2014 Clinton Creek Surface Water Quality and Hydrological Monitoring Program Report

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1.0 INTRODUCTION

Hemmera and Ecological Logistics & Research Ltd. (Hemmera/ELR) were retained by the Yukon Government (YG), Assessment and Abandoned Mines (AAM) to conduct a water quality and hydrological monitoring program at the Clinton Creek Mine site in September 2014.

The Clinton Creek Mine Site (herein referred to as the Site) is an abandoned asbestos mine, formerly owned and operated by Cassiar Asbestos Corporation Limited from 1967 to 1978. Mining activities ceased in 1978 when the economic-value of the asbestos operations were exhausted (YG 2013). During operation, approximately 16 million tons of serpentinite rock containing 940,000 tonnes of white asbestos (known as chrysotile) were removed from three pits at the mine site. From 1978 to 1992, the company attempted to implement an abandonment plan and completed limited remedial activities at the Site. Since then, various weather events have destabilized creek channels and caused erosion on Site which has increased the potential for flooding. In 2002, the federal government implemented a stabilizing program at the Site under emergency provisions of the Yukon *Waters Act* (YG 2007) to mitigate further impacts. Upon devolution in 2003, AAM assumed responsibility and control of the care, maintenance and closure of the Site.

The purpose of this 2014 fall sampling program was to monitor the current status of water quality at the Site as part of the overall care, maintenance and closure program objectives for the Site.

1.1 SITE LOCATION AND HYDROLOGICAL SETTING

The Site is located approximately 75 kilometres (km) northwest of Dawson City (100 km by road), in the traditional territory of the Tr'ondëk Hwëch'in First Nation (**Figure 1.1**). The Site is within the Klondike Plateau Ecoregion of the Boreal Cordillera Ecozone (Smith et al. 1994), near the northern extent of the Klondike Plateau, at the edge of the Tintina Trench.

The Site falls within the drainage of the Forty Mile River, a tributary to the Yukon River. Clinton Creek flows through the Site from the west then continues southeast for approximately 8 km before flowing into the Forty Mile River. Tailings slumping into the valley have dammed Clinton Creek, forming Hudgeon Lake (**Figure 1.2**). The four tributaries of Clinton Creek at or near the Site are as follows:

- Easter Creek which flows into Hudgeon Lake;
- Porcupine Creek and Wolverine Creek which flow through the Site to Clinton Creek from the south and north, respectively; and,
- Eagle Creek which flows into Clinton Creek from the north, downstream from the Site.

Slumping tailings have interrupted the flow of Wolverine Creek creating two ponds (**Figure 1.2**). Past mining activities have also formed two pit lakes: Porcupine Pit Lake and Snowshoe Pit Lake.

1.2 2014 MONITORING PROGRAM SCOPE

In accordance with the documented *Scope of Work: Clinton Creek Surface Water Quality and Hydrology Monitoring (September 2014)* provided to ELR by AAM, the 2014 monitoring program focused on recording current water quality and hydrological conditions at the Site during the fall of 2014. The scope of work included:

- Conducting surface water quality sampling at 18 designated sample sites and establishment of a new reference site. Field parameters and samples for laboratory analysis were collected at each sample site;
- Measuring stream discharge at sample sites where flowing water was present.
- Shipping samples to an accredited laboratory for analysis according to requirements established by AAM;
- Summarizing data from the field and laboratory program; and,
- Preparing a report that outlines the sampling program and presents the raw data.

This report summarizes the monitoring activities and the methods used to complete the field program, describes sample sites, summarizes data, including the quality assurance/quality control (QA/QC) program, and provides a summary of the overall success of the program.



1.3 2014 PROGRAM SAMPLE SITES

A total of 18 sites were sampled during the sampling program, including six (6) reference surface water sites, seven (7) exposed surface water sites, and five (5) exposed groundwater seepage sites. Reference sites were located on watercourses upstream from the Site that were not considered to be influenced by Site infrastructure or activities. Exposed sites included watercourses and water bodies under the influence of Site infrastructure (e.g. waste rock or tailings), and sites downstream of the Site that were considered to be part of the receiving environment.

Due to on-Site safety concerns, sampling was not conducted in 2014 at the Porcupine Pit Lake (PL) site. Access to this site follows a roadway which begins in high ground on the northeast portion of the Site and descends along the southeast edge of the pit towards the sample site. There was evidence of numerous rock falls along the length of the roadway, including one directly at the sample site. No other access route was identified that would provide safe access. Photos of the Porcupine Pit Lake taken during the site assessment are provided in **Appendix 1**.

Also, due to safety concerns, the location of exposure Site E1 (Clinton Creek downstream of gabions) was moved approximately 400 metres (m) downstream of its original location. The original location of Site E1, provided in the Scope of Work, was upstream of the primary ford, which was in a hazardous area according to the document *Clinton Creek – Site Hazards* (AAM, 2014) provided to Hemmera/ELR by AAM. Following a discussion with and approval from AAM staff, the sample location was moved downstream of the primary ford crossing (**Figure 1.2**).

In addition to five (5) previously established reference sites in the program, Hemmera/ELR also established a new reference site on Porcupine Creek up-gradient of the Site. The new reference site was recommended in the 2013 sampling program report to assess the potential influence of the mining area on Clinton Creek, in particular in the area of numerous seeps (GWCC 1 through 5).

A summary of the sample sites including field-verified UTM locations, a description of the sites, and a summary of the sampling conducted at each sampling site is provided in **Table 1.1** below. The locations of sample sites are shown in **Figures 1.2** and **1.3**.

Site	Water	Site	Sampling	Site Description	Location (UTM, Zone 7N)				
Туре	Туре	Code	Conducted	Sile Description	Easting	Northing			
		R1	Water Quality, Hydrology	Clinton Creek upstream of Hudgeon Lake	510718	7147525			
		R2	Water Quality, Hydrology	Easter Creek upstream of Hudgeon Lake	512023	7148061			
ence		R3	Water Quality, Hydrology	Wolverine Creek, upstream of tailings	513952	7148677			
Refer		R4	Water Quality, Hydrology	Eagle Creek, upstream of culvert	515981	7145344			
		R6	Water Quality	Forty Mile River, upstream of Clinton Creek	519437	7141958			
	_	R7	Water Quality, Hydrology	Porcupine Creek, upstream of waste rock	513026	7145669			
	Vate	PL	Not Sampled	Porcupine Pit Lake from shore	-	-			
	N es	SL	Water Quality	Snowshoe Pit Lake from shore	513824	7146703			
	Surfa	E1	Water Quality, Hydrology	Clinton Creek downstream of gabions	513645	7147111			
		E2	Water Quality, Hydrology	Clinton Creek, downstream of Porcupine Creek but upstream of Wolverine Creek	514149	7147076			
		E3	Water Quality, Hydrology	Wolverine Creek, upstream of culvert	514178	7147189			
		E4	Water Quality, Hydrology	Clinton Creek downstream of Wolverine Creek but upstream of Eagle Creek	515950	7145287			
sed		E7	Water Quality, Hydrology	Clinton Creek near mouth	519400	7142042			
Expos		E8	Water Quality	Forty Mile River downstream of Clinton Creek	519457	7142788			
		GWCC-1	Water Quality	Toe of the Waste Rock dump flowing into ponded area at Porcupine Creek	513902	7146960			
	r Seep	GWCC-2	Water Quality	Toe of the Waste Rock dump flowing into ponded area approx. 10 m northwest of GWCC-1	513899	7146968			
	undwate	GWCC-3	Water Quality	Toe of the Waste Rock dump flowing into side channel, approx. 10 m northwest of GWCC-2	513882	7147038			
	Gro	GWCC-4	Water Quality	Toe of the Waste Rock dump flowing into side channel, approx. 10 m northwest of GWCC-3	513868	7147052			
		GWCC-5	Water Quality, Hydrology	Groundwater flows in old Clinton Creek channel	513984	7147127			

Table 1.1 Sample Site Descriptions and Locations



2014 Clinton Creek Surface Water Quality and Hydrological Monitoring Program





2014 Clinton Creek Surface Water Quality and Hydrological Monitoring Program)el 🖸 HEMMERA Client Yukon y, Mines and R sment and Aba <u>Legend</u> Sampling Conducted Water Quality Water Quality & Hydrology Water Type Surface Water Ground Water Seepage Site Type Exposed Reference Ν 200 400 800 Meters FIGURE 1.3 Sampling Locations Forty Mile River Area Date: Dec. 15, 2014 Scale: 1:18,000 Rev. #: 2 ELR Project #: 14-183 Hemmera Project #: 1343-005.04

2.0 METHODS

Two Hemmera/ELR staff (Andrew Brown and Aaron Nicholson) completed the surface water quality and hydrological field program from September 19 to 23, 2014. Specific methods used in sampling are summarized in the following sections.

2.1 SURFACE WATER QUALITY SAMPLING

2.1.1 Field Data Collection

Surface water quality sampling was conducted in accordance with *Standard Methods for the Examination of Water and Wastewater* (Rice et al., 2012). Field *in-situ* water quality parameters were measured and laboratory analytical samples were collected at each sample site, as described below.

Upon arriving at each sample site, the following field *in-situ* water quality data were collected and recorded using a YSI Professional Plus Water Quality Meter:

- Water temperature (°C);
- pH (pH units);
- Conductivity and Specific Conductivity (µs/cm); and,
- Dissolved oxygen (mg/L and percent saturation).

Following the collection of field *in-situ* parameters at each site, samples for laboratory analysis were collected. Samples were collected directly into laboratory-supplied containers, and were field filtered and/or preserved according to laboratory instructions. The laboratory analytical bottle set for the 2014 monitoring program included seven bottles for each site, as detailed in **Table 2.1** (using Site R1 as an example), below. Nitric acid (HNO₃) was used as a preservative for metals (dissolved and total), hydrochloric acid (HCI) was used to preserve samples for ultra-trace mercury testing, and sulphuric acid (H₂SO₄) was used as a preservative for certain nutrient parameters and dissolved organic carbon (DOC).

Site Name (Example)	Bottle Number	Bottle Size	Bottle Type	Parameter Analyzed	Sample Treatment	Preservative Added		
R1	1 of 7	125 ml	Plastic	Low Level Dissolved Metals and Hardness	Field Filtered and Preserved	HNO3		
R1	2 of 7	125 ml	Plastic	Low Level Total Metals and Hardness	Preserved	HNO ₃		
R1	3 of 7	40 ml	Glass	Dissolved Mercury	Preserved	HCI		
R1	4 of 7	40 ml	Glass	Total Mercury	Preserved	HCI		
R1	5 of 7	250 ml	Glass	Nitrate, Nitrite, Ammonia-N and Total Phosphorous	Preserved	H_2SO_4		
R1	6 of 7	1L	Plastic	Total Suspended Solids (TSS), Sulphate	-	None		
R1	7 of 7	125 ml	Glass	Dissolved Organic Carbon (DOC)	Field Filtered and Preserved	H_2SO_4		

Table 2.1 Analytical Sampling Bottle Set Summary

At each sampling site, UTM coordinates were recorded using a Garmin Map 62s handheld GPS. The general condition and description of each site was recorded, including any identifiable features or conditions that may have influenced water quality results. Photos were taken at each site reference purposes and to record sampling conditions. Photos were taken facing upstream, facing downstream, and facing across the sample site at each location.

2.1.2 Sample Care and Shipping

Samples were placed into coolers immediately following water collection and were kept cool with ice. Samples were either transported by Hemmera/ELR or shipped via Air North under chain of custody and using custody seals to ALS Global laboratories in Whitehorse, Yukon for analysis.

2.1.3 Laboratory Analysis

All surface water quality samples collected during the program were received by the analytical laboratory within 72 hours of sampling, and all primary analyses were conducted within laboratory hold time limits.

Laboratory analyses for the surface water quality monitoring program employed a variety of laboratory methods to determine the various water quality parameters required under this monitoring program. Specific methods were selected to ensure that reportable detection limits (RDL) were less than the Canadian Council of Ministers on the Environment (CCME) *Water Quality Guidelines for Protection of Aquatic Life* (CCME-PAL), where applicable (CCME 2014).

2.1.4 QA/QC Program for Laboratory Analytical Sampling

QA/QC methods were employed during the surface water quality monitoring program to confirm the precision of program with respect to sample contamination, sampling error or laboratory error.

2.1.4.1 Duplicate and Blank Samples

As prescribed in the SOW, two blind duplicate samples, one field blank sample, and one travel blank sample were included in the program.

Blind duplicate samples were collected in the field at Sites E1 and GWCC-3. The results of these duplicates were compared with the results for corresponding sample sites to determine whether errors in laboratory analysis may have occurred or whether field or laboratory contamination may have been present.

One field blank was prepared at Site GWCC-3, which involved filling a program bottle set with deionized water. All handling, filtering, and preserving was conducted in the same manner as the sampling sites. The field blank was collected for the purpose of detecting contamination during the field sampling process.

One travel blank was prepared at the laboratory using deionized water. The travel blank was stored, handled, and transported in the same manner as the field samples in order to assess whether any contamination may have occurred during the transport or storage of samples.

Duplicate samples were compared with corresponding test samples to determine whether results varied significantly, thereby indicating potential contamination or errors in the field program. This analysis used the calculation of relative percent difference (RPD), where an RPD value exceeding 20% is considered to indicate significant differences between corresponding samples.

RPD is calculated according to the following formula:

$$RPD = \frac{Result 1 - Result 2}{[(Result 1 + Result 2)/2]} \times 100\%$$

2.1.4.2 Field Sampling QA/QC

Hemmera/ELR employed the following methods during field sampling to help ensure the integrity of data:

- Samplers used new nitrile gloves at each sampling site;
- All sample bottle sets were pre-labeled prior to sampling with location, analyte, and sample preservation method information. Field site data was confirmed in the field and date/time was recorded on bottle labels at the time of sampling;

- Detailed field data sheets and checklists were used to track sample collection at each sample site;
- Disposable 60 mm syringes and disposable 40 µm luer-lock filters were used for field filtering of samples. New syringes and filters (from individually sealed packages) were used at each sample site;
- Samples were preserved immediately upon collection, where required by the laboratory;
- Samples were kept cool with ice during transportation to the laboratory; and
- The field water quality multimeter was calibrated prior to field sampling, and checked against established standards to ensure correct operation.

2.2 STREAM HYDROLOGICAL MONITORING

2.2.1 Field Data Collection

Hemmera/ELR used a velocity-area method to measure discharge at surface water bodies during the monitoring program. Total discharge was calculated using the area and velocity from a series of point measurements taken across the stream at each location.

During the monitoring program, Hemmera/ELR chose hydrological monitoring locations at each sample site that were well suited to flow and velocity measurements (i.e., a straight channel with relatively flat stream bed and little vegetation or rocks, and few back-eddies that could hinder flow meter measurements). At each site, a cross section was established, and the active stream channel width was determined using a tape measure fixed to the top of the bank on each side. The stream was then divided into a series of sections (referred to as panels), where individual velocity and depth measurements were recorded. Stream channel widths were divided by 20 to establish the location of flow gauging panels. The number of panels was further reduced in cases where the resulting panel widths were less than 6.0 cm. At each point across the stream cross section and water depth was measured and mean flow was measured (at 60% depth) using a Swoffer Model 2100 Series Current Velocity Meter.

2.2.2 QA/QC Program for Hydrology Field Measurements

Two sets of measurements were collected at each stream crossing location. The first crossing was used to establish the station locations and data, and the second crossing was used to collect a duplicate set of data for QA/QC purposes (to ensure station readings were accurate and that no significant variance between the two measurements sets had occurred).

2.2.3 Data Analysis

For each sampling point (panel) at a crossing location (sample site), stream discharge (Q; m^3/s) was calculated by multiplying the cross sectional area of the panel (width of panel x mean depth; A; m^2) by the measured velocity (V; m/s), according to the following formula:

Q = AV

The total discharge for a sample site was then calculated by summing the discharge of all panels for each stream crossing location.

3.0 RESULTS

3.1 SURFACE WATER QUALITY SAMPLING

3.1.1 Field In-Situ Water Quality Results

Field *in-situ* water quality monitoring results are presented below in **Table 3.1**, with CCME-PAL exceedances shown in bold italic text. Photographs of monitoring sites are provided in **Appendix 1**.

Table 3.1 Water Quality Field Parameter Results.

Site	Water Temperature (°C)	pH (pH units)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%Sat.)									
CCME-PA	L Guideline Levels [†]													
		6.5-9.0	-	5.5 [‡]	-									
Reference	Reference Sites													
R1	1.9	-	386.6	13.05	100.0									
R2	1.8	-	353.6	13.10	100.4									
R3	2.1	7.41	465.3	10.67	77.5									
R4	3.4	7.47	448.6	13.08	104.6									
R6	6.1	7.58	157.8	10.02	80.8									
R7	1.8	6.12	113.3	10.15	72.8									
Exposed Sites														
PL	-	-	-	-	-									
SL	7.1	7.82	1014.0	13.06	114.2									
E1	7.6	7.76	327.0	11.11	99.3									
E2	8.3	7.39	504.0	1.81	16.6									
E3	5.8	7.67	492.3	11.98	101.5									
E4	8.2	7.26	547.0	11.25	101.6									
E7	6.2	7.69	511.0	9.66	78.2									
E8	5.8	7.71	153.9	10.16	81.2									
GWCC-1	4.1	7.24	1434.0	3.57	27.3									
GWCC-2	5.6	7.33	1156.0	5.71	45.7									
GWCC-3	7.9	7.17	629.0	4.45	36.6									
GWCC-4	9.3	7.27	502.0	1.88	16.3									
GWCC-5	7.2	7.25	589.0	3.36	29.9									

Notes

† Bold italic text indicates an exceedance of the CCME-PAL guideline level.

‡ Guideline level represents a minimum recommended value.

Surface water temperatures ranged from 1.9°C to 9.3°C. pH levels were relatively consistent and ranged from 6.12 to 7.82. pH levels measured at the reference site R7 were slightly acidic (6.12 pH) and below the CCME-PAL guideline range during the time of sampling. As discussed in previous communications with AAM, the field crew had calibration issues with the YSI pH sensor during sampling of two reference locations (R1 and R2). Due to the remoteness of the sites, AAM did not advise revisiting these sites to complete in-situ measurements. Field pH is therefore not provided for these two locations.

Surface water conductivity varied significantly between sites (**Table 3.1**). Reference site conductivity ranged between 113.3 μ s/cm (R7) and 465.3 μ s/cm (R3), with the lowest observed values found on the Forty Mile River (R6) and Porcupine Creek (R7).

Exposed stream sites ranged in conductivity from 327 μ s/cm (E1) to 1434 μ s/cm (GWCC-1). Exposed site conductivity was generally highest at the groundwater seepage sites GWCC-1 and GWCC-2 (1434 and 1156 μ s/cm, respectively) as well as in Snowshoe Pit Lake (SL; 1014 μ s/cm).

Measured concentrations of dissolved oxygen ranged from 1.81 mg/L (E2) to 13.1 mg/L (R2) at surface water sites (both reference and exposed), with only the lowest observed value being less than CCME-PAL guidelines (E2). The dissolved oxygen measured at four of five groundwater seepage sites was less than the CCME-PAL minimum of 5.5 mg/L, likely due to these sites being groundwater discharge locations. As such, dissolved oxygen levels are expected to increase downstream of the groundwater seeps. Recorded values at sites GWCC-1, GWCC-2, GWCC-3, GWCC-4 and GWCC-5 were 3.57 mg/L, 5.71 mg/L, 4.45 mg/L, 1.88 mg/L and 3.36 mg/L respectively.

3.1.2 Laboratory Analytical Water Quality Results

Laboratory analytical results are summarized in **Tables 3.2** through **3.4**, below. General, physical, and nutrient (non-metal) results are summarized in **Table 3.2**, total metal results are summarized in **Table 3.3**, and dissolved metal results are summarized in **Table 3.4**. Exceedances for CCME-PAL guidelines are shaded within those tables. Laboratory analytical results are presented further below with comparison to CCME-PAL guidelines. For sample sites where pH values were not collected (Sites R1 and R2) the most stringent CCME-PAL pH dependent guideline was applied (i.e., ammonia and aluminum).

For sites where duplicate samples were collected, test and duplicate samples were compared relative to the lab QA/QC analysis threshold of 20% RPD. These QA/QC results are provided in **Tables 3.5 – 3.7** and are described below.

3.1.2.1 Reference Sites

Site R1

The concentrations of total aluminum and dissolved aluminum at Site R1 were 0.129 mg/L and 0.0132 mg/L, respectively. pH was not measured at Site R1, and the CCME-PAL guideline for aluminum is pH dependent. The concentration of total aluminum exceeded the highest CCME-PAL guideline of 0.1 mg/L (regardless of pH level). The concentration of dissolved aluminum of 0.0132 mg/L exceeded the most conservative CCME-PAL guideline level of 0.005 mg/L (where pH is less than 6.5), but was less than the guideline of 0.1 mg/L (where pH is greater than 6.5). Considering pH levels observed during the 2013 Clinton Creek Monitoring Program at sample site R1 (8.04), an exceedance of dissolved aluminum in 2014 is considered to be unlikely.

The concentration of total iron and dissolved iron at Site R1 was 0.597 mg/L and 0.310 mg/L, respectively, both exceeding the CCME-PAL guideline of 0.3 mg/L.

The concentration of total selenium and dissolved selenium at Site R1 was 0.0033 mg/L and 0.00378 mg/L, both exceeded the CCME-PAL guideline of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site R1.

Site R2

The concentration of total aluminum and dissolved aluminum at Site R2 was 0.0714 mg/L and 0.0181 mg/L. pH was not measured at Site R2, and the CCME-PAL guideline for aluminum is pH dependent. The concentrations of total and dissolved aluminum exceeded the most conservative CCME-PAL guideline of 0.005 mg/L (where pH is less than 6.5), but did not exceed the guideline of 0.1 mg/L where pH is greater than 6.5. Considering pH levels observed during the 2013 Clinton Creek Monitoring Program at sample site R2 (7.70), exceedances of total and dissolved aluminum in 2014 are considered unlikely.

