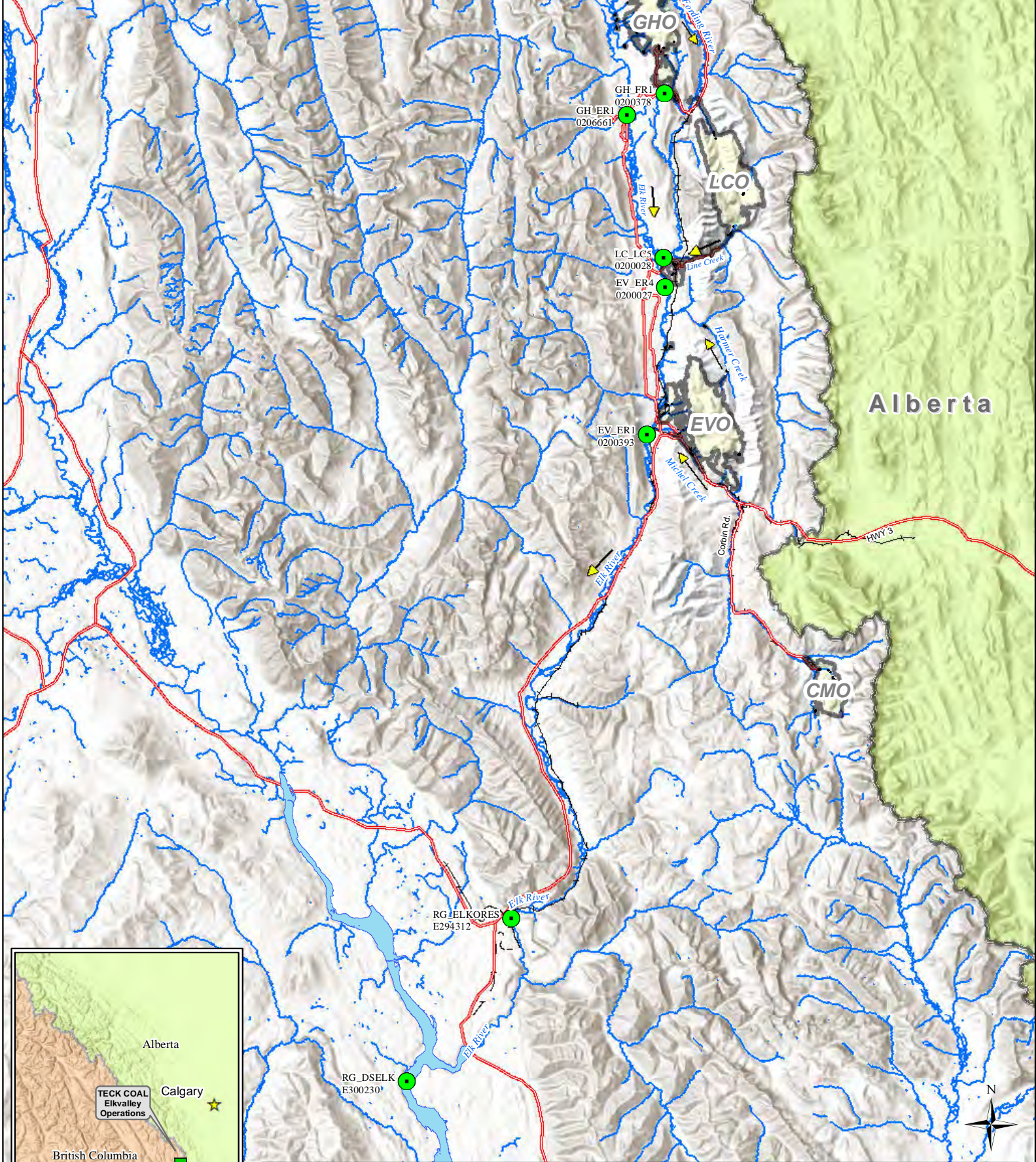
Scale: 1:325,000

Meters  
 0    3,250    6,500    13,000

**Map 7**  
Compliance Points  
Surface Water Sampling Sites

Projection: UTM 11N  
Datum: NAD83  
Date: Q1, 2016





**Legend**

- Monitoring Location
- Permit Boundary
- Stream
- Paved Surface
- ▶ Flow Direction
- Railway

Scale: 1:500,000

Meters  
 0    5,000    10,000    20,000

**Map 8**  
Order Stations  
Surface Water Sampling Sites

Projection: UTM 11N  
Datum: NAD83  
Date: Q1, 2016