The concentration of total iron at Site R2 was 0.316 mg/L, exceeding the CCME-PAL guideline of 0.3 mg/L.

No other non-metal or metal parameters exceeded CCME-PAL guidelines at Site R2.

Site R3

The concentration of total aluminum at Site R3 was 0.307 mg/L, exceeding the CCME-PAL guideline of 0.1 mg/L for pH greater than 6.5 (the pH measured at the site was 7.41).

The concentration of total iron at Site R3 was 1.05 mg/L, exceeding the CCME-PAL guideline of 0.3 mg/L.

The concentration of total chromium at Site R3 was 0.0012 mg/L, exceeding the CCME-PAL guideline of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site R3.

Site R4

The concentration of total and dissolved selenium at Site R4 was 0.00291 mg/L and 0.00305 mg/L, respectively, both exceeding the CCME-PAL guideline of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site R4.

Site R6

The concentration of total aluminum at Site R6 was 0.118 mg/L, exceeding the CCME-PAL guideline of 0.1 mg/L for pH is greater than 6.5 (the pH measured at the site was 7.58).

The concentration of total iron and dissolved iron at Site R6 was 0.44 mg/L and 0.363 mg/L, respectively, both exceeding the CCME-PAL guideline of 0.3 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site R6.

Site R7

The concentration of total aluminum and dissolved aluminum at Site R7 was 0.523 mg/L and 0.116 mg/L, respectively, both exceeding the CCME-PAL guideline of 0.005 mg/L for pH levels below 6.5 (the pH measured at the site was 6.12). pH levels at Site R7 were also below the CCME-PAL guideline range of 6.5-9.0.

The concentration of total and dissolved copper at Site R7 was 0.00533 mg/L and 0.00455 mg/L, respectively, both exceeding the hardness dependent CCME-PAL guideline of 0.00264 mg/L for a total hardness of 114 mg/L.

The concentration of total and dissolved chromium at Site R7 was 0.00232 mg/L and 0.00146 mg/L, respectively, both exceeding the CCME-PAL guideline of 0.001 mg/L.

The concentration of total iron and dissolved iron at Site R1 was 2.01 mg/L and 1.3 mg/L, respectively, both exceeding the CCME-PAL guideline of 0.3 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site R7.

3.1.2.2 Exposed Sites

Site E1

The concentration of total and dissolved selenium at Site E1 was 0.00141 mg/L and 0.00148 mg/L, respectively, exceeding the CCME-PAL guideline of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site E1.

Site E2

The concentration of total and dissolved iron at Site E2 was 0.374 mg/L and 0.303 mg/L, respectively, both exceeding the CCME-PAL guideline of 0.3 mg/L.

The concentration of total and dissolved selenium at Site E2 was 0.00144 mg/L and 0.00144 mg/L, respectively, exceeding the CCME-PAL guideline of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site E2.

Site E3

The concentration of total iron at Site E3 was 0.341 mg/L, exceeding the CCME-PAL guideline of 0.3 mg/L.

The concentration of total chromium at Site E3 was 0.00104 mg/L, exceeding the CCME-PAL guideline of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site E3.

Site E4

The concentration of total iron at Site E4 was 0.328 mg/L, exceeding the CCME-PAL guideline of 0.3 mg/L.

The concentration of total and dissolved selenium at Site E4 was 0.00123 mg/L and 0.00128 mg/L, respectively, exceeding the CCME-PAL guideline of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site E4.

Site E7

The concentration of total iron at Site E7 was 0.308 mg/L, exceeding the CCME-PAL guideline of 0.3 mg/L.

The concentration of dissolved selenium at Site E7 was 0.00105 mg/L, exceeding the CCME-PAL guideline of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site E7.

Site E8

The concentration of total aluminum at Site E8 was 0.134 mg/L, exceeding the CCME-PAL guideline of 0.1 mg/L for pH greater than 6.5 (the pH measured at the site was 7.71).

The concentration of total iron at Site E8 was 0.344 mg/L, exceeding the CCME-PAL guideline of 0.3 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site E8.

Site SL

The concentration of total and dissolved arsenic at Site SL was 0.0152 mg/L and 0.0148 mg/L respectively, both exceeding the CCME-PAL guideline of 0.005 mg/L.

The concentration of total chromium at Site SL was 0.00156 mg/L, exceeding the CCME-PAL guideline of 0.001 mg/L.

The concentration of total and dissolved selenium at Site SL was 0.0105 mg/L and 0.0103 mg/L respectively, both exceeding the CCME-PAL guideline of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site SL.

Site GWCC-1

The concentration of total and dissolved chromium at Site R7 was 0.00247 mg/L and 0.00232 mg/L, respectively, both exceeding the CCME-PAL guideline of 0.001 mg/L.

The concentration of total and dissolved selenium at Site GWCC-1 was 0.00412 mg/L and 0.00422 mg/L respectively, both exceeding the CCME-PAL guideline of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site GWCC-1.

Site GWCC-2

The concentration of total and dissolved chromium at Site R7 was 0.00173 mg/L and 0.00164 mg/L, respectively, both exceeding the CCME-PAL guideline of 0.001 mg/L.

The concentration of total and dissolved selenium at Site GWCC-2 was 0.00338 mg/L and 0.00363 mg/L respectively, both exceeding the CCME-PAL guideline of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site GWCC-2.

Site GWCC-3

The concentration of total and dissolved selenium at Site GWCC-3 was 0.00143 mg/L and 0.00148 mg/L respectively, both exceeding the CCME-PAL guideline of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site GWCC-3.

Site GWCC-4

No reported parameters exceeded CCME-PAL guidelines at Site GWCC-4.

Site GWCC-5

The concentration of total and dissolved selenium at Site GWCC-5 was 0.00475 mg/L and 0.00501 mg/L respectively, both exceeding the CCME-PAL guideline of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guidelines at Site GWCC-5.

			Surface Water – Reference Sites							Surface Water – Exposed Sites								Groundwater – Exposed Sites					
Parameter	Units	CCME-	R1	R2	R3	R4	R6	R7	E1	E2	E3	E4	E7	E8	PL	SL	GWCC-1	GCWW–2	GWCC–3	GWCC-4	GWCC-5		
		PAL	20/09/ 2014	20/09/ 2014	22/09 /2014	19/09 /2014	21/09/ 2014	22/09/ 2014	19/09/ 2014	19/09 /2014	19/09/ 2014	19/09/ 2014	21/09/ 2014	21/09 /2014		20/09/ 2014	21/09/ 2014	21/09/ 2014	21/09/ 2014	21/09/ 2014	19/09/ 2014		
Total Hardness (calculated as CaCO3)	mg/L	-	401	370	499	448	130	114	278	433	465	473	486	126	-	990	1660	1230	637	431	541		
Total Suspended Solids (TSS)	mg/L	Varies [†]	6	<3.000	12.7	<3.000*	<3.000*	27.3	<3.000*	<3.000*	<3.000*	<3.000*	<3.000*	<3.000*	-	4	<3.000*	<3.000*	<3.000*	<3.000*	<3.000*		
Nitrate	mg/L	13	0.162	0.0402	0.0633	0.113*	0.0859*	0.145	0.152*	0.138*	0.126*	0.103*	0.103*	0.0954*	-	<0.050	0.44*	0.396*	0.176*	0.0729*	<0.025*		
Nitrite	mg/L	0.06	0.0011	<0.001	0.0015	<0.001*	<0.001*	<0.001	0.0016*	0.0011*	0.0013*	<0.001*	<0.001*	<0.001*	-	<0.010	<0.020*	<0.010*	<0.010*	<0.001*	<0.005*		
Sulfate (SO4)	mg/L	-	220	172	304	235*	50.2*	45.3	139*	252*	261*	268*	271*	50.1*	-	721	1340*	929*	412*	231*	281*		
Ammonia	mg/L	Varies‡	0.031	0.0082	0.0244	0.0175	0.0065	0.0306	0.0107	0.0128	0.0063	0.0054	0.0063	0.0067	-	<0.005	0.0077	<0.005	<0.005	<0.005	0.0062		
Total Kjeldahl Nitrogen	mg/L	-	0.368	0.238	0.441	0.378	0.335	0.846	0.418	0.428	0.411	0.394	0.399	0.339	-	0.216	0.157	0.222	0.259	0.288	0.235		
Dissolved Organic Carbon	mg/L	-	12.7	9.89	12.7	12.9	11.1	27.2	16.8	15	13.5	14.3	13.9	11.2	-	7.79	5.43	7.16	9.45	10.9	8.31		
Total Phosphorus	mg/L	-	0.0064	0.0063	0.0165	0.0036	0.0033	0.0295	0.005	0.0043	0.0093	0.0055	0.004	0.0027	-	0.0034	<0.002	<0.002	<0.002	<0.002	0.0026		

Table 3.2 Laboratory Analytical Results Summary for Non-Metal Parameters

Notes:

CCME-PAL: Canadian Council of Ministers of the Environment, Water Quality Guidelines for the Protection of Aquatic Life (Freshwater), updated to November 2014.

- = No standard or not analyzed

Shaded text indicates results that exceeded the applicable CCME-PAL guideline level.

† CCME-PAL guideline for TSS exposure is a maximum increase of 25 mg/L above baseline for up to 24 hours, or a maximum increase of 5 mg/L above baseline lasting between 24 hours and 30 days.

‡ Ammonia varies with pH and temperature for CCME FAL; see the CCME ammonia fact sheet for details regarding the applicable criteria, ammonia-N. CCME values listed in the fact sheet table are expressed as ammonia (N). When field or lab pH are both not available, the most stringent guideline has been used. *Indicates the collection day/time varies in relation to other analysis at this site. Due to holding time constraints, general chemistry samples (including analysis of TSS, nitrate, nitrite, and sulfate) in some cases were collected the following day (e.g. the majority of R4 samples were collected on Sept. 19,

whereas general chemistry samples for R4 were collected on Sept.20). Detailed sampling times and dates are provided on the analytical laboratory reports.

Table 3.3 Laboratory Analytical Results Summary for Total Metal Parameters

				Surf	face Water -	Reference S	ites				Surfa	ice Water - E	xposed Sites	5			Groundwater Seepage – Exposed Sites				
Metal	Reported	CCME-	R1	R2	R3	R4	R6	R7	E1	E2	E3	E4	E7	E8	PL	SL	GWCC-1	GWCC-2	GWCC-3	GWCC-4	GWCC-5
motar	Unit	PAL	20/09/	20/09/	22/09	19/09	21/09/	22/09/	19/09/	19/09	19/09/	19/09/	21/09/	21/09		20/09/	21/09/	21/09/	21/09/	21/09/	19/09/
			2014	2014	/2014	/2014	2014	2014	2014	/2014	2014	2014	2014	/2014		2014	2014	2014	2014	2014	2014
Aluminum	mg/L	Varies	0.129	0.0714	0.307	0.0304	0.118	0.523	0.042	0.0253	0.0681	0.0237	0.0325	0.134	-	0.0214	< 0.003	< 0.003	< 0.003	0.0032	< 0.003
Antimony	mg/L	-	0.00027	0.00054	0.00018	0.00047	0.00011	0.00022	0.00034	0.00046	0.00102	0.00051	0.00038	0.00012	-	0.00354	0.00136	0.00123	0.00081	0.0008	0.00089
Arsenic	mg/L	0.005	0.00071	0.00089	0.00086	0.0023	0.00062	0.00147	0.0008	0.0012	0.00125	0.00122	0.00093	0.00052	-	0.0152	0.00217	0.0014	0.00082	0.00118	0.00069
Barium	mg/L	-	0.0586	0.0523	0.056	0.0627	0.04	0.0842	0.0554	0.0517	0.0539	0.0516	0.0527	0.0418	-	0.0199	0.019	0.0176	0.0264	0.0297	0.0551
Beryllium	mg/L	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	< 0.0005	<0.0005	<0.0005	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Boron	mg/L	1.5	0.014	0.016	<0.01	<0.01	<0.01	<0.01	0.012	0.045	0.089	0.065	0.053	<0.01	-	0.051	0.288	0.144	0.065	0.04	0.039
Cadmium	mg/L	Varies	0.000086	0.000029	0.00003	0.000094	0.000021	0.000033	0.000036	0.000055	0.000019	0.000045	0.000057	0.000023	-	0.000026	0.000203	0.000178	0.000091	0.00005	0.00012
Calcium	mg/L	-	89.5	65.8	91.3	92.7	31.6	23.9	59.3	79	77.2	83.3	82	32.3	-	226	205	172	110	77	123
Chromium	mg/L	0.001	0.0007	0.00072	0.0012	0.0005	0.00047	0.00232	0.00078	0.0007	0.00104	0.00079	0.00079	0.00051	-	0.00156	0.00247	0.00173	0.00058	0.00047	0.0008
Cobalt	mg/L	-	0.00078	0.00024	0.00065	0.00182	0.00047	0.00102	0.00032	0.0007	0.0003	0.00072	0.00077	0.00044	-	0.00012	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	mg/L	Varies ⁺	0.00285	0.00184	0.00226	0.00288	0.00246	0.00533	0.00324	0.00267	0.00182	0.00244	0.00196	0.00246	-	0.00133	0.00093	0.00112	0.00111	0.00109	0.00122
Iron	mg/L	0.3	0.597	0.316	1.05	0.268	0.44	2.01	0.235	0.347	0.341	0.328	0.308	0.344	-	0.035	<0.01	<0.01	<0.01	<0.01	0.011
Lead	mg/L	Varies ³	0.000263	0.000056	0.00027	<0.00005	<0.00005	0.000303	0.000083	<0.00005	0.000057	<0.00005	0.000054	<0.00005	-	<0.00005	<0.00005	0.00009	<0.00005	<0.00005	<0.00005
Lithium	mg/L	-	0.00399	0.00622	0.00419	0.00492	0.00397	0.00096	0.003	0.0099	0.00502	0.0142	0.0123	0.00397	-	0.0111	0.0714	0.0161	0.00631	0.0054	0.0103
Magnesium	mg/L	-	40.7	49	57.9	49	11.3	11.6	29.7	55.4	62.3	63.3	59.9	10.9	-	101	279	193	86.5	50.4	57.5
Manganese	mg/L	-	0.388	0.122	0.177	0.304	0.0441	0.274	0.102	0.119	0.0901	0.146	0.261	0.0275	-	0.00325	0.000298	0.000207	0.000186	0.000537	0.0023
Mercury	mg/L	0.000026	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Molybdenum	mg/L	0.073	0.00169	0.000833	0.00127	0.00139	0.000476	0.000532	0.00138	0.00181	0.00146	0.00183	0.00152	0.000498	-	0.00196	0.00253	0.00288	0.00254	0.0024	0.00197
Nickel	mg/L	Varies	0.00526	0.0032	0.00423	0.0148	0.00271	0.00445	0.00537	0.0162	0.011	0.0188	0.0166	0.00286	-	0.0183	0.0757	0.0428	0.0297	0.0289	0.017
Phosphorus	mg/L	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	<0.050	< 0.050	< 0.050	<0.050	<0.050	<0.050
Potassium	mg/L	-	0.62	0.79	0.90	0.59	1.02	0.22	0.57	0.85	0.88	0.97	0.99	1.01		1.48	3.14	1.93	1.16	0.92	0.96
Selenium	mg/L	0.001	0.0033	0.00068	0.00054	0.00291	0.00021	0.00034	0.00141	0.00144	0.00082	0.00123	0.00097	0.00022	-	0.0105	0.00412	0.00338	0.00143	0.00071	0.00475
Silicon	mg/L	-	4.84	5.8	6.14	5.18	4.93	5.85	4.4	4.7	5.81	4.79	4.54	5.12	-	5.42	6.33	5.04	4.65	4.98	4.82
Silver	mg/L	0.0001	0.000011	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Sodium	mg/L	-	3.51	3.33	4.11	5	4.22	1.33	2.62	4.06	4.49	5.24	4.54	4.16		2.59	17.4	6.56	3.85	2.77	3.98
Strontium	mg/L	-	0.46	0.392	0.43	0.538	0.167	0.0743	0.29	0.497	0.41	0.565	0.51	0.17	-	1.1	2.02	1.01	0.54	0.383	0.771
Sulfur	mg/L	-	74.8	58.9	99.9	78.1	17	14.9	46.7	86.1	88.2	93	88.8	16.9		234	442	313	139	76.3	98.6
Thallium	mg/L	0.0008	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.000022	<0.00001	0.000017	<0.00001	<0.00001	-	0.000018	0.000091	0.000072	0.000059	0.000061	0.000017
Tin	mg/L	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Titanium	mg/L	-	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium	mg/L	0.015	0.00285	0.00474	0.00612	0.00641	0.00108	0.000128	0.00192	0.00228	0.00435	0.00252	0.00241	0.00106	-	0.00313	0.00694	0.00328	0.00145	0.000904	0.0022
Vanadium	mg/L	-	<0.001	<0.001	0.0014	<0.001	<0.001	0.0025	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	mg/L	0.03	0.0043	<0.003	0.0048	0.005	0.0041	0.0042	<0.003	<0.003	<0.003	<0.003	0.0048	0.0045	-	<0.003	0.0083	0.006	0.0036	<0.003	<0.003

Notes:

CCME-PAL: Canadian Council of Ministers of the Environment, Water Quality Guidelines for the Protection of Aquatic Life (Freshwater), updated to November 2014.

- = No standard or not analyzed

Shaded text indicates results that exceeded the applicable CCME-PAL guideline level. Bold and italic text indicates results that were near to but not exceeding CCME-PAL guideline level.

CCME-PAL guideline values denoted as "varies" are calculated on a site specific basis based on the parameter-specific criteria outlined below.

¹Aluminum varies with pH as follows for CCME FAL; 0.005 if pH<6.5, 0.1 if pH>=6.5. Exceedance noted for Aluminum at Site R2 is based on the most conservative value of 0.005 at pH<6.5, since field pH could not be measured. ²Cadmium varies with Hardness in mg/L as follows for CCME FAL: 0.04 if H<17, 0.00004 - 0.00037 if H>=17 and H<=280 as follows; CWQG (µg/L) = 10{0.83(log[hardness]) - 2.46 }, 0.00037 if H>180.

³Chromium CCME PAL guidelines are expressed in chromium, hexavalent (CrVI). All laboratory data is expressed in total chromium. Total chromium values over 0.001 mg/l are flagged as exceedances.

⁴Copper varies with Hardness in mg/L as follows for CCME FAL: 0.002 if H<82, 0.002-0.004 if H>=82 and H<=180 as follows; CWQG (µg/L) = 0.2 * e{0.8545[ln(hardness)]-1.465}, and 0.004 if H>180.

⁵Lead varies with Hardness in mg/L as follows for CCME FAL: 1 if H<60, 0.001 –0.007 if H>=60 and H<=180 as follows; CWQG (µg/L)= e{1.273[ln(hardness)]-4.705}, and 0.007 if H>180.

⁶Nickel varies with Hardness in mg/L as follows for CCME FAL: 0.025 if H<60, 0.025 – 0.15 if H>=60 and H<=180 as follows; CWQG (µg/L) = e{0.76[ln(hardness)]+1.06}, and 0.15 if H>180.

Table 3.4 Laboratory Analytical Results Summary for Dissolved Metal Parameters

Phane Phane Phae Phae Phae Phae Phae <th></th> <th></th> <th colspan="6">Surface Water Reference Sites</th> <th></th> <th></th> <th></th> <th>Surfa</th> <th>ice Water – E</th> <th>Exposed Site</th> <th>s</th> <th></th> <th></th> <th colspan="4">Groundwater Seepage - Exposed Sites</th>			Surface Water Reference Sites									Surfa	ice Water – E	Exposed Site	s			Groundwater Seepage - Exposed Sites				
http Phot 2004 2004 2004 20	Metal	Reported	CCME-	R1	R2	R3	R4	R6	R7	E1	E2	E3	E4	E7	E8	PL	SL	GWCC-1	GWCC-2	GWCC-3	GWCC-4	GWCC-5
matrix matrix 2014 <	Wetar	Unit	PAL	20/09/	20/09/	22/09	19/09	21/09/	22/09/	19/09/	19/09	19/09/	19/09/	21/09/	21/09		20/09/	21/09/	21/09/	21/09/	21/09/	19/09/
Auminum mpL Vales 0.0181 0.0181 0.0182 0.0181 0.0017 <td></td> <td>, in the second se</td> <td></td> <td>2014</td> <td>2014</td> <td>/2014</td> <td>/2014</td> <td>2014</td> <td>2014</td> <td>2014</td> <td>/2014</td> <td>2014</td> <td>2014</td> <td>2014</td> <td>/2014</td> <td></td> <td>2014</td> <td>2014</td> <td>2014</td> <td>2014</td> <td>2014</td> <td>2014</td>		, in the second se		2014	2014	/2014	/2014	2014	2014	2014	/2014	2014	2014	2014	/2014		2014	2014	2014	2014	2014	2014
Anthromy mgL - 0.00082 0.00081 0.00081 0.00083 - 0.0184 0.00183 0.00082 0.00082 0.00082 0.00084 0.00081 0.00083 - 0.0184 0.0118 0.00182 0.00082 0.00082 0.00084 0.00084 0.00084 0.00184 0.00144 0.00144 0.00144 0.00144 0.0014 0.00014 0.00014 0.00014 0.00014 0.00014 0.00014 0.00014 0.00014 0.00014 0.0014 0.0014	Aluminum	mg/L	Varies	0.0132	0.0181	0.0215	0.0124	0.0678	0.116	0.0322	0.0198	0.0188	0.0146	0.012	0.0711	-	0.0012	0.001	0.0019	0.0017	0.002	0.0018
Arean mgL 0.005 0.0058 0.0008 0.0008 0.00071 0.00071 0.00071 0.00071 0.00071 0.00071 0.00071 0.00071 0.00071 0.00071 0.00071 0.00071 0.00071 0.00172 0.00071 0.00172 0.00071 0.00172 0.00071 0.00172 0.00171 0.00172 0.00172 0.00171 0.00172 0.00011 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011	Antimony	mg/L	-	0.00022	0.00051	0.00017	0.00048	0.00011	0.00022	0.00033	0.00047	0.00094	0.00051	0.00039	0.00013	-	0.00342	0.00133	0.00113	0.00083	0.00082	0.00091
Barliam mgL - 0.0587 0.0698 0.0694 0.0694 0.0694 0.0694 0.0014 - 0.0178 0.0208 0.0014 0.00015 0.00005 0.00005 0.00005 0.00005 0.00014 0.00015 0.00014 0.00015 0.00014 0.00015 0.00014 0.00015 0.00014 0.00015 0.00014 0.00015 0.00014 0.00015 0.00014 <th0.00014< th=""> <th0.00014< th=""> <th0.001< td=""><td>Arsenic</td><td>mg/L</td><td>0.005</td><td>0.00056</td><td>0.00082</td><td>0.00055</td><td>0.00226</td><td>0.00058</td><td>0.00128</td><td>0.00076</td><td>0.00107</td><td>0.0011</td><td>0.00112</td><td>0.00091</td><td>0.00045</td><td>-</td><td>0.0148</td><td>0.00216</td><td>0.00135</td><td>0.00082</td><td>0.00123</td><td>0.00065</td></th0.001<></th0.00014<></th0.00014<>	Arsenic	mg/L	0.005	0.00056	0.00082	0.00055	0.00226	0.00058	0.00128	0.00076	0.00107	0.0011	0.00112	0.00091	0.00045	-	0.0148	0.00216	0.00135	0.00082	0.00123	0.00065
Berylin mg/L - <	Barium	mg/L	-	0.0535	0.0503	0.0462	0.0624	0.0403	0.0772	0.0552	0.0512	0.0541	0.05	0.0547	0.041	-	0.0192	0.0191	0.0178	0.0266	0.031	0.0545
Banuth mgL - <	Beryllium	mg/L	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Berner mgL 1.5 0.011 0.011 -0.01 -0.01 0.044 0.062 0.0003 0.00030 0.00031 0.00030 0.00031 0.00031 0.00031 0.00031 0.00031 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 <th0.0001< th=""> <th0.0001< th=""> <th0.0001<< td=""><td>Bismuth</td><td>mg/L</td><td>-</td><td><0.0005</td><td><0.0005</td><td><0.0005</td><td><0.0005</td><td><0.0005</td><td><0.0005</td><td><0.0005</td><td><0.0005</td><td><0.0005</td><td><0.0005</td><td><0.0005</td><td><0.0005</td><td>-</td><td><0.0005</td><td><0.0005</td><td><0.0005</td><td><0.0005</td><td><0.0005</td><td><0.0005</td></th0.0001<<></th0.0001<></th0.0001<>	Bismuth	mg/L	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Cademim mpL Varief* 0.000079 0.000027 0.000072 0.000072 0.000073 0.000015 0.	Boron	mg/L	1.5	0.011	0.013	<0.01	<0.01	<0.01	<0.01	<0.01	0.044	0.082	0.057	0.049	<0.01	-	0.048	0.264	0.11	0.058	0.037	0.034
Calcum mgL 0.01* 0.00024 0.00049 0.00028 0.00014 0.00028 0.00076 0.00028 0.00014 0.00028 0.00014 0.00028 0.00014 0.00028 0.00014 0.00028 0.00014 0.00028 0.00014 0.00028 0.00014 0.00028 0.00014 0.00028 0.00014 0.00028 0.00014 0.00028 0.00014 0.00028 0.00014 0.00028 0.00014 0.000	Cadmium	mg/L	Varies ²	0.000067	0.000025	0.000012	0.000084	0.000022	0.000025	0.000037	0.000049	0.000013	0.000045	0.000053	0.000019	-	0.000023	0.000205	0.000179	0.000089	0.000048	0.000089
Chromum mgL 0.001 ⁴¹ 0.00028 0.00038 0.00038 0.00039 0.00039 0.00039 0.00039 0.00039 0.00039 0.00039 0.00039 0.00039 0.00048 0.00044 0.00048 0.00040 0.00040 0.00040 0.00014 0.00017 0.00014 0.00018 0.00076 0.00048 0.00014 0.00016 0.00005 <th0.0005< th=""> <th0.0005< th=""> <th0.000< td=""><td>Calcium</td><td>mg/L</td><td>-</td><td>93.3</td><td>67</td><td>97.8</td><td>96.8</td><td>32.9</td><td>25.5</td><td>61.5</td><td>80.8</td><td>80.8</td><td>84.6</td><td>88.8</td><td>32.5</td><td>-</td><td>230</td><td>207</td><td>175</td><td>112</td><td>83.8</td><td>123</td></th0.000<></th0.0005<></th0.0005<>	Calcium	mg/L	-	93.3	67	97.8	96.8	32.9	25.5	61.5	80.8	80.8	84.6	88.8	32.5	-	230	207	175	112	83.8	123
Cobait mgL - 0.00026 0.00024 0.00076 0.00076 0.00076 0.00071 - 0.0001 -0.001 -0.001	Chromium	mg/L	0.001 ³	0.00026	0.00047	0.00049	0.00038	0.00032	0.00146	0.00054	0.00058	0.00075	0.00062	0.00057	0.00033	-	0.00099	0.00232	0.00164	0.00048	0.00041	0.00068
Copper mg/L 0.3 0.00163 0.00163 0.00223 0.00184 0.00217 0.00184 0.00237 0.00088 0.00121 0.0016 0.0016 0.0011 Lond mg/L 0.3 0.31 0.212 0.184 0.218 0.33 0.218 0.248 0.244 - 0.0018 0.00058 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00001 <0.00001 <th< td=""><td>Cobalt</td><td>mg/L</td><td>-</td><td>0.00065</td><td>0.0002</td><td>0.00044</td><td>0.00179</td><td>0.00045</td><td>0.0008</td><td>0.00028</td><td>0.00065</td><td>0.00026</td><td>0.00068</td><td>0.00076</td><td>0.0004</td><td>-</td><td><0.0001</td><td><0.0001</td><td><0.0001</td><td><0.0001</td><td><0.0001</td><td><0.0001</td></th<>	Cobalt	mg/L	-	0.00065	0.0002	0.00044	0.00179	0.00045	0.0008	0.00028	0.00065	0.00026	0.00068	0.00076	0.0004	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Iron mg/L 0.3 0.21 0.144 0.184 0.13 0.21 0.300 0.026 0.246 0.246 0.244 - - - - - 0.011 - 0.011 - 0.010 - 0.0005 - 0.0015 0.00025 - 0.0001 - 0.0005 - 0.0015 0.00021 0.00021 0.00033 0.00038 0.00031 0.0024 0.00241 0.00021 0.00031 0.00031 0.0001 - 0.0021 0.00221 0.0024 0.00241 0	Copper	mg/L	Varies ⁴	0.00193	0.00163	0.0016	0.00205	0.00223	0.00455	0.00314	0.00223	0.00166	0.00207	0.00194	0.00233	-	0.0008	0.00088	0.00121	0.00104	0.00106	0.001
Lead mgL Varies [®] 0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.00005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.00005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.0005 <0.000	Iron	mg/L	0.3	0.31	0.212	0.184	0.198	0.363	1.3	0.21	0.303	0.093	0.26	0.246	0.244	-	<0.01	<0.01	<0.01	<0.01	<0.01	0.011
Lithium mg/L - 0.00339 0.00611 0.00624 0.00072 0.00072 0.00999 0.0013 0.013 0.01682 0.00385 0.00895 0.00999 Magnesium mg/L - 0.0414 0.111 0.112 12.3 30.3 56.2 63.8 63.6 64.1 10.8 - 10.11 2.77 19.44 6.61.8 6.3.8 63.4 6.1.8 0.274 0.0257 - 0.0024 0.0024 0.00014 0.00001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.000	Lead	mg/L	Varies⁵	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.000055	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Magnese mgL - 40.9 49.1 61.8 50.1 11.5 12.3 30.3 56.2 63.8 63.6 64.1 10.8 - 101 277 194 86.9 53.8 56.8 Manganese mgL - 0.348 0.0172 0.0284 0.0028 0.00024 0.00024 0.00024 0.00024 0.00014 0.00001 -0.0001 -0.0001 -0.0001 -0.0001 -0.0001 -0.0001 -0.0001 -0.0001 -0.0001 -0.0001 -0.0001 -0.0001 -0.00	Lithium	mg/L	-	0.00339	0.00611	0.00434	0.00504	0.0042	0.00072	0.00315	0.00999	0.00513	0.0138	0.013	0.00415	-	0.0105	0.0682	0.0133	0.00665	0.00554	0.00995
Manganese mgL - 0.348 0.117 0.299 0.0433 0.277 0.0977 0.0176 0.0247 0.00247 0.00247 0.00247 0.00247 0.00247 0.00247 0.000212 0.000214 0.00011 0.000011 0.00001 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.0001 0.0018 0.0173 0.0027 0 0.0016 0.00173 0.00173 0.00416 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0.00011 0	Magnesium	mg/L	-	40.9	49.1	61.8	50.1	11.5	12.3	30.3	56.2	63.8	63.6	64.1	10.8	-	101	277	194	86.9	53.8	56.8
Mercury mg/L 0.00026 c0.0001 c0.0016 c0.0016 <thc0.0016< th=""> <thc0.0016< th=""> <thc0.0< td=""><td>Manganese</td><td>mg/L</td><td>-</td><td>0.348</td><td>0.119</td><td>0.172</td><td>0.299</td><td>0.0433</td><td>0.277</td><td>0.0947</td><td>0.11</td><td>0.0876</td><td>0.138</td><td>0.274</td><td>0.0257</td><td>-</td><td>0.0024</td><td>0.000212</td><td>0.000246</td><td>0.000164</td><td>0.000393</td><td>0.00208</td></thc0.0<></thc0.0016<></thc0.0016<>	Manganese	mg/L	-	0.348	0.119	0.172	0.299	0.0433	0.277	0.0947	0.11	0.0876	0.138	0.274	0.0257	-	0.0024	0.000212	0.000246	0.000164	0.000393	0.00208
Molybdenum mgL 0.073 0.00156 0.00073 0.00126 0.00131 0.000457 0.00131 0.00153 0.00153 0.00155 0.000457 - 0.00173 0.00248 0.00249 0.0024 0.00249 0.00244 0.00249 0.00244 0.00249 0.00244 0.00249 0.00244 0.00249 0.00244 0.00249 0.00244 0.00249 0.00244 0.00249 0.00244 0.00249 0.00244 0.00249 0.00244 0.00249 0.00244 0.00249 0.00244 0.00249 0.00244 0.0029 0.0161 Phosphorus mgL - <.0050	Mercury	mg/L	0.000026	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Nickel mg/L Varies ⁶ 0.00451 0.00305 0.00345 0.0146 0.00395 0.0151 0.0151 0.0168 0.0122 0.0266 - 0.0168 0.0739 0.0464 0.0284 0.0299 0.0165 Phosphorus mg/L - 0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050	Molybdenum	mg/L	0.073	0.00156	0.00073	0.00126	0.00131	0.000456	0.000517	0.00123	0.00153	0.00123	0.00166	0.00155	0.000457	-	0.00173	0.00248	0.00264	0.00249	0.0024	0.00181
Phosphorus mg/L 40.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <td>Nickel</td> <td>mg/L</td> <td>Varies⁶</td> <td>0.00451</td> <td>0.00305</td> <td>0.00345</td> <td>0.0146</td> <td>0.00265</td> <td>0.00399</td> <td>0.00514</td> <td>0.0151</td> <td>0.0106</td> <td>0.0181</td> <td>0.0172</td> <td>0.00276</td> <td>-</td> <td>0.0168</td> <td>0.0739</td> <td>0.0446</td> <td>0.0284</td> <td>0.0299</td> <td>0.0165</td>	Nickel	mg/L	Varies ⁶	0.00451	0.00305	0.00345	0.0146	0.00265	0.00399	0.00514	0.0151	0.0106	0.0181	0.0172	0.00276	-	0.0168	0.0739	0.0446	0.0284	0.0299	0.0165
Potassium mg/L - 0.6 0.8 0.6 1.03 0.2 0.57 0.87 0.88 1 1.07 0.98 - 1.46 3.11 1.92 1.18 0.99 0.96 Selenium mg/L 0.001 0.00378 0.007 0.00352 0.00305 0.0003 0.00148 0.0014 0.00179 0.00128 0.00105 0.0013 0.0013 0.0042 0.00363 0.00148 0.0072 Silcon mg/L - 4.71 5.7 5.98 5.24 4.98 5.55 4.51 4.68 5.83 4.75 4.82 4.96 - 5.35 6.33 5.05 4.61 5.0001 5.0001 5.35 6.33 5.05 6.33 5.05 4.82 4.96 5.35 6.33 5.25 4.82 4.96 5.35 6.33 5.25 4.82 4.96 5.35 6.103 5.0016 5.3 6.33 5.25 4.82 4.90 5.35 6.103	Phosphorus	mg/L	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Selenium mg/L 0.001 0.00378 0.0007 0.00305 0.00305 0.00305 0.00148 0.00179 0.00128 0.00105 0.00023 0.00305 0.00305 0.00023 0.00128 0.00105 0.00103 0.00422 0.00303 0.00148 0.0007 0.00128 0.00105 0.00103 0.00423 0.00135 0.00015 0.00015 0.00015 0.00015 0.00015 0.00015 0.00015 0.00015 0.00015 0.0	Potassium	mg/L	-	0.6	0.8	0.87	0.6	1.03	0.2	0.57	0.87	0.88	1	1.07	0.98	-	1.46	3.11	1.92	1.18	0.99	0.96
Siliconmg/L.4.715.75.985.244.985.554.514.685.834.754.824.96.5.356.335.054.665.324.75Silvermg/L0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001<0.0001 <th< td=""><td>Selenium</td><td>mg/L</td><td>0.001</td><td>0.00378</td><td>0.0007</td><td>0.00052</td><td>0.00305</td><td>0.00023</td><td>0.00036</td><td>0.00148</td><td>0.00144</td><td>0.00079</td><td>0.00128</td><td>0.00105</td><td>0.00023</td><td>-</td><td>0.0103</td><td>0.00422</td><td>0.00363</td><td>0.00148</td><td>0.00072</td><td>0.00501</td></th<>	Selenium	mg/L	0.001	0.00378	0.0007	0.00052	0.00305	0.00023	0.00036	0.00148	0.00144	0.00079	0.00128	0.00105	0.00023	-	0.0103	0.00422	0.00363	0.00148	0.00072	0.00501
Silver mg/L 0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0	Silicon	mg/L	-	4.71	5.7	5.98	5.24	4.98	5.55	4.51	4.68	5.83	4.75	4.82	4.96	-	5.35	6.33	5.05	4.66	5.32	4.75
Sodiummg/L3.243.3.4.284.994.221.392.663.734.465.24.824.192.3417.46.763.742.883.9Stroniummg/L0.4260.3610.4480.5490.1680.07430.290.4220.3560.5330.5250.1660.9712.010.9630.5350.3930.745Suffurmg/L73.757.910578.717.315.646.88688.691.194.316.70.00014.0009.00550.00050.000570.001650.002550.001650.001650.00160.0	Silver	mg/L	0.0001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Strontium mg/L - 0.426 0.361 0.448 0.549 0.168 0.29 0.422 0.356 0.533 0.525 0.166 - 0.971 2.01 0.963 0.535 0.393 0.745 Sulfur mg/L - 73.7 57.9 105 78.7 17.3 15.6 46.8 86 88.6 91.1 94.3 16.7 230 435 314 139 79.2 95.3 Thallium mg/L 0.0008 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0011 <0.0001 <0.0011 <0.0011	Sodium	mg/L	-	3.24	3.3	4.28	4.99	4.22	1.39	2.66	3.73	4.46	5.2	4.82	4.19	-	2.34	17.4	6.76	3.74	2.88	3.9
Sulfur mg/L - 73.7 57.9 105 78.7 17.3 15.6 46.8 88.6 91.1 94.3 16.7 230 435 314 139 79.2 95.3 Thallium mg/L 0.0008 <0.0001	Strontium	mg/L	-	0.426	0.361	0.448	0.549	0.168	0.0743	0.29	0.422	0.356	0.533	0.525	0.166	-	0.971	2.01	0.963	0.535	0.393	0.745
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Sulfur	mg/L	-	73.7	57.9	105	78.7	17.3	15.6	46.8	86	88.6	91.1	94.3	16.7		230	435	314	139	79.2	95.3
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Thallium	mg/L	0.0008	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	<0.00001	0.00002	<0.00001	<0.00001	-	0.000015	0.000092	0.000065	0.000058	0.000062	0.000017
Titanium mg/L - <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <	Tin	mg/L	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Uranium mg/L 0.015 0.00269 0.00419 0.00678 0.00105 0.000099 0.00181 0.00202 0.00382 0.00235 0.00102 - 0.00284 0.00684 0.00311 0.00146 0.000937 0.00208 Vanadium mg/L - 0.00144 0.00146 0.000937 0.00208 Vanadium mg/L - <th< td=""><td>Titanium</td><td>mg/L</td><td>-</td><td><0.01</td><td><0.01</td><td><0.01</td><td><0.01</td><td><0.01</td><td><0.01</td><td><0.01</td><td><0.01</td><td><0.01</td><td><0.01</td><td><0.01</td><td><0.01</td><td>-</td><td><0.01</td><td><0.01</td><td><0.01</td><td><0.01</td><td><0.01</td><td><0.01</td></th<>	Titanium	mg/L	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium mg/L - <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001	Uranium	mg/L	0.015	0.00269	0.00419	0.00621	0.00678	0.00105	0.000099	0.00181	0.00202	0.00382	0.00235	0.00251	0.00102	-	0.00284	0.00684	0.00311	0.00146	0.000937	0.00208
	Vanadium	mg/L	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.0011	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Zinc	mg/L	0.03	0.0022	0.0022	0.0013	0.0038	0.0026	0.0022	0.0017	0.0017	0.0028	0.0012	0.0024	0.0034	-	<0.001	0.0073	0.0053	0.0024	0.0012	<0.001

Notes:

CCME-PAL: Canadian Council of Ministers of the Environment, Water Quality Guidelines for the Protection of Aquatic Life (Freshwater), updated to November 2014.

- = No standard or not analyzed

Shaded text indicates results that exceeded the applicable CCME-PAL guideline level. Bold and italic text indicates results that were near to but not exceeding CCME-PAL guideline level.

CCME-PAL guideline values denoted as "varies" are calculated on a site specific basis based on the parameter-specific criteria outlined below.

¹Aluminum varies with pH as follows for CCME FAL; 0.005 if pH<6.5, 0.1 if pH>=6.5. Exceedance noted for Aluminum at Site R2 is based on the most conservative value of 0.005 at pH<6.5, since field pH could not be measured. ²Cadmium varies with Hardness in mg/L as follows for CCME FAL: 0.04 if H<17, 0.00004 - 0.00037 if H>=17 and H<=280 as follows; CWQG (µg/L) = 10{0.83(log[hardness]) - 2.46 }, 0.00037 if H>180.

³Chromium CCME PAL guidelines are expressed in chromium, hexavalent (CrVI). All laboratory data is expressed in total chromium. Total chromium values over 0.001 mg/l are flagged as exceedances.

⁴Copper varies with Hardness in mg/L as follows for CCME FAL: 0.002 if H<82, 0.002-0.004 if H>=82 and H<=180 as follows; CWQG (µg/L) = 0.2 * e{0.8545[ln(hardness)]-1.465}, and 0.004 if H>180.

⁵Lead varies with Hardness in mg/L as follows for CCME FAL: 1 if H<60, 0.001 –0.007 if H>=60 and H<=180 as follows; CWQG (μ g/L)= e{1.273[ln(hardness)]-4.705}, and 0.007 if H>180.

⁶Nickel varies with Hardness in mg/L as follows for CCME FAL: 0.025 if H<60, 0.025 – 0.15 if H>=60 and H<=180 as follows; CWQG (μ g/L) = e{0.76[ln(hardness)]+1.06}, and 0.15 if H>180.

3.1.3 Water Quality Monitoring QA/QC Review

Duplicate laboratory analytical samples were collected at Sites E1 and GWCC-3, using the same methods for collection and treatment (application of preservative and/or filtration). Comparative results between duplicate and corresponding test samples are summarized in **Tables 3.5**, **3.6**, and **3.7**, below. Instances where the duplicate results and the test results exceeded the acceptable RPD limit of 20% are shaded within the tables, and discussed in the following sections. Field and travel blank sample results are provided for comparison.

3.1.3.1 QA/QC for Non-Metal Parameters

Site E1 / Duplicate 1

The RPD values for all corresponding pairs of results between Site E1 and DUP1 were less than the 20% QA/QC threshold, indicating that sampling error or laboratory error did not occur (**Table 3.5**).

Site GWCC-3 / Duplicate 2

The RPD values for all corresponding pairs of results between Site GWCC-3 and DUP2 were less than the 20% QA/QC threshold, indicating that sampling error or laboratory error did not occur (**Table 3.5**).

Field Blank and Travel Blank

A reported total Kjeldahl nitrogen (TKN) concentration of 1.59 mg/L for the field blank exceeded the RDL of 0.05 mg/L. Furthermore, a reported dissolved organic carbon concentration of 51.2 mg/L for the field blank exceeded the RDL of 2.5 mg/L (Discussed in **Section 4.1.1**).

The measured ammonia concentration in the travel blank was 0.0096 mg/L, slightly exceeded the RDL of 0.005 mg/L.

All other analytical results of the field blank and travel blank were less than or near RDL values for nonmetal parameters (**Table 3.5**).

		Surfac	e Water – Ex	posed	Se	ep – Expose	Blanks ³		
Parameter	Units	Site E1	Duplicate (DUP1)	RPD ¹	GWCC -3	Duplicate (DUP2)	RPD ¹	Field Blank (GWCC-3)	Travel Blank
Hardness, Total (CaCO3)	mg/L	278	279	0.4	637	638	0.2	<0.500	<0.500
Total Suspended Solids	mg/L	<3.000	<3.000	-	<3.000	<3.000	-	<3.000	<3.000
Nitrate	mg/L	0.152	0.151	0.7	0.176	0.172	-	<0.005	<0.005
Nitrite	mg/L	0.0016	0.0021	-	<0.010	<0.010	-	<0.001	<0.001
Sulfate (SO4)	mg/L	139	139	0.0	412	413	0.2	<0.500	<0.500
Ammonia	mg/L	0.0107	0.011	-	<0.005	<0.005	-	<0.005	0.0096
Total Kjeldahl Nitrogen	mg/L	0.418	0.49	15.9	0.259	0.254	1.9	1.59	<0.050
Dissolved Organic Carbon	mg/L	16.8	17.1	1.8	9.45	9.67	2.3	51.2	
Total Organic Carbon	mg/L	-	-	-	-	-	-	-	< 0.5004

Table 3.5 Comparison of Duplicate and Blank Results for Non-Metal Parameters

Notes:

¹RPD was not calculated if either sample or duplicate were less than five times the RDL.

²Shaded cells indicate instances where duplicate and test sample results exceeded the 20% RPD threshold.

³Bold text indicates results in the field or travel blank above RDL level.

⁴Only total organic carbon was reported by the laboratory for the travel blank, and provides an indication of dissolved organic carbon.

3.1.3.2 QA/QC for Total Metal Parameters

Site E1 and DUP1

The RPDs for Site E1 and its duplicate (DUP1) were less than the 20% QA/QC threshold, indicating that sampling error or laboratory error was unlikely to have occurred (**Table 3.6**).

Site GWCC-3 and DUP2

The RPDs for Site GWCC-3 and its duplicate (DUP2) were less than the 20% QA/QC threshold, indicating that sampling error or laboratory error was unlikely to have occurred (**Table 3.6**).

Field Blank and Travel Blank

The analytical results of the travel blank were less than or near RDLs for all total metal parameters (Table 3.6).

The reported concentrations of total antimony, barium, boron, calcium, copper, lead, lithium, sodium, and strontium in the field blank all exceeded the laboratory RDLs (**Table 3.6**; Discussed in **Section 4.1.1**).

		Surface Water – Exposed			Se	ep – Exposed	Blanks ³		
Metal	Units	Site E1	Duplicate (DUP1)	RPD % ¹	GWCC-3	Duplicate (DUP2)	RPD % ¹	Field Blank (Site GWCC-3)	Travel Blank
Aluminum	mg/L	0.042	0.0382	9.5	<0.003	<0.003	-	<0.003	<0.003
Antimony	mg/L	0.00034	0.00034	-	0.00081	0.00081	0.0	0.00014	<0.0001
Arsenic	mg/L	0.0008	0.00077	3.8	0.00082	0.00082	0.0	<0.0001	<0.0001
Barium	mg/L	0.0554	0.0551	0.5	0.0264	0.0258	2.3	0.000226	<0.00005
Beryllium	mg/L	0.0001	0.0001	-	0.0001	0.0001	-	<0.0001	<0.0001
Bismuth	mg/L	<0.0005	<0.0005	-	<0.0005	<0.0005	-	<0.0005	<0.0005
Boron	mg/L	0.012	0.012	-	0.065	0.059	-	0.022	<0.01
Cadmium	mg/L	0.000036	0.00004	-	0.000091	0.000089	2.2	<0.00001	<0.00001
Calcium	mg/L	59.3	59.3	0.0	110	108	1.8	0.139	<0.05
Chromium	mg/L	0.00078	0.00069	12.2	0.00058	0.00059	1.7	<0.0001	<0.0001
Cobalt	mg/L	0.00032	0.00031	-	<0.0001	<0.0001	-	<0.0001	<0.0001
Copper	mg/L	0.00324	0.0033	1.8	0.00111	0.00109	-	0.00077	<0.0005
Iron	mg/L	0.235	0.233	0.9	<0.01	<0.01	-	<0.01	<0.01
Lead	mg/L	0.000083	0.000083	-	<0.00005	<0.00005	-	0.000086	<0.00005
Lithium	mg/L	0.003	0.00312	3.9	0.00631	0.00688	8.6	0.00121	<0.0005
Magnesium	mg/L	29.7	30	1.0	86.5	84.4	2.5	<0.1	<0.1
Manganese	mg/L	0.102	0.101	1.0	0.000186	0.000255	-	<0.00005	<0.00005
Mercury	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001
Molybdenum	mg/L	0.00138	0.00139	0.7	0.00254	0.00255	0.4	<0.00005	<0.00005
Nickel	mg/L	0.00537	0.00525	2.3	0.0297	0.0288	3.1	<0.0005	<0.0005
Phosphorus	mg/L	0.000005	0.0000059	-	<0.00002	<0.00002	-	<0.00002	<0.00002
Potassium	mg/L	0.57	0.56	1.8	1.16	1.14	1.7	<0.1	<0.1
Selenium	mg/L	0.00141	0.0014	0.7	0.00143	0.00137	4.3	<0.0001	<0.0001

Table 3.6 Comparison of Duplicate and Blank Results for Total Metals

		Surfac	ce Water – Expos	ed	Se	ep – Exposed	Blanks ³		
Metal	Units	Site E1	Duplicate (DUP1)	RPD % ¹	GWCC-3	Duplicate (DUP2)	RPD % ¹	Field Blank (Site GWCC-3)	Travel Blank
Silicon	mg/L	4.4	4.46	1.4	4.65	4.61	0.9	<0.05	<0.05
Silver	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001
Sodium	mg/L	2.62	2.62	0.0	3.85	3.66	5.1	1.43	<0.05
Strontium	mg/L	0.29	0.303	4.4	0.54	0.533	1.3	0.00105	<0.0002
Sulfur	mg/L	46.7	47	0.6	139	136	2.2	<0.500	<0.500
Thallium	mg/L	<0.00001	<0.00001	-	0.000059	0.00006	1.7	<0.00001	<0.00001
Tin	mg/L	<0.0001	<0.0001	-	<0.0001	<0.0001	-	<0.0001	<0.0001
Titanium	mg/L	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01
Uranium	mg/L	0.00192	0.00193	0.5	0.00145	0.00145	0.0	<0.00001	<0.00001
Vanadium	mg/L	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
Zinc	mg/L	<0.003	<0.003	-	0.0036	0.0036	-	<0.003	<0.003

Notes:

¹RPD was not calculated if either sample or duplicate were less than five times the RDL. ²Shaded cells indicate instances where duplicate and test sample results exceeded the 20% RPD threshold. ³Bold text indicates results in the field or travel blank above RDL level.

3.1.3.3 QA/QC for Dissolved Metal Parameters

Site E1 and DUP1

The RPDs for Site E1 and its duplicate (DUP1) were less than the 20% QA/QC threshold for dissolved metals, indicating that sampling error or laboratory error was unlikely to have occurred (**Table 3.7**).

GWCC-3 and DUP2

The RPDs for GWCC-3 and its duplicate (DUP2) were less than the 20% QA/QC threshold, indicating that sampling error or laboratory error was unlikely to have occurred (**Table 3.7**).

Field Blank and Travel Blank

No results for dissolved metals were provided by the analytical laboratory for the travel blank, however all total metals concentrations for the travel blank were less than the RDLs (**Table 3.6**), and therefore dissolved metals concentration are assumed to be acceptable (**Table 3.7**).

The reported concentrations of dissolved barium, boron, calcium, copper, sodium, and strontium in the field blank all exceeded the laboratory RDL (**Table 3.7**; Discussed in **Section 4.1.1**).

		Surface	e Water – Expos	ed	Se	eep – Exposed	Blanks		
Parameter	Units	Site E1	Duplicate (DUP1)	RPD %	GWCC-3	Duplicate (DUP2)	RPD %	Field Blank (Site GWCC-3)	Travel Blank
Aluminum	mg/L	0.0322	0.0293	9.4	0.0017	0.0016	-	<0.001	-
Antimony	mg/L	0.00033	0.00033	-	0.00083	0.00084	1.2	0.0001	-
Arsenic	mg/L	0.00076	0.00069	9.7	0.00082	0.00085	3.6	<0.0001	-
Barium	mg/L	0.0552	0.0518	6.4	0.0266	0.0262	1.5	0.000206	-
Beryllium	mg/L	<0.0001	<0.0001	-	<0.0001	<0.0001	-	<0.0001	-
Bismuth	mg/L	<0.0005	<0.0005	-	<0.0005	<0.0005	-	<0.0005	-
Boron	mg/L	<0.01	<0.01	-	0.058	0.055	5.3	0.016	-
Cadmium	mg/L	0.000037	0.000035	-	0.000089	0.000087	2.3	<0.00001	-
Calcium	mg/L	61.5	61.6	0.2	112	112	0.0	0.142	-
Chromium	mg/L	0.00054	0.00047	-	0.00048	0.00047	-	<0.0001	-
Cobalt	mg/L	0.00028	0.00024	-	<0.0001	<0.0001	-	<0.0001	-
Copper	mg/L	0.00314	0.00265	16.9	0.00104	0.00102	1.9	0.00071	-
Iron	mg/L	0.21	0.202	3.9	<0.01	<0.01	-	<0.01	-
Lead	mg/L	0.000055	<0.00005	-	<0.00005	<0.00005	-	<0.00005	-
Lithium	mg/L	0.00315	0.00298	5.5	0.00665	0.00718	7.7	<0.0005	-
Magnesium	mg/L	30.3	30.5	0.7	86.9	87	0.1	<0.1	-
Manganese	mg/L	0.0947	0.0831	13.0	0.000164	0.000167	-	<0.00005	-
Mercury	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	-
Molybdenum	mg/L	0.00123	0.00125	1.6	0.00249	0.00254	2.0	<0.00005	-
Nickel	mg/L	0.00514	0.00459	11.3	0.0284	0.0286	0.7	<0.0005	-
Phosphorus	mg/L	<0.00005	<0.00005	-	<0.00005	<0.00005	-	<0.00005	-
Potassium	mg/L	0.57	0.57	0.0	1.18	1.16	1.7	<0.1	-
Selenium	mg/L	0.00148	0.00158	6.5	0.00148	0.00148	0.0	<0.0001	-

Table 3.7 Comparison of Duplicate and Blank Results for Dissolved Metals

		Surface Water – Exposed			Se	eep – Exposed	Blanks		
Parameter	Units	Site E1	Duplicate (DUP1)	RPD %	GWCC-3	Duplicate (DUP2)	RPD %	Field Blank (Site GWCC-3)	Travel Blank
Silicon	mg/L	4.51	4.5	0.2	4.66	4.72	1.3	<0.05	-
Silver	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	-
Sodium	mg/L	2.66	2.32	13.7	3.74	3.71	0.8	1.47	-
Strontium	mg/L	0.29	0.282	2.8	0.535	0.539	0.7	0.00097	-
Sulfur	mg/L	46.8	46.9	0.2	139	136	2.2	-	-
Thallium	mg/L	<0.00001	<0.00001	-	0.000058	0.000059	1.7	<0.00001	-
Tin	mg/L	<0.0001	<0.0001	-	<0.0001	<0.0001	-	<0.0001	-
Titanium	mg/L	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-
Uranium	mg/L	0.00181	0.00182	0.6	0.00146	0.00145	0.7	<0.00001	-
Vanadium	mg/L	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	-
Zinc	mg/L	0.0017	0.0011	-	0.0024	0.0025	-	<0.001	-

Notes:

RPD was not calculated if both sample and duplicate were below detectable limits. Shaded cells indicate instances where duplicate and test sample results exceeded the 20% RPD threshold. Bold text indicates results in the field or travel blank above RDL level.

3.2 STREAM HYDROLOGICAL MONITORING RESULTS

Stream hydrological monitoring was completed at 12 of the 19 sites visited during the monitoring program. Hydrological monitoring was not conducted at four (4) of the sampling sites due to a lack of defined channel and/or flows (Snowshoe Pit, GWCC-1, GWCC-2 and GWCC-4) and three (3) sites due to unsafe conditions (Porcupine Pit, R6, and E8).

Hydrological measurements collected during the monitoring program are summarized in Table 3.8, below, while detailed data, calculations, and crossing profiles are attached in Appendix 3.

	Location	(UTM – 7N)		Mean	Mean	Mean	
Site	Easting	Northing	Wetted Width (m)	Channel Depth (m)	Velocity (m/s)	Discharge (m ³ /s)	
R1	510718	7147525	3.90	0.140	0.365	0.2618	
R2	512023	7148061	1.90	0.080	0.265	0.0578	
R3	513952	7148677	1.85	0.050	0.310	0.0396	
R4	515981	7145344	1.55	0.040	0.475	0.0346	
R6*	519437	7141958	-	-	-	-	
R7	513026	7145669	0.70	0.070	0.015	0.0014	
E1	513645	7147111	8.85	0.120	0.195	0.2687	
E2	514149	7147076	5.70	0.135	0.360	0.4155	
E3	5141178	7147189	2.00	0.160	0.120	0.0513	
E4	515950	7145287	5.95	0.145	0.455	0.4606	
E7	519400	7142042	4.70	0.180	0.520	0.5505	
E8†	519457	7142788	-	-	-	-	
PL‡	-	-	-	-	-	-	
SL‡	513824	7146703	-	-	-	-	
GWCC-1§	513902	7146960	-	-	-	-	
GWCC-2§	513899	7146968	-	-	-	-	
GWCC-3**	513882	7147038	-	-	-	6.33 x10 ⁻⁴	
GWCC-4§	513868	7147052	-	-	-	-	
GWCC-5	513984	7147127	0.65	0.040	0.050	0.0016	

Table 3.8 Summary of Hydrological Data Collected During the Monitoring Program

Notes:

* Site R6 = Forty Mile River upstream of Clinton Creek; discharge data could not be safely collected.

† Site E8 = Forty Mile River, downstream of Clinton Creek; discharge data could not be safely collected.

‡ Sites PL and SL were pit lakes, therefore no discharge data was collected.

§ Groundwater seepage site without defined channel. No measureable discharge.

No defined channel present, but Hemmera/ELR were able to collect discharge data at Site GWCC-3 using a timed volume flow measurement

3.2.1 Site R1

A total of 21 stations were sampled at Site R1 (Clinton Creek upstream of Hudgeon Lake). The channel had a wetted width of 3.90 m and a mean depth of 0.140 m. Stream velocity ranged from 0.21 m/s to 0.65 m/s, with a mean velocity of 0.365 m/s. The calculated discharge for two crossings was 0.2506 m³/s and 0.2730 m³/s, resulting in a mean calculated discharge at Site R1 of 0.2618 m³/s.

3.2.2 Site R2

A total of 21 stations were sampled at Site R2 (Easter Creek upstream of Hudgeon Lake). The channel had a wetted width of 1.90 m and a mean depth of 0.080 m. Stream velocity ranged from 0.10 m/s to 0.57 m/s, with a mean velocity of 0.265 m/s. The calculated discharge at two crossings was 0.0608 m³/s and 0.0548 m³/s, resulting in a mean calculated discharge at Site R2 of 0.0578 m³/s.

3.2.3 Site R3

A total of 21 stations were sampled at Site R3 (Wolverine Creek, upstream of the tailings area). The channel had a wetted width of 1.85 m, with a mean depth of 0.050 m. Stream velocity ranged from 0.09 m/s to 0.64 m/s, with a mean velocity of 0.310 m/s. The calculated discharge at two crossings was 0.0379 m³/s and 0.0414 m³/s, resulting in a mean calculated discharge at Site R3 of 0.0396 m³/s.

3.2.4 Site R4

A total of 21 stations were sampled at Site R4 (Clinton Creek, upstream of Eagle Creek). The channel had a wetted width of 1.55 m, with a mean depth of 0.040 m. Stream velocity ranged from 0.17 m/s to 0.88 m/s, with a mean velocity of 0.475 m/s. The calculated discharge at two crossings was 0.0352 m³/s and 0.0341 m³/s, resulting in a mean calculated discharge at Site R4 of 0.0346 m³/s.

3.2.5 Site R6

Site R6 is at the Forty Mile River upstream of Clinton Creek. Due to the size and velocity of the river, neither channel width nor flow data was collected.

3.2.6 Site R7

A total of eleven (11) stations were sampled at Site R7 (Porcupine Creek, upstream of waste rock). The channel had a wetted width of 0.70 m, with a mean depth of 0.070 m. Stream velocity ranged from 0.01 m/s to 0.07 m/s, with a mean velocity of 0.015 m/s. The calculated discharge at two crossings was 0.0016 m³/s and 0.0012 m³/s, resulting in a mean calculated discharge at Site R4 of 0.0014 m³/s.

3.2.7 Site E1

A total of 21 stations were sampled at Site E1 (Clinton Creek, upstream of Porcupine Creek but downstream of the Gabions). The channel had a wetted width of 8.85 m, with a mean depth of 0.120 m. Stream velocity ranged from 0.03 m/s to 0.65 m/s, with a mean velocity of 0.195 m/s. The calculated discharge at two crossings was 0.2760 m³/s and 0.2614 m³/s, resulting in a mean calculated discharge at Site E1 of 0.2687 m³/s.

3.2.8 Site E2

A total of 21 stations were sampled at Site E2 (Clinton Creek, downstream of Porcupine Creek but downstream of Wolverine Creek). The channel had a wetted width of 5.70 m, with a mean depth of 0.135 m. Stream velocity ranged from 0.03 m/s to 0.81 m/s, with a mean velocity of 0.360 m/s. The calculated discharge at two crossings was 0.4102 m³/s and 0.4208 m³/s, resulting in a mean calculated discharge at Site E2 of 0.4155 m³/s.

3.2.9 Site E3

A total of 21 stations were sampled at Site E3 (Wolverine Creek upstream from Clinton Creek). The channel had a wetted width of 2.00 m, with a mean depth of 0.160 m. Stream velocity ranged from 0.07 m/s to 0.26 m/s, with a mean velocity of 0.120 m/s. The calculated discharge at two crossings was 0.0495 m³/s and 0.0532 m³/s, resulting in a mean calculated discharge at Site E3 of 0.0513 m³/s.

3.2.10 Site E4

A total of 21 stations were sampled at Site E4 (Clinton Creek upstream from Eagle Creek). The channel had a wetted width of 5.95 m, with a mean depth of 0.145 m. Stream velocity ranged from 0.06 m/s to 0.86 m/s, with a mean velocity of 0.455 m/s. The calculated discharge at two crossings was 0.4461 m³/s and 0.4751 m³/s, resulting in a mean calculated discharge at Site E4 of 0.4606 m³/s.

3.2.11 Site E7

A total of 21 stations were sampled at Site E7 (Clinton Creek upstream from the Forty Mile River). The channel had a wetted width of 4.70 m, with a mean depth of 0.180 m. Stream velocity ranged from 0.13 m/s to 0.82 m/s, with a mean velocity of 0.520 m/s. The calculated discharge at two crossings was 0.5493 m^3 /s and 0.5518 m^3 /s, resulting in a mean calculated discharge at Site E7 of 0.5505 m^3 /s.

3.2.12 Site E8

Site E8 is at the Forty Mile River downstream of Clinton Creek. Due to the size and velocity of the river, neither channel width nor flow data was collected.
3.2.13 Site PL

Site PL is at the Porcupine Pit Lake; therefore, no channel or flow data was collected.

3.2.14 Site SL

Site SL is at the Snowshoe Pit Lake; therefore, no channel or flow data was collected.

3.2.15 Site GWCC-1

No defined channel was present at groundwater seepage Site GWCC-1 nor was flows sufficient to measure discharge.

3.2.16 Site GWCC-2

No defined channel was present at groundwater seepage Site GWCC-2 nor was flows sufficient to measure discharge.

3.2.17 Site GWCC-3

No defined channel was present at groundwater seepage Site GWCC-3; however, Hemmera/ELR was able to conduct a timed volume flow measurement at the seep. Five timed one-litre measurements were collected, ranging in time from 1.5 seconds to 2.0 seconds. The resulting calculated discharge ranged from 5.0 $\times 10^{-4}$ m³/s and 6.67 $\times 10^{-4}$ m³/s, resulting in a mean calculated discharge at Site GWCC-3 of 6.33 $\times 10^{-4}$ m³/s.

3.2.18 Site GWCC-4

No defined channel was present at groundwater seepage Site GWCC-4 nor was flows sufficient to measure discharge.

3.2.19 Site GWCC-5

A total of eight (8) stations were sampled at Site GWCC-5 (Groundwater flows in old Clinton Creek channel). Surface flows at seepage Site GWCC-5 were minimal, and there was no defined channel. In order to collect discharge data, ELR was forced to channelize existing flows. The resulting channel had a wetted width of 0.65 m, with a mean depth of 0.040 m. Stream velocity ranged from 0.01 m/s to 0.16 m/s, with a mean velocity of 0.050 m/s. The calculated discharge at two crossings was 0.0018 m³/s and 0.0015 m³/s, resulting in a mean calculated discharge at Site E7 of 0.0016 m³/s.

4.0 SUMMARY AND DISCUSSION OF WATER QUALITY MONITORING RESULTS

4.1 SUMMARY OF WATER QUALITY EXCEEDANCES

A summary of the observed exceedances of CCME-PAL guideline levels are summarized according to parameter in **Table 4.1**, below.

Table 4.1 Summary of Exceedances of CCME-PAL Guideline Levels Organized According to Parameter

Parameter	Detected Level (Site)	CCME-PAL Guideline	Comments
рН	6.12 pH (R7)	6.5 – 9.0	Field pH levels at Site R7 were observed to be outside the CCME-PAL guidelines. No occurrences were identified in the field that may be impacting in- situ pH levels. Recorded pH values are assumed to be a component of the natural system.
Dissolved Oxygen	3.57 mg/L (GWCC-1) 4.45 mg/L (GWCC-3) 1.88 mg/L (GWCC-4) 3.36 mg/L (GWCC-5) 1.81 mg/L (E2)	Minimum of 5.5 mg/L	Low dissolved oxygen conditions were detected at groundwater seep sites, which can commonly have reduced dissolved oxygen. No implications for the site are assumed. Low dissolved oxygen levels were also measured at Site E2, no occurrences were identified in the field that may be impacting in- situ DO concentrations.
Total Aluminum	0.129 mg/L (R1) - pH not available, but exceeds least conservative limit regardless of pH. 0.0714 mg/L (R2). pH not available. Not likely to be an exceedance when considering 2013 pH value (7.70). 0.307 mg/L at pH 7.41 (R3) 0.118 mg/L at pH 7.58 (R6) 0.523 mg/L at pH 6.12 (R7) 0.134 mg/L at pH 7.71 (E8)	0.005 mg/L when pH <6.5, 0.1 mg/L when pH > 6.5	All exceedances of total aluminum appear to originate from off-site sources. At least four of the six sampled reference sites show total aluminum concentrations greater than CCME-PAL guidelines. The exceedance at Site E8 is considered to originate from the Forty Mile River, not Clinton Creek.
Dissolved Aluminum	0.0132 mg/L - pH not available (R1) 0.0181 mg/L - pH not available (R2) 0.116 mg/L at pH 6.12 (R7)	0.005 mg/L when pH <6.5, 0.1 mg/L when pH > 6.5	All exceedances of dissolved aluminum appear to originate from off-site sources. Dissolved aluminum did not exceed CCME-PAL guidelines in any of the sampled exposure sites.

Parameter	Detected Level (Site)	CCME-PAL Guideline	Comments
Total Arsenic	0.0152 mg/L (SL)	0.005 mg/L	Exceedances of total arsenic are limited to Snowshoe Pit lake (SL). Arsenic appears to be primarily in the dissolved form, as suggested by comparison of total and dissolved arsenic results. Total arsenic is not currently considered to be a concern for the receiving environment of the Site as exceedances are restricted to the pit area.
Dissolved Arsenic	0.0148 mg/L (SL)	0.005 mg/L	Exceedances of total arsenic are limited to Snowshoe Pit lake (SL). Total arsenic is not currently considered to be a concern for the receiving environment of the Site. Arsenic appears to be primarily in the dissolved form, as suggested by comparison of total and dissolved arsenic results.
Total Chromium	0.0012 mg/L (R3) 0.00232 mg/L (R7) 0.00104 mg/L (E3) 0.00156 mg/L (SL) 0.00247 mg/L (GWCC-1) 0.00173 mg/L (GWCC-2)	0.001 mg/L Note – standard is for hexavalent Chromium (CrVI) as noted in Table 3.3 .	Exceedances for chromium are based on the CrVI standard, however speciated chromium was not specifically measured during the current study. Exceedances appear to be primarily in reference, pit, and seepage areas, and there are currently no exceedances downstream from the site in Clinton Creek.
Dissolved Chromium	0.00146 mg/L (R7) 0.00232 mg/L (GWCC-1) 0.00164 mg/L (GWCC-2)	0.001 mg/L Note – standard is for hexavalent Chromium (CrVI) as noted in Table 3.4 .	Exceedances for chromium are based on the CrVI standard, however speciated chromium was not specifically measured during the current study. Exceedances appear to be primarily in reference and seepage areas, and there are currently no exceedances downstream from the site in Clinton Creek.
Total Copper	0.00533 mg/L at total hardness of 114 mg/L (R7)	0.00264 mg/L based on hardness	Total copper appears to be contributed primarily by an off-site source (R7). Total copper is therefore not considered to be a concern in relation to the Site at this time.
Dissolved Copper	0.00455 mg/L at total hardness of 114 mg/L (R7)	0.00264 mg/L based on hardness	Dissolved copper appears to be contributed primarily by an off-site source (R7). Dissolved copper is therefore not considered to be a concern in relation to the Site at this time.
Total Iron	0.597 mg/L (R1) 0.316 mg/L (R2) 1.050 mg/L (R3) 0.440 mg/L (R6) 2.010 mg/L (R7) 0.347 mg/L (E2) 0.341 mg/L (E3) 0.328 mg/L (E4) 0.308 mg/L (E7) 0.344 mg/L (E8)	0.3 mg/L	Total iron appears to be in nearly all cases originating off-site (R1, R2, R3, R6, and R7), thereby influencing exposed sites.
Dissolved Iron	0.310 mg/L (R1) 0363 mg/L (R6) 1.300 mg/L (R7) 0.303 mg/L (E2)	0.3 mg/L	Dissolved iron appears to be originating off-site (R1, R6, and R7). Dissolved iron levels at exposure sites are close to CCME-PAL guideline. Therefore, dissolved iron is not considered to be a current concern in relation to the site.

Parameter	Detected Level (Site)	CCME-PAL Guideline	Comments
Total Selenium	0.0033 mg/L (R1) 0.00291 mg/L (R4) 0.00141 mg/L (E1) 0.00144 mg/L (E2) 0.00123 mg/L (E4) 0.0105 mg/L (SL) 0.00412 mg/L (GWCC-1) 0.00338 mg/L (GWCC-2) 0.00143 mg/L (GWCC-3) 0.00475 mg/L (GWCC-5)	0.001 mg/L	Total selenium is in some cases originating off-site (R1 and R4), but is also elevated in exposure sites (E1, E2, E4). Concentrations of total selenium are highest in seepage samples GWCC-1 and GWCC- 5. Total selenium levels on upper Clinton Creek exposure sites exceed CCME-PAL guidelines but are below CCME lowest observed effects level (LOEL). Selenium appears to be primarily in the dissolved form, as suggested by comparison of total and dissolved selenium results. Future investigations of Selenium loading from on- vs. off- site sources is suggested.
Dissolved Selenium	0.00378 mg/L (R1) 0.00305 mg/L (R4) 0.0148 mg/L (E1) 0.00144 mg/L (E2) 0.00128 mg/L (E2) 0.00105 mg/L (E7) 0.0103 mg/L (SL) 0.00422 mg/L (GWCC-1) 0.00363 mg/L (GWCC-2) 0.00148 mg/L (GWCC-3) 0.0501 mg/L (GWCC-5)	0.001 mg/L	Dissolved selenium is in some cases originating off- site (R1 and R4), but is consistently elevated in exposure sites (E1, E2, E4, and E7). Concentrations of dissolved selenium are highest in seepage samples GWCC-1 and GWCC-5. Although dissolved selenium levels were elevated on all Clinton Creek exposure sites, concentrations are below CCME LOEL. Selenium appears to be primarily in the dissolved form, as suggested by comparison of total and dissolved selenium results. Future investigations of Selenium loading from on- vs. off-site sources is suggested.

4.2 DISCUSSION OF QA/QC PROGRAM RESULTS

The two blind field duplicate samples demonstrated that there were no obvious sources of error in either field sampling program or laboratory analysis. No exceedances of the 20% RPD threshold were noted between sample and duplicates.

As noted in Section 3.1.3, concentrations of total Kjeldahl nitrogen, dissolved organic carbon, total antimony, dissolved and total barium, dissolved and total boron, dissolved and total calcium, dissolved and total copper, total lead, total lithium, dissolved and total sodium, and dissolved and total strontium were detected in the travel blank. For this particular sampling program, the analytical laboratory did not supply laboratory de-ionized water for preparing the field blank as is customary. This was not noted until Hemmera/ELR were at the Site, and the crew alternately prepared the field blank using a commercial de-ionized water. At the time the field blank was prepared, Hemmera/ELR was unaware that this specific brand of deionized water contained a bittering agent intended to discourage the product from being used for human consumption. A material safety data sheet (MSDS) for the bittering agent references benzenemethanaminium, N-[2-[(2,6-dimethylphenyl)amino]-2-oxoethyl]-N-diethyl-, and benzoate (1:1) as ingredients present which are classified as hazardous to health or the environment and therefore require reporting. These ingredients were listed as present in the deionized water in concentrations of less than 0.1 percent by weight. The presence of the bittering agent in the commercial de-ionized water is thought to be the reason for analytical results in the field blank greater than RDL values, as many of the compounds detected were not found to be elevated in any other sample collected from the Site.

To further investigate whether the source of field blank contamination may have been in the commercial deionized water, two additional samples were submitted to the laboratory for analysis: one using a sample of the same commercial brand of de-ionized water used to prepare the field blank, and the other containing laboratory certified de-ionized water provided by the laboratory. Additional blanks were prepared with both waters at the same time as per laboratory specifications (field filtered and preserved), and both were analysed for total Kjeldahl nitrogen, dissolved organic carbon, total metals and dissolved metals. A comparison of analytical results for the original field blank, commercial de-ionized water test blank, and laboratory certified de-ionized water test blank are provided in **Tables 4.2** and **Table 4.3**.

Results of the blank test samples show a similar chemical composition for metal and non-metal parameters between the field blank and the commercial deionized water. Of the 18 parameters where detectable levels were found in the field blank, 16 of the same parameters were detected in the commercial deionized water test (total Kjeldahl nitrogen and dissolved organic carbon, total antimony, total and dissolved barium, boron, calcium, and copper, total lead, and total and dissolved sodium and strontium). Slight variance between the field blank and commercial deionized water was observed for dissolved antimony, and total lithium (detected in the field blank but not in the commercial deionized test sample). Three other parameters (total manganese, total potassium, and dissolved lead) were detected in the deionized test sample but not in the field blank). The laboratory certified deionized water sample was below RDL values for all parameters except total iron and total manganese.

Parameters	Units	Field Blank (Site GWCC-3)	Commercial Deionized Water Test	Laboratory Deionized Water Test
Total Kjeldahl Nitrogen	mg/L	1.59	1.50	<0.050
Dissolved Organic Carbon	mg/L	51.2	49.5	<0.50
Total Metals				
Aluminum	mg/L	<0.003	<0.0030	<0.0030
Antimony	mg/L	0.00014	0.00015	<0.00010
Arsenic	mg/L	<0.0001	<0.00010	<0.00010
Barium	mg/L	0.000226	0.000450	<0.000050
Beryllium	mg/L	<0.0001	<0.00010	<0.00010
Bismuth	mg/L	<0.0005	<0.00050	<0.00050
Boron	mg/L	0.022	0.023	<0.010
Cadmium	mg/L	<0.00001	<0.000010	<0.000010
Calcium	mg/L	0.139	0.167	<0.050
Chromium	mg/L	<0.0001	<0.00010	<0.00010
Cobalt	mg/L	<0.0001	<0.00010	<0.00010
Copper	mg/L	0.00077	0.00069	<0.00050
Iron	mg/L	<0.01	<0.010	0.018
Lead	mg/L	0.000086	0.000082	<0.000050

 Table 4.2
 Comparison of Total Metals, Total Kjeldahl Nitrogen, and Dissolved Organic Carbon Results for Field Blank and Commercial and Laboratory Deionized Water

Parameters	Units	Field Blank (Site GWCC-3)	Commercial Deionized Water Test	Laboratory Deionized Water Test
Lithium	mg/L	0.00121	<0.00050	<0.00050
Magnesium	mg/L	<0.1	<0.10	<0.10
Manganese	mg/L	<0.00005	0.000067	0.000303
Mercury	mg/L	<0.00001	-	-
Molybdenum	mg/L	<0.00005	<0.000050	<0.000050
Nickel	mg/L	<0.0005	<0.00050	0.00055
Phosphorus	mg/L	<0.00002	<0.050	<0.050
Potassium	mg/L	<0.1	0.12	<0.10
Selenium	mg/L	<0.0001	<0.00010	<0.00010
Silicon	mg/L	<0.05	<0.050	<0.050
Silver	mg/L	<0.00001	<0.000010	<0.000010
Sodium	mg/L	1.43	1.60	<0.050
Strontium	mg/L	0.00105	0.00105	<0.00020
Sulfur	mg/L	<0.500	<0.50	<0.50
Thallium	mg/L	<0.00001	<0.000010	<0.000010
Tin	mg/L	<0.0001	<0.00010	<0.00010
Titanium	mg/L	<0.01	<0.010	<0.010
Uranium	mg/L	<0.00001	<0.000010	<0.000010
Vanadium	mg/L	<0.001	<0.0010	<0.0010
Zinc	mg/L	<0.003	<0.0030	<0.0030

Notes: Bold text indicates results above RDL level.

Table 4.3 Comparison of Dissolved Metals Results between Field Blank, Commercial and Laboratory Deionized Water

Metal	Units	Field Blank (Site GWCC-3)	Commercial Deionized Water Test	Laboratory Deionized Water Test
Aluminum	mg/L	<0.001	<0.0010	<0.0010
Antimony	mg/L	0.0001	<0.00010	<0.00010
Arsenic	mg/L	<0.0001	<0.00010	<0.00010
Barium	mg/L	0.000206	0.000394	<0.000050
Beryllium	mg/L	<0.0001	<0.00010	<0.00010
Bismuth	mg/L	<0.0005	<0.00050	<0.00050
Boron	mg/L	0.016	0.019	<0.010
Cadmium	mg/L	<0.00001	<0.000010	<0.000010
Calcium	mg/L	0.142	0.168	<0.050
Chromium	mg/L	<0.0001	<0.00010	<0.00010
Cobalt	mg/L	<0.0001	<0.00010	<0.00010
Copper	mg/L	0.00071	0.00054	<0.00020
Iron	mg/L	<0.01	<0.010	<0.010
Lead	mg/L	<0.00005	0.000050	<0.000050
Lithium	mg/L	<0.0005	<0.00050	<0.00050

Metal	Units	Field Blank (Site GWCC-3)	Commercial Deionized Water Test	Laboratory Deionized Water Test
Magnesium	mg/L	<0.1	<0.10	<0.10
Manganese	mg/L	<0.00005	<0.000050	<0.000050
Mercury	mg/L	<0.00001	-	-
Molybdenum	mg/L	<0.00005	<0.000050	<0.000050
Nickel	mg/L	<0.0005	<0.00050	<0.00050
Phosphorus	mg/L	<0.00005	<0.050	<0.050
Potassium	mg/L	<0.1	<0.10	<0.10
Selenium	mg/L	<0.0001	<0.00010	<0.00010
Silicon	mg/L	<0.05	<0.050	<0.050
Silver	mg/L	<0.00001	<0.000010	<0.000010
Sodium	mg/L	1.47	1.51	<0.050
Strontium	mg/L	0.00097	0.00101	<0.00020
Sulfur	mg/L	-	<0.50	<0.50
Thallium	mg/L	<0.00001	<0.000010	<0.000010
Tin	mg/L	<0.0001	<0.00010	<0.00010
Titanium	mg/L	<0.01	<0.010	<0.010
Uranium	mg/L	<0.00001	<0.000010	<0.000010
Vanadium	mg/L	<0.001	<0.0010	<0.0010
Zinc	mg/L	<0.001	<0.0010	<0.0010

Notes: Bold text indicates results above RDL level.

Hemmera/ELR consider the results of the follow-up analysis to show that the detected elements in the field blank most likely originated in the commercial deionized water rather than being from on-site sources of contamination. This is supported by the very close chemical match between the field blank and commercial deionized water test despite separate sample preparation events in separate locations. Further, many of the metals detected in both samples were not found to be elevated in other samples collected from the Clinton Creek Site (in water samples). The slight variation between the two samples is likely due to slight differences amongst batches of commercial deionized water (the two sources were the same brand, but not the same actual container).

Based on these results, Hemmera/ELR consider the field blank results to be isolated from the remainder of the program and has confidence in the program analytical results. The entire program was conducted using stringent QA/QC techniques, and the de-ionized water used in the field blank was not used for the cleaning of any field equipment or instruments. Further, the results from field duplicates and the travel blank indicate sound sampling and laboratory practices.

5.0 **RECOMMENDATIONS**

Hemmera/ELR has prepared several recommendations based on the results of the 2014 Clinton Creek water quality and hydrological monitoring program. These recommendations relate to the consistent collection of data on Site, and to better understanding the potential sources of contamination to the Site and its receiving waters.

- 1) The installation of signs at sample site locations to aid field crews with the location and identification of sites and to ensure consistency between sampling events (in particular groundwater seepage sites).
- 2) If flow data from the Forty Mile River is considered to be important to the overall monitoring program for the Site, a method for collecting hydrological data safely from this larger river site should be developed. This could potentially involve the installation of safety cables and the use of remote hydrometric data loggers (e.g., pressure transducer stations).
- 3) Hemmera/ELR recommend that sample Site E1 be permanently relocated to a safe area that can be consistently sampled in the future. During the 2014 program, samples were collected for Site E1 at a location downstream of the primary ford structure after discussion with AAM. The Clinton Creek – Site Hazards document (AAM, 2014) identified the area upstream of the primary ford as a potentially hazardous location, and therefore the site was relocated.

6.0 CLOSURE

Hemmera/ELR are pleased to provide the Yukon Government, Assessment and Abandoned Mines this report that summarizes the 2014 water quality and hydrological monitoring program at the Clinton Creek Site. Please do not hesitate to contact us should you have any questions regarding this report.

Sincerely,

Prepared by: Ecological Logistics & Research Ltd.

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Jason Wilkins, P.Ag., EP, CSAP Director, Land Development Projects 604.669.0424 (209) jwilkins@hemmera.com

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APPENDIX 1 Site Photos



Photo 1: Downstream view of Site R1 (Clinton Creek upstream of Hudgeon Lake). Photo taken on September 20, 2014.



Photo 2: Downstream view of Site R2 (Easter Creek upstream of Hudgeon Lake). Photo taken on September 20, 2014.



Photo 3: Downstream view of Site R3 (Wolverine Creek, upstream of tailings). Photo taken on September 22, 2014.



Photo 4: Upstream view of Site R4 (Eagle Creek, upstream of culvert). Photo taken on September 19, 2014.



Photo 5: Downstream view of Site R6 (Forty Mile River, upstream of Clinton Creek). Photo taken on September 22, 2014.



Photo 6: Upstream view of Site R7 (Porcupine Creek, upstream of waste rock). Photo taken on September 22, 2014.



Photo 7: Upstream view of relocated Site E1 (Clinton Creek downstream of gabions). Photo taken on September 19, 2014.



Photo 8: Downstream view of Site E2 (Clinton Creek, downstream of Porcupine Creek but upstream of Wolverine Creek). Photo taken on September 19, 2014.



Photo 9: Upstream view of Site E3.Photo taken on September 19, 2014.



Photo 10: Upstream view of Site E4 (Clinton Creek downstream of Wolverine Creek but upstream of Eagle Creek). Photo taken on September 19, 2014.



Photo 11: Upstream view of Site E7 (Clinton Creek near mouth).Photo taken on September 21, 2014.



Photo 12: Downstream view of Site E8 (Forty Mile River downstream of Clinton Creek). Photo taken on September 21, 2014.



Photo 13: View of Porcupine Pit Lake (Site PL). Photo taken on September 20, 2014.



Photo 14: Access route to Porcupine Pit Lake (Site PL).Photo taken on September 20, 2014.



Photo 15: Rock falls at sampling location, Porcupine Pit Lake (Site PL).Photo taken on September 20, 2014.



Photo 16: View of Snowshoe Pit Lake (Site SL). Photo taken on September 20, 2014.



Photo 17: View of groundwater seepage Site GWCC-1. Photo taken on September 21, 2014.



Photo 18: View of groundwater seepage Site GWCC-2. Photo taken on September 21, 2014.



Photo 19: View of groundwater seepage Sites GWCC-1 and GWCC-2. Photo taken on September 21, 2014.



Photo 20: View of groundwater seepage Site GWCC-3. Photo taken on September 21, 2014.



Photo 21: View of groundwater seepage Site GWCC-4. Photo taken on September 21, 2014.



Photo 22: View of groundwater seepage GWCC-5. Photo taken on September 19, 2014.





Photo 23: View of unnamed groundwater seepage site. Photo taken on September 21, 2014.



Photo 24: View of channel formed from groundwater seepage sites. Photo taken on September 21, 2014.

APPENDIX 2

Water Quality Analytical Laboratory Reports



HEMMERA ENVIROCHEM INC. ATTN: Natasha Sandys 230 - 2237 2nd Avenue Whitehorse YK Y1A 0K7

ADDRESS: 8081

Date Received: 22-SEP-14 Report Date: 01-OCT-14 17:25 (MT) Version: FINAL

Client Phone: 867-456-4865

Certificate of Analysis

L1521155

Lab Work Order #:

Project P.O. #: Job Reference: C of C Numbers: Legal Site Desc: NOT SUBMITTED HEMMERA 1343-005.04/ELR 14-183 10-152908, 10-152909



Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

Suite 100. Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700. S Group A Campbell Brothers Limited Company

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	· · · · · · · · · · · · · · · · · · ·		1	1	10.0.	
	Sample ID	L1521155-1 Surface Water	L1521155-2 Surface Water	L1521155-3 Surface Water	L1521155-4 Surface Water	L1521155-5 Surface Water
	Description Sampled Date	19-SEP-14	19-SEP-14	20-SEP-14	20-SEP-14	19-SEP-14
	Sampled Time	11:02		15:10		13:45
	Client ID	E1	DUP 1	E1	DUP 1	GWCC-5
Grouping	Analyte					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	278	279			541
	Total Suspended Solids (mg/L)			<3.0	<3.0	• • •
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0107	0.0110			0.0062
	Nitrate (as N) (mg/L)			0.152	0.151	
	Nitrite (as N) (mg/L)			0.0016	0.0021	
	Total Kjeldahl Nitrogen (mg/L)	0.418	0.490			0.235
	Phosphorus (P)-Total (mg/L)	0.0050	0.0059			0.0026
	Sulfate (SO4) (mg/L)			139	139	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	16.8	17.1			8.31
Total Metals	Aluminum (Al)-Total (mg/L)	0.0420	0.0382			<0.0030
	Antimony (Sb)-Total (mg/L)	0.00034	0.00034			0.00089
	Arsenic (As)-Total (mg/L)	0.00080	0.00077			0.00069
	Barium (Ba)-Total (mg/L)	0.0554	0.0551			0.0551
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010			<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050			<0.00050
	Boron (B)-Total (mg/L)	0.012	0.012			0.039
	Cadmium (Cd)-Total (mg/L)	0.000036	0.000040			0.000120
	Calcium (Ca)-Total (mg/L)	59.3	59.3			123
	Chromium (Cr)-Total (mg/L)	0.00078	0.00069			0.00080
	Cobalt (Co)-Total (mg/L)	0.00032	0.00031			<0.00010
	Copper (Cu)-Total (mg/L)	0.00324	0.00330			0.00122
	Iron (Fe)-Total (mg/L)	0.235	0.233			0.011
	Lead (Pb)-Total (mg/L)	0.000083	0.000083			<0.000050
	Lithium (Li)-Total (mg/L)	0.00300	0.00312			0.0103
	Magnesium (Mg)-Total (mg/L)	29.7	30.0			57.5
	Manganese (Mn)-Total (mg/L)	0.102	0.101			0.00230
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010			<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.00138	0.00139			0.00197
	Nickel (Ni)-Total (mg/L)	0.00537	0.00525			0.0170
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050			<0.050
	Potassium (K)-Total (mg/L)	0.57	0.56			0.96
	Selenium (Se)-Total (mg/L)	0.00141	0.00140			0.00475
	Silicon (Si)-Total (mg/L)	4.40	4.46			4.82
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			<0.000010
	Sodium (Na)-Total (mg/L)	2.62	2.62			3.98
	Strontium (Sr)-Total (mg/L)	0.290	0.303			0.771

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1521155-6 Surface Water 20-SEP-14 15:15 GWCC-5	L1521155-7 Surface Water 19-SEP-14 15:00 E2	L1521155-8 Surface Water 20-SEP-14 15:25 E2	L1521155-9 Surface Water 19-SEP-14 16:20 E3	L1521155-10 Surface Water 20-SEP-14 15:25 E3
Grouping	Analyte					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)		433		465	
	Total Suspended Solids (mg/L)	<3.0		<3.0		<3.0
Anions and Nutrients	Ammonia, Total (as N) (mg/L)		0.0128		0.0063	
	Nitrate (as N) (mg/L)	DLA <0.025		0.138		0.126
	Nitrite (as N) (mg/L)	DLA <0.0050		0.0011		0.0013
	Total Kjeldahl Nitrogen (mg/L)		0.428		0.411	
	Phosphorus (P)-Total (mg/L)		0.0043		0.0093	
	Sulfate (SO4) (mg/L)	281		252		261
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)		15.0		13.5	
Total Metals	Aluminum (Al)-Total (mg/L)		0.0253		0.0681	
	Antimony (Sb)-Total (mg/L)		0.00046		0.00102	
	Arsenic (As)-Total (mg/L)		0.00120		0.00125	
	Barium (Ba)-Total (mg/L)		0.0517		0.0539	
	Beryllium (Be)-Total (mg/L)		<0.00010		<0.00010	
	Bismuth (Bi)-Total (mg/L)		<0.00050		<0.00050	
	Boron (B)-Total (mg/L)		0.045		0.089	
	Cadmium (Cd)-Total (mg/L)		0.000055		0.000019	
	Calcium (Ca)-Total (mg/L)		79.0		77.2	
	Chromium (Cr)-Total (mg/L)		0.00070		0.00104	
	Cobalt (Co)-Total (mg/L)		0.00070		0.00030	
	Copper (Cu)-Total (mg/L)		0.00267		0.00182	
	Iron (Fe)-Total (mg/L)		0.347		0.341	
	Lead (Pb)-Total (mg/L)		<0.000050		0.000057	
	Lithium (Li)-Total (mg/L)		0.00990		0.00502	
	Magnesium (Mg)-Total (mg/L)		55.4		62.3	
	Manganese (Mn)-Total (mg/L)		0.119		0.0901	
	Mercury (Hg)-Total (mg/L)		<0.000010		<0.000010	
	Molybdenum (Mo)-Total (mg/L)		0.00181		0.00146	
	Nickel (Ni)-Total (mg/L)		0.0162		0.0110	
	Phosphorus (P)-Total (mg/L)		<0.050		<0.050	
	Potassium (K)-Total (mg/L)		0.85		0.88	
	Selenium (Se)-Total (mg/L)		0.00144		0.00082	
	Silicon (Si)-Total (mg/L)		4.70		5.81	
	Silver (Ag)-Total (mg/L)		<0.000010		<0.000010	
	Sodium (Na)-Total (mg/L)		4.06		4.49	
	Strontium (Sr)-Total (mg/L)		0.497		0.410	

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	Sample ID Description Sampled Date Sampled Time Client ID	L1521155-11 Surface Water 19-SEP-14 18:38 E4	L1521155-12 Surface Water 20-SEP-14 15:35 E4	L1521155-13 Surface Water 19-SEP-14 17:35 R4	L1521155-14 Surface Water 20-SEP-14 15:40 R4	L1521155-15 Surface Water 20-SEP-14 10:10 R1
Grouping	Analyte					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	473		448		401
	Total Suspended Solids (mg/L)		<3.0		<3.0	6.0
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0054		0.0175		0.0310
	Nitrate (as N) (mg/L)		0.103		0.113	0.162
	Nitrite (as N) (mg/L)		<0.0010		<0.0010	0.0011
	Total Kjeldahl Nitrogen (mg/L)	0.394		0.378		0.368
	Phosphorus (P)-Total (mg/L)	0.0055		0.0036		0.0064
	Sulfate (SO4) (mg/L)		268		235	220
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	14.3		12.9		12.7
Total Metals	Aluminum (Al)-Total (mg/L)	0.0237		0.0304		0.129
	Antimony (Sb)-Total (mg/L)	0.00051		0.00047		0.00027
	Arsenic (As)-Total (mg/L)	0.00122		0.00230		0.00071
	Barium (Ba)-Total (mg/L)	0.0516		0.0627		0.0586
	Beryllium (Be)-Total (mg/L)	<0.00010		<0.00010		<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050		<0.00050		<0.00050
	Boron (B)-Total (mg/L)	0.065		<0.010		0.014
	Cadmium (Cd)-Total (mg/L)	0.000045		0.000094		0.000086
	Calcium (Ca)-Total (mg/L)	83.3		92.7		89.5
	Chromium (Cr)-Total (mg/L)	0.00079		0.00050		0.00070
	Cobalt (Co)-Total (mg/L)	0.00072		0.00182		0.00078
	Copper (Cu)-Total (mg/L)	0.00244		0.00288		0.00285
	Iron (Fe)-Total (mg/L)	0.328		0.268		0.597
	Lead (Pb)-Total (mg/L)	<0.000050		<0.000050		0.000263
	Lithium (Li)-Total (mg/L)	0.0142		0.00492		0.00399
	Magnesium (Mg)-Total (mg/L)	63.3		49.0		40.7
	Manganese (Mn)-Total (mg/L)	0.146		0.304		0.388
	Mercury (Hg)-Total (mg/L)	<0.000010		<0.000010		<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.00183		0.00139		0.00169
	Nickel (Ni)-Total (mg/L)	0.0188		0.0148		0.00526
	Phosphorus (P)-Total (mg/L)	<0.050		<0.050		<0.050
	Potassium (K)-Total (mg/L)	0.97		0.59		0.62
	Selenium (Se)-Total (mg/L)	0.00123		0.00291		0.00330
	Silicon (Si)-Total (mg/L)	4.79		5.18		4.84
	Silver (Ag)-Total (mg/L)	<0.000010		<0.000010		0.000011
	Sodium (Na)-Total (mg/L)	5.24		5.00		3.51
	Strontium (Sr)-Total (mg/L)	0.565		0.538		0.460

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	Sample ID Description Sampled Date Sampled Time Client ID	L1521155-16 Surface Water 20-SEP-14 11:55 R2	L1521155-17 Surface Water 20-SEP-14 14:30 SL		
Grouping	Analyte				
WATER					
Physical Tests	Hardness (as CaCO3) (mg/L)	370	990		
	Total Suspended Solids (mg/L)	<3.0	4.0		
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0082	<0.0050		
	Nitrate (as N) (mg/L)	0.0402	<0.050		
	Nitrite (as N) (mg/L)	<0.0010	<0.010		
	Total Kjeldahl Nitrogen (mg/L)	0.238	0.216		
	Phosphorus (P)-Total (mg/L)	0.0063	0.0034		
	Sulfate (SO4) (mg/L)	172	721		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	9.89	7.79		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0714	0.0214		
	Antimony (Sb)-Total (mg/L)	0.00054	0.00354		
	Arsenic (As)-Total (mg/L)	0.00089	0.0152		
	Barium (Ba)-Total (mg/L)	0.0523	0.0199		
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010		
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050		
	Boron (B)-Total (mg/L)	0.016	0.051		
	Cadmium (Cd)-Total (mg/L)	0.000029	0.000026		
	Calcium (Ca)-Total (mg/L)	65.8	226		
	Chromium (Cr)-Total (mg/L)	0.00072	0.00156		
	Cobalt (Co)-Total (mg/L)	0.00024	0.00012		
	Copper (Cu)-Total (mg/L)	0.00184	0.00133		
	Iron (Fe)-Total (mg/L)	0.316	0.035		
	Lead (Pb)-Total (mg/L)	0.000056	<0.000050		
	Lithium (Li)-Total (mg/L)	0.00622	0.0111		
	Magnesium (Mg)-Total (mg/L)	49.0	101		
	Manganese (Mn)-Total (mg/L)	0.122	0.00325		
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010		
	Molybdenum (Mo)-Total (mg/L)	0.000833	0.00196		
	Nickel (Ni)-Total (mg/L)	0.00320	0.0183		
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050		
	Potassium (K)-Total (mg/L)	0.79	1.48		
	Selenium (Se)-Total (mg/L)	0.00068	0.0105		
	Silicon (Si)-Total (mg/L)	5.80	5.42		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	3.33	2.59		
	Strontium (Sr)-Total (mg/L)	0.392	1.10		

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	Sample ID Description Sampled Date Sampled Time Client ID	L1521155-1 Surface Water 19-SEP-14 11:02 E1	L1521155-2 Surface Water 19-SEP-14 DUP 1	L1521155-3 Surface Water 20-SEP-14 15:10 E1	L1521155-4 Surface Water 20-SEP-14 DUP 1	L1521155-5 Surface Water 19-SEP-14 13:45 GWCC-5
Grouping	Analyte	-				
WATER						
Total Metals	Sulfur (S)-Total (mg/L)	46.7	47.0			98.6
	Thallium (TI)-Total (mg/L)	<0.000010	<0.000010			0.000017
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			<0.010
	Uranium (U)-Total (mg/L)	0.00192	0.00193			0.00220
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010			<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD			FIELD
	Aluminum (AI)-Dissolved (mg/L)	0.0322	0.0293			0.0018
	Antimony (Sb)-Dissolved (mg/L)	0.00033	0.00033			0.00091
	Arsenic (As)-Dissolved (mg/L)	0.00076	0.00069			0.00065
	Barium (Ba)-Dissolved (mg/L)	0.0552	0.0518			0.0545
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010			<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050			<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010			0.034
	Cadmium (Cd)-Dissolved (mg/L)	0.000037	0.000035			0.000089
	Calcium (Ca)-Dissolved (mg/L)	61.5	61.6			123
	Chromium (Cr)-Dissolved (mg/L)	0.00054	0.00047			0.00068
	Cobalt (Co)-Dissolved (mg/L)	0.00028	0.00024			<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00314	0.00265			0.00100
	Iron (Fe)-Dissolved (mg/L)	0.210	0.202			0.011
	Lead (Pb)-Dissolved (mg/L)	0.000055	<0.000050			<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.00315	0.00298			0.00995
	Magnesium (Mg)-Dissolved (mg/L)	30.3	30.5			56.8
	Manganese (Mn)-Dissolved (mg/L)	0.0947	0.0831			0.00208
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010			<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.00123	0.00125			0.00181
	Nickel (Ni)-Dissolved (mg/L)	0.00514	0.00459			0.0165
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			<0.050
	Potassium (K)-Dissolved (mg/L)	0.57	0.57			0.96
	Selenium (Se)-Dissolved (mg/L)	0.00148	0.00158			0.00501
	Silicon (Si)-Dissolved (mg/L)	4.51	4.50			4.75
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			<0.000010
	Sodium (Na)-Dissolved (mg/L)	2.66	2.32			3.90
	Strontium (Sr)-Dissolved (mg/L)	0.290	0.282			0.745
	Sulfur (S)-Dissolved (mg/L)	46.8	46.9			95.3

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	Sample ID Description Sampled Date Sampled Time Client ID	L1521155-6 Surface Water 20-SEP-14 15:15 GWCC-5	L1521155-7 Surface Water 19-SEP-14 15:00 E2	L1521155-8 Surface Water 20-SEP-14 15:25 E2	L1521155-9 Surface Water 19-SEP-14 16:20 E3	L1521155-10 Surface Water 20-SEP-14 15:25 E3
Grouping	Analyte					
WATER						
Total Metals	Sulfur (S)-Total (mg/L)		86.1		88.2	
	Thallium (TI)-Total (mg/L)		0.000022		<0.000010	
	Tin (Sn)-Total (mg/L)		<0.00010		<0.00010	
	Titanium (Ti)-Total (mg/L)		<0.010		<0.010	
	Uranium (U)-Total (mg/L)		0.00228		0.00435	
	Vanadium (V)-Total (mg/L)		<0.0010		<0.0010	
	Zinc (Zn)-Total (mg/L)		<0.0030		<0.0030	
Dissolved Metals	Dissolved Mercury Filtration Location		FIELD		FIELD	
	Dissolved Metals Filtration Location		FIELD		FIELD	
	Aluminum (AI)-Dissolved (mg/L)		0.0198		0.0188	
	Antimony (Sb)-Dissolved (mg/L)		0.00047		0.00094	
	Arsenic (As)-Dissolved (mg/L)		0.00107		0.00110	
	Barium (Ba)-Dissolved (mg/L)		0.0512		0.0541	
	Beryllium (Be)-Dissolved (mg/L)		<0.00010		<0.00010	
	Bismuth (Bi)-Dissolved (mg/L)		<0.00050		<0.00050	
	Boron (B)-Dissolved (mg/L)		0.044		0.082	
	Cadmium (Cd)-Dissolved (mg/L)		0.000049		0.000013	
	Calcium (Ca)-Dissolved (mg/L)		80.8		80.8	
	Chromium (Cr)-Dissolved (mg/L)		0.00058		0.00075	
	Cobalt (Co)-Dissolved (mg/L)		0.00065		0.00026	
	Copper (Cu)-Dissolved (mg/L)		0.00223		0.00166	
	Iron (Fe)-Dissolved (mg/L)		0.303		0.093	
	Lead (Pb)-Dissolved (mg/L)		<0.000050		<0.000050	
	Lithium (Li)-Dissolved (mg/L)		0.00999		0.00513	
	Magnesium (Mg)-Dissolved (mg/L)		56.2		63.8	
	Manganese (Mn)-Dissolved (mg/L)		0.110		0.0876	
	Mercury (Hg)-Dissolved (mg/L)		<0.000010		<0.000010	
	Molybdenum (Mo)-Dissolved (mg/L)		0.00153		0.00123	
	Nickel (Ni)-Dissolved (mg/L)		0.0151		0.0106	
	Phosphorus (P)-Dissolved (mg/L)		<0.050		<0.050	
	Potassium (K)-Dissolved (mg/L)		0.87		0.88	
	Selenium (Se)-Dissolved (mg/L)		0.00144		0.00079	
	Silicon (Si)-Dissolved (mg/L)		4.68		5.83	
	Silver (Ag)-Dissolved (mg/L)		<0.000010		<0.000010	
	Sodium (Na)-Dissolved (mg/L)		3.73		4.46	
	Strontium (Sr)-Dissolved (mg/L)		0.422		0.356	
	Sulfur (S)-Dissolved (mg/L)		86.0		88.6	

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	Sample ID Description Sampled Date Sampled Time Client ID	L1521155-11 Surface Water 19-SEP-14 18:38 E4	L1521155-12 Surface Water 20-SEP-14 15:35 E4	L1521155-13 Surface Water 19-SEP-14 17:35 R4	L1521155-14 Surface Water 20-SEP-14 15:40 R4	L1521155-15 Surface Water 20-SEP-14 10:10 R1
Grouping	Analyte					
WATER						
Total Metals	Sulfur (S)-Total (mg/L)	93.0		78.1		74.8
	Thallium (TI)-Total (mg/L)	0.000017		<0.000010		<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010		<0.00010		<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010		<0.010		<0.010
	Uranium (U)-Total (mg/L)	0.00252		0.00641		0.00285
	Vanadium (V)-Total (mg/L)	<0.0010		<0.0010		<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030		0.0050		0.0043
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD		FIELD		FIELD
	Dissolved Metals Filtration Location	FIELD		FIELD		FIELD
	Aluminum (AI)-Dissolved (mg/L)	0.0146		0.0124		0.0132
	Antimony (Sb)-Dissolved (mg/L)	0.00051		0.00048		0.00022
	Arsenic (As)-Dissolved (mg/L)	0.00112		0.00226		0.00056
	Barium (Ba)-Dissolved (mg/L)	0.0500		0.0624		0.0535
	Beryllium (Be)-Dissolved (mg/L)	<0.00010		<0.00010		<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050		<0.00050		<0.00050
	Boron (B)-Dissolved (mg/L)	0.057		<0.010		0.011
	Cadmium (Cd)-Dissolved (mg/L)	0.000045		0.000084		0.000067
	Calcium (Ca)-Dissolved (mg/L)	84.6		96.8		93.3
	Chromium (Cr)-Dissolved (mg/L)	0.00062		0.00038		0.00026
	Cobalt (Co)-Dissolved (mg/L)	0.00068		0.00179		0.00065
	Copper (Cu)-Dissolved (mg/L)	0.00207		0.00205		0.00193
	Iron (Fe)-Dissolved (mg/L)	0.260		0.198		0.310
	Lead (Pb)-Dissolved (mg/L)	<0.000050		<0.000050		<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0138		0.00504		0.00339
	Magnesium (Mg)-Dissolved (mg/L)	63.6		50.1		40.9
	Manganese (Mn)-Dissolved (mg/L)	0.138		0.299		0.348
	Mercury (Hg)-Dissolved (mg/L)	<0.000010		<0.000010		<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.00166		0.00131		0.00156
	Nickel (Ni)-Dissolved (mg/L)	0.0181		0.0146		0.00451
	Phosphorus (P)-Dissolved (mg/L)	<0.050		<0.050		<0.050
	Potassium (K)-Dissolved (mg/L)	1.00		0.60		0.60
	Selenium (Se)-Dissolved (mg/L)	0.00128		0.00305		0.00378
	Silicon (Si)-Dissolved (mg/L)	4.75		5.24		4.71
	Silver (Ag)-Dissolved (mg/L)	<0.000010		<0.000010		<0.000010
	Sodium (Na)-Dissolved (mg/L)	5.20		4.99		3.24
	Strontium (Sr)-Dissolved (mg/L)	0.533		0.549		0.426
	Sulfur (S)-Dissolved (mg/L)	91.1		78.7		73.7

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	Sample ID Description Sampled Date Sampled Time Client ID	L1521155-16 Surface Water 20-SEP-14 11:55 R2	L1521155-17 Surface Water 20-SEP-14 14:30 SL			
Grouping	Analyte					
WATER						
Total Metals	Sulfur (S)-Total (mg/L)	58.9	234			
	Thallium (TI)-Total (mg/L)	<0.000010	0.000018			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.00474	0.00313			
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (AI)-Dissolved (mg/L)	0.0181	0.0012			
	Antimony (Sb)-Dissolved (mg/L)	0.00051	0.00342			
	Arsenic (As)-Dissolved (mg/L)	0.00082	0.0148			
	Barium (Ba)-Dissolved (mg/L)	0.0503	0.0192			
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050			
	Boron (B)-Dissolved (mg/L)	0.013	0.048			
	Cadmium (Cd)-Dissolved (mg/L)	0.000025	0.000023			
	Calcium (Ca)-Dissolved (mg/L)	67.0	230			
	Chromium (Cr)-Dissolved (mg/L)	0.00047	0.00099			
	Cobalt (Co)-Dissolved (mg/L)	0.00020	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.00163	0.00080			
	Iron (Fe)-Dissolved (mg/L)	0.212	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.00611	0.0105			
	Magnesium (Mg)-Dissolved (mg/L)	49.1	101			
	Manganese (Mn)-Dissolved (mg/L)	0.119	0.00240			
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000730	0.00173			
	Nickel (Ni)-Dissolved (mg/L)	0.00305	0.0168			
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			
	Potassium (K)-Dissolved (mg/L)	0.80	1.46			
	Selenium (Se)-Dissolved (mg/L)	0.00070	0.0103			
	Silicon (Si)-Dissolved (mg/L)	5.70	5.35			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	3.30	2.34			
	Strontium (Sr)-Dissolved (mg/L)	0.361	0.971			
	Sulfur (S)-Dissolved (mg/L)	57.9	230			

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	Sample ID Description Sampled Date Sampled Time Client ID	L1521155-1 Surface Water 19-SEP-14 11:02 E1	L1521155-2 Surface Water 19-SEP-14 DUP 1	L1521155-3 Surface Water 20-SEP-14 15:10 E1	L1521155-4 Surface Water 20-SEP-14 DUP 1	L1521155-5 Surface Water 19-SEP-14 13:45 GWCC-5
Grouping	Analyte					
WATER						
Dissolved Metals	Thallium (TI)-Dissolved (mg/L)	<0.000010	<0.000010			0.000017
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			<0.010
	Uranium (U)-Dissolved (mg/L)	0.00181	0.00182			0.00208
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010			<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.0017	0.0011			<0.0010

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	Sample ID Description Sampled Date Sampled Time Client ID	L1521155-6 Surface Water 20-SEP-14 15:15 GWCC-5	L1521155-7 Surface Water 19-SEP-14 15:00 E2	L1521155-8 Surface Water 20-SEP-14 15:25 E2	L1521155-9 Surface Water 19-SEP-14 16:20 E3	L1521155-10 Surface Water 20-SEP-14 15:25 E3
Grouping	Analyte					
WATER						
Dissolved Metals	Thallium (TI)-Dissolved (mg/L)		0.000020		<0.000010	
	Tin (Sn)-Dissolved (mg/L)		<0.00010		<0.00010	
	Titanium (Ti)-Dissolved (mg/L)		<0.010		<0.010	
	Uranium (U)-Dissolved (mg/L)		0.00202		0.00382	
	Vanadium (V)-Dissolved (mg/L)		<0.0010		<0.0010	
	Zinc (Zn)-Dissolved (mg/L)		0.0017		0.0028	

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	Sample ID Description Sampled Date Sampled Time Client ID	L1521155-11 Surface Water 19-SEP-14 18:38 E4	L1521155-12 Surface Water 20-SEP-14 15:35 E4	L1521155-13 Surface Water 19-SEP-14 17:35 R4	L1521155-14 Surface Water 20-SEP-14 15:40 R4	L1521155-15 Surface Water 20-SEP-14 10:10 R1
Grouping	Analyte					
WATER						
Dissolved Metals	Thallium (TI)-Dissolved (mg/L)	0.000020		<0.000010		<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010		<0.00010		<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010		<0.010		<0.010
	Uranium (U)-Dissolved (mg/L)	0.00235		0.00678		0.00269
	Vanadium (V)-Dissolved (mg/L)	<0.0010		<0.0010		<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.0012		0.0038		0.0022
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	Sample ID Description Sampled Date Sampled Time Client ID	L1521155-16 Surface Water 20-SEP-14 11:55 R2	L1521155-17 Surface Water 20-SEP-14 14:30 SL		
Grouping	Analyte				
WATER					
Dissolved Metals	Thallium (TI)-Dissolved (mg/L)	<0.000010	0.000015		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.00419	0.00284		
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010		
	Zinc (Zn)-Dissolved (mg/L)	0.0022	<0.0010		

Qualifiers for Ir	ndividual S	amples List	ed:			
Sample Number	Client Sa	mple ID	Qualifier	Description		
L1521155-7	E2		WSMT	Water sample(s	s) for total mer ICI preservativ	cury analysis was not submitted in glass or PTFE /e. Results may be biased low.
QC Samples with	n Qualifiers	s & Commer	nts:			
QC Type Descrip	otion		Parameter		Qualifier	Applies to Sample Number(s)
Matrix Spike			Sulfate (SO4)		MS-B	L1521155-10, -12, -14, -15, -16, -17, -3, -4, -6, -8
Matrix Spike			Sodium (Na)-Disso	olved	MS-B	L1521155-1, -11, -13, -15, -16, -17, -2, -5, -7, -9
Matrix Spike			Strontium (Sr)-Dise	solved	MS-B	L1521155-1, -11, -13, -15, -16, -17, -2, -5, -7, -9
Matrix Spike			Sulfur (S)-Dissolve	ed	MS-B	L1521155-1, -11, -13, -15, -16, -17, -2, -5, -7, -9
Matrix Spike			Dissolved Organic	Carbon	MS-B	L1521155-1, -2
Qualifiers for In	dividual P	arameters L	isted:			
Qualifier	Descriptio	n				
DLA	Detection	Limit adiuste	d for required dilution			
MS-B	Matrix Spil	ke recoverv o	could not be accurately	calculated due to	high analvte l	background in sample.
			, ,		5	
est Method Re	terences:	Motrix	Test Deserietien			Mothed Deference**
ALS Test Code		Matrix	Test Description			
ANIONS-NO2-IC-	WR	Water	Nitrite Nitrogen by Io	n Chromatography	/	EPA 300.1
This analysis is 1.0, April 1999 a Dionex 2003. N	carried out and from "D itrate is det	using procec etermination ected by UV	lures adapted from EP of Inorganic Anions in absorbance.	A Method 300.1, ' Environmental W	Determination aters Using a	of Inorganic Anions by Ion Chromatography", Revision Hydroxide-Selective Column", Application Note 154 v.19
NIONS-NO3-IC-	WR	Water	Nitrate Nitrogen by Ic	on Chromatograph	ıy	EPA 300.1
This analysis is 1.0, April 1999 a Dionex 2003. N	carried out and from "D itrate is det	using proced etermination ected by UV	lures adapted from EP of Inorganic Anions in absorbance.	A Method 300.1, ' Environmental W	Determination aters Using a	o of Inorganic Anions by Ion Chromatography", Revision Hydroxide-Selective Column", Application Note 154 v.19
ANIONS-SO4-IC-	WR	Water	Sulphate by Ion Chro	omatography		EPA 300.1
This analysis is 1.0, April 1999 a Dionex 2003.	carried out and from "D	using procec etermination	lures adapted from EP of Inorganic Anions in	A Method 300.1, ' Environmental W	Determination aters Using a	o of Inorganic Anions by Ion Chromatography", Revision Hydroxide-Selective Column", Application Note 154 v.19
CARBONS-DOC-	VA	Water	Dissolved organic ca	rbon by combustic	on	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is determined by fi	carried out Itering the s	using procec sample throu	lures adapted from AP gh a 0.45 micron mem	HA Method 5310 brane filter prior to	"Total Organic o analysis.	Carbon (TOC)". Dissolved carbon (DOC) fractions are
HARDNESS-CAL	C-VA	Water	Hardness			APHA 2340B
Hardness (also l Dissolved Calciu	known as T Im and Mag	otal Hardnes	s) is calculated from th centrations are prefere	ne sum of Calcium ntially used for the	n and Magnesi e hardness cal	um concentrations, expressed in CaCO3 equivalents. culation.
IG-DIS-LOW-CV	AFS-VA	Water	Dissolved Mercury in	Water by CVAFS	(Low)	EPA SW-846 3005A & EPA 245.7
This analysis is American Public States Environm involves a cold-c analysis is by co	carried out Health Ass nental Prote oxidation of Id vapour a	using proced sociation, and totion Agency the acidified tomic fluores	lures adapted from "St d with procedures adap y (EPA). The procedur sample using bromine scence spectrophotom	andard Methods for oted from "Test Me res may involve pr e monochloride pri etry or atomic abs	or the Examina ethods for Eva reliminary sam or to reduction corption spectre	ation of Water and Wastewater" published by the iluating Solid Waste" SW-846 published by the United ple treatment by filtration (EPA Method 3005A) and of the sample with stannous chloride. Instrumental ophotometry (EPA Method 245.7).
IG-TOT-LOW-C	/AFS-VA	Water	Total Mercury in Wat	er by CVAFS(Low	()	EPA 245.7
This analysis is American Public States Environm reduction of the spectrophotome	carried out Health Ass iental Prote sample with try (EPA M	using proced sociation, and ection Agency h stannous c ethod 245.7)	lures adapted from "St d with procedures adap y (EPA). The procedur hloride. Instrumental a	andard Methods for oted from "Test Me re involves a cold- analysis is by cold	or the Examina ethods for Eva oxidation of th vapour atomic	ation of Water and Wastewater" published by the iluating Solid Waste" SW-846 published by the United e acidified sample using bromine monochloride prior to c fluorescence spectrophotometry or atomic absorption
IET-D-CCMS-V	4	Water	Dissolved Metals in W	Vater by CRC ICF	PMS	APHA 3030 B&E / EPA SW-846 6020A
This analysis is American Public States Environm filtration (APHA 6020A).	carried out Health Ass iental Prote 3030B&E).	using proced sociation, and ction Agency Instrumenta	dures adapted from "St d with procedures adaµ y (EPA). The procedur al analysis is by collisio	andard Methods fo oted from "Test Me res may involve pr n cell inductively o	or the Examina ethods for Eva reliminary sam coupled plasm	ation of Water and Wastewater" published by the Iluating Solid Waste" SW-846 published by the United ple treatment by acid digestion, using hotblock, or a - mass spectrometry (modified from EPA Method
MET-DIS-LOW-IC	P-VA	Water	Dissolved Metals in V	Vater by ICPOES		EPA 3005A/6010B
This analysis is	carried out	using proced	lures adapted from "St	andard Methods f	or the Examina	ation of Water and Wastewater" published by the

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma -

optical emission spectrophotometry (EPA Method 6010B).

Total Metals in Water by CRC ICPMS **MET-T-CCMS-VA** Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

MET-TOT-LOW-ICP-VA Water Total Metals in Water by ICPOES

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA Water Ammonia in Water by Fluorescence

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry. "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater". Roslyn J. Waston et al.

P-T-PRES-COL-VA Water Total P in Water by Colour

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

S-DIS-ICP-VA Water **Dissolved Sulfur in Water by ICPOES**

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA Water Total Sulfur in Water by ICPOES

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

TKN in Water by Fluorescence **TKN-F-VA** Water

Water

APHA 4500-NORG D.

APHA 2540 D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-MAN-WR

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids are determined by filtering a sample through a glass fibre filter and drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Total Suspended Solids by Gravimetric

Laboratory Definition Code	Laboratory Location
WR	ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

10-152908

10-152909

EPA SW-846 3005A/6010B

APHA 4500-P Phosphorus

EPA SW-846 3005A/6010B

APHA 3030 B&E / EPA SW-846 6020A

J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

EPA 3005A/6010B

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. *mg/kg* - *milligrams per kilogram based on dry weight of sample.*

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Chain of Custody / Analytical Req Canada Toll Free: 1 800 668 www.alsglobal.com	L1521155-C
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ADDRESS: 8081 L

Date Received:06-NOV-14Report Date:19-NOV-14 14:07 (MT)Version:FINAL

Client Phone: 867-668-6386

Certificate of Analysis

Lab Work Order #: L1543778

Project P.O. #: Job Reference: C of C Numbers: Legal Site Desc: ELR 14-183 HEMMERA 1343-005.04 10-219289



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L1543778 CONTD.... PAGE 2 of 5 19-NOV-14 14:07 (MT) Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1543778-1 Water 06-NOV-14 12:10 DI TEST-COM	L1543778-2 Water 06-NOV-14 12:10 DI TEST-LAB		
Grouping	Analyte				
WATER	Anaryo				
Physical Tests	Hardness (as CaCO3) (mg/L)	0.50	0.50		
Anions and Nutrients	Total Kjeldahl Nitrogen (mg/L)	<0.50 1.50	<0.50		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	49.5	<0.50		
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030	<0.0030		
	Antimony (Sb)-Total (mg/L)	0.00015	<0.00010		
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010		
	Barium (Ba)-Total (mg/L)	0.000450	<0.000050		
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010		
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050		
	Boron (B)-Total (mg/L)	0.023	<0.010		
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010		
	Calcium (Ca)-Total (mg/L)	0.167	<0.050		
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010		
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010		
	Copper (Cu)-Total (mg/L)	0.00069	<0.00050		
	Iron (Fe)-Total (mg/L)	<0.010	0.018		
	Lead (Pb)-Total (mg/L)	0.000082	<0.000050		
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050		
	Magnesium (Mg)-Total (mg/L)	<0.10	<0.10		
	Manganese (Mn)-Total (mg/L)	0.000067	0.000303		
	Molybdenum (Mo)-Total (mg/L)	<0.000050	<0.000050		
	Nickel (Ni)-Total (mg/L)	<0.00050	0.00055		
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050		
	Potassium (K)-Total (mg/L)	0.12	<0.10		
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010		
	Silicon (Si)-Total (mg/L)	<0.050	<0.050		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	1.60	<0.050		
	Strontium (Sr)-Total (mg/L)	0.00105	<0.00020		
	Sulfur (S)-Total (mg/L)	<0.50	<0.50		
	Thallium (TI)-Total (mg/L)	<0.000010	<0.000010		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010		
	Uranium (U)-Total (mg/L)	<0.000010	<0.000010		
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010		
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030		

L1543778 CONTD.... PAGE 3 of 5 19-NOV-14 14:07 (MT) Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

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	Sample ID Description Sampled Date Sampled Time Client ID	L1543778-1 Water 06-NOV-14 12:10 DI TEST-COM	L1543778-2 Water 06-NOV-14 12:10 DI TEST-LAB			
Grouping	Analute					
WATER	Analyte				<u> </u>	
	Dissolved Metals Eiltration Location					
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	FIELD	FIELD			
	Antimony (Sb)-Dissolved (mg/L)	<0.0010	<0.0010			
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010			
	Ratium (Ra)-Dissolved (mg/L)	<0.00010	<0.00010			
	Benullium (Ba)-Dissolved (mg/L)	0.000394	<0.000050			
	Bismuth (Bi)-Dissolved (mg/L)	<0.00010	<0.00010			
	Boron (B)-Dissolved (mg/L)	<0.00050	<0.00050			
	Cadmium (Cd)-Dissolved (mg/L)	0.019	<0.010			
	Calcium (Ca)-Dissolved (mg/L)	<0.000010	<0.000010			
	Chromium (Cr) Dissolved (mg/L)	0.168	<0.050			
	Cobalt (Co) Dissolved (mg/L)	<0.00010	<0.00010			
	Coppor (Cu) Dissolved (mg/L)	<0.00010	<0.00010			
	Iron (Eq) Dissolved (mg/L)	0.00054	<0.00020			
	Lood (Pb) Dissolved (mg/L)	<0.010	<0.010			
	Lithium (Li) Dissolved (mg/L)	0.000050	<0.000050			
	Magnosium (Mg) Dissolved (mg/L)	<0.00050	<0.00050			
	Manganese (Mn)-Dissolved (mg/L)	<0.10	<0.10			
	Malybdopum (Mo) Dissolved (mg/L)	<0.000050	<0.000050			
		<0.000050	<0.000050			
	Receptories (R) Dissolved (mg/L)	<0.00050	<0.00050			
	Priosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			
	Polassium (K)-Dissolved (mg/L)	<0.10	<0.10			
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010			
	Silicon (SI)-Dissolved (mg/L)	<0.050	<0.050			
		<0.000010	<0.000010			
	Socium (Na)-Dissoived (mg/L)	1.51	<0.050			
	Subnitum (Sr)-Dissolved (mg/L)	0.00101	<0.00020			
	Sullur (S)-Dissolved (mg/L)	<0.50	<0.50			
		<0.000010	<0.000010			
	Tin (Sn)-Dissoivea (mg/L)	<0.00010	<0.00010			
	Intanium (II)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010			
	vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010			
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010			

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Antimony (Sb)-Dissolved	DLA	L1543778-1, -2
Duplicate	Arsenic (As)-Dissolved	DLA	L1543778-1, -2
Duplicate	Beryllium (Be)-Dissolved	DLA	L1543778-1, -2
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1543778-1, -2
Duplicate	Lead (Pb)-Dissolved	DLA	L1543778-1, -2
Duplicate	Selenium (Se)-Dissolved	DLA	L1543778-1, -2
Duplicate	Silver (Ag)-Dissolved	DLA	L1543778-1, -2
Duplicate	Tin (Sn)-Dissolved	DLA	L1543778-1, -2
Duplicate	Titanium (Ti)-Dissolved	DLA	L1543778-1, -2
Duplicate	Vanadium (V)-Dissolved	DLA	L1543778-1, -2
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1543778-1, -2
Matrix Spike	Dissolved Organic Carbon	MS-B	L1543778-2
Matrix Spike	Dissolved Organic Carbon	MS-B	L1543778-2
Matrix Spike	Dissolved Organic Carbon	MS-B	L1543778-2
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1543778-1, -2
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L1543778-1, -2
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1543778-1, -2
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L1543778-1, -2
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L1543778-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1543778-1, -2
Matrix Spike	Tin (Sn)-Dissolved	MS-B	L1543778-1, -2
Matrix Spike	Barium (Ba)-Total	MS-B	L1543778-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L1543778-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**					
CARBONS-DOC-VA Water Dissolved organic carbon by combustion		APHA 5310 TOTAL ORGANIC CARBON (TOC)						
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.								

HARDNESS-CALC-VA Water Hardness APHA 2340B

APHA 3030 B&E / EPA SW-846 6020A

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

MET-DIS-LOW-ICP-VA Water **Dissolved Metals in Water by ICPOES** EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA

Water Total Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

MET-TOT-LOW-ICP-VA

EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

S-DIS-ICP-VA Water

Dissolved Sulfur in Water by ICPOES

EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA

Water Total Sulfur in Water by ICPOES

EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

TKN-F-VA Water TKN in Water by Fluorescence

APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code Laboratory Location

VA

ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

10-219289

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Chain of Custody / Analytical Rec Canada Toll Free: 1 800 668

www.alsglobal.com



L1543778-COFC

Page of

10-219289



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HEMMERA ENVIROCHEM INC. ATTN: Natasha Sandys 230 - 2237 2nd Avenue Whitehorse YK Y1A 0K7 Date Received: 23-SEP-14 Report Date: 07-OCT-14 10:49 (MT) Version: FINAL

Client Phone: 867-456-4865

Certificate of Analysis

L1522214

Lab Work Order #:

Project P.O. #: Job Reference: C of C Numbers: Legal Site Desc: NOT SUBMITTED HEMMERA 1343-005-04. ELR 14-183 10-152910, 10-152911



Account Manager

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L1522214 CONTD.... PAGE 2 of 19 07-OCT-14 10:49 (MT) Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

		1	1	1		
	Sample ID Description Sampled Date Sampled Time Client ID	L1522214-1 SW 21-SEP-14 18:50 E7	L1522214-2 SW 22-SEP-14 15:40 E7	L1522214-3 SW 21-SEP-14 18:00 E8	L1522214-4 SW 22-SEP-14 15:20 E8	L1522214-5 SW 21-SEP-14 15:30 GWCC-1
Grouping	Δηρίντο					
WATER	Pilalyte					
Physical Tests	Hardness (as CaCO3) (mg/l)	100		400		4000
T Hysical Tests	Total Suspended Solids (mg/L)	486		126		1660
Anions and	Ammonia Total (as N) (mg/L)	0.0000	<3.0	0.0007	<3.0	0.0077
Nutrients		0.0063		0.0067		0.0077
	Nitrate (as N) (mg/L)		0.103		0.0954	
	Nitrite (as N) (mg/L)		<0.0010		<0.0010	
	Total Kjeldahl Nitrogen (mg/L)	0.399		0.339		0.157
	Phosphorus (P)-Total (mg/L)	0.0040		0.0027		<0.0020
	Sulfate (SO4) (mg/L)		271		50.1	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	13.9		11.2		5.43
J. J	Total Organic Carbon (mg/L)					
Total Metals	Aluminum (AI)-Total (mg/L)	0.0325		0.134		<0.0030
	Antimony (Sb)-Total (mg/L)	0.00038		0.00012		0.00136
	Arsenic (As)-Total (mg/L)	0.00093		0.00052		0.00217
	Barium (Ba)-Total (mg/L)	0.0527		0.0418		0.0190
	Beryllium (Be)-Total (mg/L)	<0.00010		<0.00010		<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050		<0.00050		<0.00050
	Boron (B)-Total (mg/L)	0.053		<0.010		0.288
	Cadmium (Cd)-Total (mg/L)	0.000057		0.000023		0.000203
	Calcium (Ca)-Total (mg/L)	82.0		32.3		205
	Chromium (Cr)-Total (mg/L)	0.00079		0.00051		0.00247
	Cobalt (Co)-Total (mg/L)	0.00077		0.00044		<0.00010
	Copper (Cu)-Total (mg/L)	0.00196		0.00246		0.00093
	Iron (Fe)-Total (mg/L)	0.308		0.344		<0.010
	Lead (Pb)-Total (mg/L)	0.000054		<0.000050		<0.000050
	Lithium (Li)-Total (mg/L)	0.0123		0.00397		0.0714
	Magnesium (Mg)-Total (mg/L)	59.9		10.9		279
	Manganese (Mn)-Total (mg/L)	0.261		0.0275		0.000298
	Mercury (Hg)-Total (mg/L)	<0.000010		<0.000010		<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.00152		0.000498		0.00253
	Nickel (Ni)-Total (mg/L)	0.0166		0.00286		0.0757
	Phosphorus (P)-Total (mg/L)	<0.050		<0.050		<0.050
	Potassium (K)-Total (mg/L)	0.99		1.01		3.14
	Selenium (Se)-Total (mg/L)	0.00097		0.00022		0.00412
	Silicon (Si)-Total (mg/L)	4.54		5.12		6.33
	Silver (Ag)-Total (mg/L)	<0.000010		<0.000010		<0.000010
	Sodium (Na)-Total (mg/L)	4.54		4.16		17.4

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	Sample ID Description Sampled Date Sampled Time Client ID	L1522214-6 SW 22-SEP-14 14:30 GWCC-1	L1522214-7 SW 21-SEP-14 15:00 GWCC-2	L1522214-8 SW 22-SEP-14 14:35 GWCC-2	L1522214-9 SW 21-SEP-14 13:35 GWCC-3	L1522214-10 SW 22-SEP-14 14:40 GWCC-3
Grouping	Analyte					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)		1230		637	
	Total Suspended Solids (mg/L)	<3.0		<3.0		<3.0
Anions and Nutrients	Ammonia, Total (as N) (mg/L)		<0.0050		<0.0050	
	Nitrate (as N) (mg/L)	0.44		0.396		0.176
	Nitrite (as N) (mg/L)	<0.020		ola <0.010		ola <0.010
	Total Kjeldahl Nitrogen (mg/L)		0.222		0.259	
	Phosphorus (P)-Total (mg/L)		<0.0020		<0.0020	
	Sulfate (SO4) (mg/L)	1340		929		412
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)		7.16		9.45	
	Total Organic Carbon (mg/L)					
Total Metals	Aluminum (Al)-Total (mg/L)		<0.0030		<0.0030	
	Antimony (Sb)-Total (mg/L)		0.00123		0.00081	
	Arsenic (As)-Total (mg/L)		0.00140		0.00082	
	Barium (Ba)-Total (mg/L)		0.0176		0.0264	
	Beryllium (Be)-Total (mg/L)		<0.00010		<0.00010	
	Bismuth (Bi)-Total (mg/L)		<0.00050		<0.00050	
	Boron (B)-Total (mg/L)		0.144		0.065	
	Cadmium (Cd)-Total (mg/L)		0.000178		0.000091	
	Calcium (Ca)-Total (mg/L)		172		110	
	Chromium (Cr)-Total (mg/L)		0.00173		0.00058	
	Cobalt (Co)-Total (mg/L)		<0.00010		<0.00010	
	Copper (Cu)-Total (mg/L)		0.00112		0.00111	
	Iron (Fe)-Total (mg/L)		<0.010		<0.010	
	Lead (Pb)-Total (mg/L)		0.000090		<0.000050	
	Lithium (Li)-Total (mg/L)		0.0161		0.00631	
	Magnesium (Mg)-Total (mg/L)		193		86.5	
	Manganese (Mn)-Total (mg/L)		0.000207		0.000186	
	Mercury (Hg)-Total (mg/L)		<0.000010		<0.000010	
	Molybdenum (Mo)-Total (mg/L)		0.00288		0.00254	
	Nickel (Ni)-Total (mg/L)		0.0428		0.0297	
	Phosphorus (P)-Total (mg/L)		<0.050		<0.050	
	Potassium (K)-Total (mg/L)		1.93		1.16	
	Selenium (Se)-Total (mg/L)		0.00338		0.00143	
	Silicon (Si)-Total (mg/L)		5.04		4.65	
	Silver (Ag)-Total (mg/L)		<0.000010		<0.000010	
	Sodium (Na)-Total (mg/L)		6.56		3.85	

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	Sample ID Description Sampled Date Sampled Time Client ID	L1522214-11 SW 21-SEP-14 14:25 GWCC-4	L1522214-12 SW 22-SEP-14 14:30 GWCC-4	L1522214-13 SW 22-SEP-14 09:25 R3	L1522214-14 SW 21-SEP-14 19:55 R6	L1522214-15 SW 22-SEP-14 15:45 R6
Grouping	Analyte	-				
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	431		499	130	
	Total Suspended Solids (mg/L)		<3.0	12.7		<3.0
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050		0.0244	0.0065	
	Nitrate (as N) (mg/L)		0.0729	0.0633		0.0859
	Nitrite (as N) (mg/L)		<0.0010	0.0015		<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.288		0.441	0.335	
	Phosphorus (P)-Total (mg/L)	<0.0020		0.0165	0.0033	
	Sulfate (SO4) (mg/L)		231	304		50.2
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	10.9		12.7	11.1	
	Total Organic Carbon (mg/L)					
Total Metals	Aluminum (Al)-Total (mg/L)	0.0032		0.307	0.118	
	Antimony (Sb)-Total (mg/L)	0.00080		0.00018	0.00011	
	Arsenic (As)-Total (mg/L)	0.00118		0.00086	0.00062	
	Barium (Ba)-Total (mg/L)	0.0297		0.0560	0.0400	
	Beryllium (Be)-Total (mg/L)	<0.00010		<0.00010	<0.00010	
	Bismuth (Bi)-Total (mg/L)	<0.00050		<0.00050	<0.00050	
	Boron (B)-Total (mg/L)	0.040		<0.010	<0.010	
	Cadmium (Cd)-Total (mg/L)	0.000050		0.000030	0.000021	
	Calcium (Ca)-Total (mg/L)	77.0		91.3	31.6	
	Chromium (Cr)-Total (mg/L)	0.00047		0.00120	0.00047	
	Cobalt (Co)-Total (mg/L)	<0.00010		0.00065	0.00047	
	Copper (Cu)-Total (mg/L)	0.00109		0.00226	0.00246	
	Iron (Fe)-Total (mg/L)	<0.010		1.05	0.440	
	Lead (Pb)-Total (mg/L)	<0.000050		0.000270	<0.000050	
	Lithium (Li)-Total (mg/L)	0.00540		0.00419	0.00397	
	Magnesium (Mg)-Total (mg/L)	50.4		57.9	11.3	
	Manganese (Mn)-Total (mg/L)	0.000537		0.177	0.0441	
	Mercury (Hg)-Total (mg/L)	<0.000010		<0.000010	<0.000010	
	Molybdenum (Mo)-Total (mg/L)	0.00240		0.00127	0.000476	
	Nickel (Ni)-Total (mg/L)	0.0289		0.00423	0.00271	
	Phosphorus (P)-Total (mg/L)	<0.050		<0.050	<0.050	
	Potassium (K)-Total (mg/L)	0.92		0.90	1.02	
	Selenium (Se)-Total (mg/L)	0.00071		0.00054	0.00021	
	Silicon (Si)-Total (mg/L)	4.98		6.14	4.93	
	Silver (Ag)-Total (mg/L)	<0.000010		<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	2.77		4.11	4.22	

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	Sample ID Description Sampled Date Sampled Time Client ID	L1522214-16 SW 22-SEP-14 12:15 R7	L1522214-17 SW 21-SEP-14 DUP2	L1522214-18 SW 22-SEP-14 DUP2	L1522214-19 SW 21-SEP-14 FB1	L1522214-20 SW 22-SEP-14 FB1 GC
Grouping	Analyte					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	114	638		<0.50	
	Total Suspended Solids (mg/L)	27.3		<3.0		<3.0
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0306	<0.0050		<0.0050	
	Nitrate (as N) (mg/L)	0.145		0.172		<0.0050
	Nitrite (as N) (mg/L)	<0.0010		DLA <0.010		<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.846	0.254		1.59	
	Phosphorus (P)-Total (mg/L)	0.0295	<0.0020		<0.0020	
	Sulfate (SO4) (mg/L)	45.3		413		<0.50
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	27.2	9.67		51.2	
	Total Organic Carbon (mg/L)					
Total Metals	Aluminum (AI)-Total (mg/L)	0.523	<0.0030		<0.0030	
	Antimony (Sb)-Total (mg/L)	0.00022	0.00081		0.00014	
	Arsenic (As)-Total (mg/L)	0.00147	0.00082		<0.00010	
	Barium (Ba)-Total (mg/L)	0.0842	0.0258		0.000226	
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010		<0.00010	
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050		<0.00050	
	Boron (B)-Total (mg/L)	<0.010	0.059		0.022	
	Cadmium (Cd)-Total (mg/L)	0.000033	0.000089		<0.000010	
	Calcium (Ca)-Total (mg/L)	23.9	108		0.139	
	Chromium (Cr)-Total (mg/L)	0.00232	0.00059		<0.00010	
	Cobalt (Co)-Total (mg/L)	0.00102	<0.00010		<0.00010	
	Copper (Cu)-Total (mg/L)	0.00533	0.00109		0.00077	
	Iron (Fe)-Total (mg/L)	2.01	<0.010		<0.010	
	Lead (Pb)-Total (mg/L)	0.000303	<0.000050		0.000086	
	Lithium (Li)-Total (mg/L)	0.00096	0.00688		0.00121	
	Magnesium (Mg)-Total (mg/L)	11.6	84.4		<0.10	
	Manganese (Mn)-Total (mg/L)	0.274	0.000255		<0.000050	
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010		<0.000010	
	Molybdenum (Mo)-Total (mg/L)	0.000532	0.00255		<0.000050	
	Nickel (Ni)-Total (mg/L)	0.00445	0.0288		<0.00050	
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050		<0.050	
	Potassium (K)-Total (mg/L)	0.22	1.14		<0.10	
	Selenium (Se)-Total (mg/L)	0.00034	0.00137		<0.00010	
	Silicon (Si)-Total (mg/L)	5.85	4.61		<0.050	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010		<0.000010	
	Sodium (Na)-Total (mg/L)	1.33	3.66		1.43	

	Sample ID Description Sampled Date Sampled Time Client ID	L1522214-21 SW 23-SEP-14 16:20 TRAVEL BLANK		
Grouping	Analyte			
WATER				
Physical Tests	Hardness (as CaCO3) (mg/L)	<0.50		
	Total Suspended Solids (mg/L)	<3.0		
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0096		
	Nitrate (as N) (mg/L)	<0.0050		
	Nitrite (as N) (mg/L)	<0.0010		
	Total Kjeldahl Nitrogen (mg/L)	<0.050		
	Phosphorus (P)-Total (mg/L)	<0.0020		
	Sulfate (SO4) (mg/L)	<0.50		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)			
	Total Organic Carbon (mg/L)	<0.50		
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030		
	Antimony (Sb)-Total (mg/L)	<0.00010		
	Arsenic (As)-Total (mg/L)	<0.00010		
	Barium (Ba)-Total (mg/L)	<0.000050		
	Beryllium (Be)-Total (mg/L)	<0.00010		
	Bismuth (Bi)-Total (mg/L)	<0.00050		
	Boron (B)-Total (mg/L)	<0.010		
	Cadmium (Cd)-Total (mg/L)	<0.000010		
	Calcium (Ca)-Total (mg/L)	<0.050		
	Chromium (Cr)-Total (mg/L)	<0.00010		
	Cobalt (Co)-Total (mg/L)	<0.00010		
	Copper (Cu)-Total (mg/L)	<0.00050		
	Iron (Fe)-Total (mg/L)	<0.010		
	Lead (Pb)-Total (mg/L)	<0.000050		
	Lithium (Li)-Total (mg/L)	<0.00050		
	Magnesium (Mg)-Total (mg/L)	<0.10		
	Manganese (Mn)-rotal (mg/L)	<0.000050		
	Melvbdenum (Me) Total (mg/L)	<0.000010		
	Nickel (Ni)-Total (mg/L)	<0.000050		
	Phosphorus (P)-Total (mg/L)	<0.00050		
	Potassium (K)-Total (mg/L)	<0.050		
	Selenium (Se)-Total (mg/L)	<0.10		
	Silicon (Si)-Total (mg/L)	<0.00010		
	Silver (Ag)-Total (mg/L)	<0.050		
	Sodium (Na)-Total (mg/L)	<0.000010		
		<0.050		

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ALS ENVIRONMENTAL ANALYTICAL REPORT

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	Sample ID Description Sampled Date Sampled Time Client ID	L1522214-1 SW 21-SEP-14 18:50 E7	L1522214-2 SW 22-SEP-14 15:40 E7	L1522214-3 SW 21-SEP-14 18:00 E8	L1522214-4 SW 22-SEP-14 15:20 E8	L1522214-5 SW 21-SEP-14 15:30 GWCC-1
Grouping	Analyte					
WATER						
Total Metals	Strontium (Sr)-Total (mg/L)	0.510		0.170		2.02
	Sulfur (S)-Total (mg/L)	0.510		16.0		2.02
	Thallium (TI)-Total (mg/L)	~0.00010		-0.000010		0.000001
	Tin (Sn)-Total (mg/L)	<0.000010		<0.00010		<0.000091
	Titanium (Ti)-Total (mg/L)	<0.00010		<0.00010		<0.00010
	Uranium (U)-Total (mg/L)	0.00241		0.00106		0.00694
	Vanadium (V)-Total (mg/L)	<0.00241		<0.00100		~0.0010
	Zinc (Zn)-Total (mg/L)	0.0048		0.0045		0.0083
Dissolved Metals	Dissolved Mercury Filtration Location	FIFL D		FIFI D		FIFLD
	Dissolved Metals Filtration Location	FIFI D		FIFI D		FIFLD
	Aluminum (AI)-Dissolved (mg/L)	0.0120		0.0711		0.0010
	Antimony (Sb)-Dissolved (mg/L)	0.00039		0.00013		0.00133
	Arsenic (As)-Dissolved (mg/L)	0.00091		0.00045		0.00216
	Barium (Ba)-Dissolved (mg/L)	0.0547		0.0410		0.0191
	Beryllium (Be)-Dissolved (mg/L)	<0.00010		<0.00010		<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050		<0.00050		<0.00050
	Boron (B)-Dissolved (mg/L)	0.049		<0.010		0.264
	Cadmium (Cd)-Dissolved (mg/L)	0.000053		0.000019		0.000205
	Calcium (Ca)-Dissolved (mg/L)	88.8		32.5		207
	Chromium (Cr)-Dissolved (mg/L)	0.00057		0.00033		0.00232
	Cobalt (Co)-Dissolved (mg/L)	0.00076		0.00040		<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00194		0.00233		0.00088
	Iron (Fe)-Dissolved (mg/L)	0.246		0.244		<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050		<0.000050		<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0130		0.00415		0.0682
	Magnesium (Mg)-Dissolved (mg/L)	64.1		10.8		277
	Manganese (Mn)-Dissolved (mg/L)	0.274		0.0257		0.000212
	Mercury (Hg)-Dissolved (mg/L)	<0.000010		<0.000010		<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.00155		0.000457		0.00248
	Nickel (Ni)-Dissolved (mg/L)	0.0172		0.00276		0.0739
	Phosphorus (P)-Dissolved (mg/L)	<0.050		<0.050		<0.050
	Potassium (K)-Dissolved (mg/L)	1.07		0.98		3.11
	Selenium (Se)-Dissolved (mg/L)	0.00105		0.00023		0.00422
	Silicon (Si)-Dissolved (mg/L)	4.82		4.96		6.33
	Silver (Ag)-Dissolved (mg/L)	<0.000010		<0.000010		<0.000010
	Sodium (Na)-Dissolved (mg/L)	4.82		4.19		17.4
	Strontium (Sr)-Dissolved (mg/L)	0.525		0.166		2.01

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	Sample ID Description Sampled Date Sampled Time Client ID	L1522214-6 SW 22-SEP-14 14:30 GWCC-1	L1522214-7 SW 21-SEP-14 15:00 GWCC-2	L1522214-8 SW 22-SEP-14 14:35 GWCC-2	L1522214-9 SW 21-SEP-14 13:35 GWCC-3	L1522214-10 SW 22-SEP-14 14:40 GWCC-3
Grouping	Analyte					
WATER						
Total Metals	Strontium (Sr)-Total (mg/L)		1.01		0.540	
	Sulfur (S)-Total (mg/L)		313		139	
	Thallium (TI)-Total (mg/L)		0.000072		0.000059	
	Tin (Sn)-Total (mg/L)		<0.00010		<0.00010	
	Titanium (Ti)-Total (mg/L)		<0.010		<0.010	
	Uranium (U)-Total (mg/L)		0.00328		0.00145	
	Vanadium (V)-Total (mg/L)		<0.0010		<0.0010	
	Zinc (Zn)-Total (mg/L)		0.0060		0.0036	
Dissolved Metals	Dissolved Mercury Filtration Location		FIELD		FIELD	
	Dissolved Metals Filtration Location		FIELD		FIELD	
	Aluminum (Al)-Dissolved (mg/L)		0.0019		0.0017	
	Antimony (Sb)-Dissolved (mg/L)		0.00113		0.00083	
	Arsenic (As)-Dissolved (mg/L)		0.00135		0.00082	
	Barium (Ba)-Dissolved (mg/L)		0.0178		0.0266	
	Beryllium (Be)-Dissolved (mg/L)		<0.00010		<0.00010	
	Bismuth (Bi)-Dissolved (mg/L)		<0.00050		<0.00050	
	Boron (B)-Dissolved (mg/L)		0.110		0.058	
	Cadmium (Cd)-Dissolved (mg/L)		0.000179		0.000089	
	Calcium (Ca)-Dissolved (mg/L)		175		112	
	Chromium (Cr)-Dissolved (mg/L)		0.00164		0.00048	
	Cobalt (Co)-Dissolved (mg/L)		<0.00010		<0.00010	
	Copper (Cu)-Dissolved (mg/L)		0.00121		0.00104	
	Iron (Fe)-Dissolved (mg/L)		<0.010		<0.010	
	Lead (Pb)-Dissolved (mg/L)		<0.000050		<0.000050	
	Lithium (Li)-Dissolved (mg/L)		0.0133		0.00665	
	Magnesium (Mg)-Dissolved (mg/L)		194		86.9	
	Manganese (Mn)-Dissolved (mg/L)		0.000246		0.000164	
	Mercury (Hg)-Dissolved (mg/L)		<0.000010		<0.000010	
	Molybdenum (Mo)-Dissolved (mg/L)		0.00264		0.00249	
	Nickel (Ni)-Dissolved (mg/L)		0.0446		0.0284	
	Phosphorus (P)-Dissolved (mg/L)		<0.050		<0.050	
	Potassium (K)-Dissolved (mg/L)		1.92		1.18	
	Selenium (Se)-Dissolved (mg/L)		0.00363		0.00148	
	Silicon (Si)-Dissolved (mg/L)		5.05		4.66	
	Silver (Ag)-Dissolved (mg/L)		<0.000010		<0.000010	
	Sodium (Na)-Dissolved (mg/L)		6.76		3.74	
	Strontium (Sr)-Dissolved (mg/L)		0.963		0.535	

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	Sample ID Description Sampled Date Sampled Time Client ID	L1522214-11 SW 21-SEP-14 14:25 GWCC-4	L1522214-12 SW 22-SEP-14 14:30 GWCC-4	L1522214-13 SW 22-SEP-14 09:25 R3	L1522214-14 SW 21-SEP-14 19:55 R6	L1522214-15 SW 22-SEP-14 15:45 R6
Grouping	Analyte					
WATER						
Total Metals	Strontium (Sr)-Total (mg/L)	0.383		0.430	0.167	
	Sulfur (S)-Total (mg/L)	76.3		99.9	17.0	
	Thallium (TI)-Total (mg/L)	0.000061		<0.000010	<0.000010	
	Tin (Sn)-Total (mg/L)	<0.00010		<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)	<0.010		<0.010	<0.010	
	Uranium (U)-Total (mg/L)	0.000904		0.00612	0.00108	
	Vanadium (V)-Total (mg/L)	<0.0010		0.0014	<0.0010	
	Zinc (Zn)-Total (mg/L)	<0.0030		0.0048	0.0041	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD		FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD		FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	0.0020		0.0215	0.0678	
	Antimony (Sb)-Dissolved (mg/L)	0.00082		0.00017	0.00011	
	Arsenic (As)-Dissolved (mg/L)	0.00123		0.00055	0.00058	
	Barium (Ba)-Dissolved (mg/L)	0.0310		0.0462	0.0403	
	Beryllium (Be)-Dissolved (mg/L)	<0.00010		<0.00010	<0.00010	
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050		<0.00050	<0.00050	
	Boron (B)-Dissolved (mg/L)	0.037		<0.010	<0.010	
	Cadmium (Cd)-Dissolved (mg/L)	0.000048		0.000012	0.000022	
	Calcium (Ca)-Dissolved (mg/L)	83.8		97.8	32.9	
	Chromium (Cr)-Dissolved (mg/L)	0.00041		0.00049	0.00032	
	Cobalt (Co)-Dissolved (mg/L)	<0.00010		0.00044	0.00045	
	Copper (Cu)-Dissolved (mg/L)	0.00106		0.00160	0.00223	
	Iron (Fe)-Dissolved (mg/L)	<0.010		0.184	0.363	
	Lead (Pb)-Dissolved (mg/L)	<0.000050		<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	0.00554		0.00434	0.00420	
	Magnesium (Mg)-Dissolved (mg/L)	53.8		61.8	11.5	
	Manganese (Mn)-Dissolved (mg/L)	0.000393		0.172	0.0433	
	Mercury (Hg)-Dissolved (mg/L)	<0.000010		<0.000010	<0.000010	
	Molybdenum (Mo)-Dissolved (mg/L)	0.00240		0.00126	0.000456	
	Nickel (Ni)-Dissolved (mg/L)	0.0299		0.00345	0.00265	
	Phosphorus (P)-Dissolved (mg/L)	<0.050		<0.050	<0.050	
	Potassium (K)-Dissolved (mg/L)	0.99		0.87	1.03	
	Selenium (Se)-Dissolved (mg/L)	0.00072		0.00052	0.00023	
	Silicon (Si)-Dissolved (mg/L)	5.32		5.98	4.98	
	Silver (Ag)-Dissolved (mg/L)	<0.000010		<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	2.88		4.28	4.22	
	Strontium (Sr)-Dissolved (mg/L)	0.393		0.448	0.168	

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	Sample ID	L1522214-16	L1522214-17	L1522214-18	L1522214-19	L1522214-20
	Description	SW	SW	SW	SW	SW
	Sampled Date Sampled Time	12:15	21-SEP-14	22-SEP-14	21-SEP-14	22-SEP-14
	Client ID	R7	DUP2	DUP2	FB1	FB1 GC
Grouping	Analyte					
WATER						
Total Metals	Strontium (Sr)-Total (mg/L)	0.0743	0.533		0.00105	
	Sulfur (S)-Total (mg/L)	14.9	136		<0.50	
	Thallium (TI)-Total (mg/L)	<0.000010	0.000060		<0.000010	
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010		<0.00010	
	Titanium (Ti)-Total (mg/L)	0.020	<0.010		<0.010	
	Uranium (U)-Total (mg/L)	0.000128	0.00145		<0.000010	
	Vanadium (V)-Total (mg/L)	0.0025	<0.0010		<0.0010	
	Zinc (Zn)-Total (mg/L)	0.0042	0.0036		<0.0030	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD		FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD		FIELD	
	Aluminum (AI)-Dissolved (mg/L)	0.116	0.0016		<0.0010	
	Antimony (Sb)-Dissolved (mg/L)	0.00022	0.00084		0.00010	
	Arsenic (As)-Dissolved (mg/L)	0.00128	0.00085		<0.00010	
	Barium (Ba)-Dissolved (mg/L)	0.0772	0.0262		0.000206	
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010		<0.00010	
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050		<0.00050	
	Boron (B)-Dissolved (mg/L)	<0.010	0.055		0.016	
	Cadmium (Cd)-Dissolved (mg/L)	0.000025	0.000087		<0.000010	
	Calcium (Ca)-Dissolved (mg/L)	25.5	112		0.142	
	Chromium (Cr)-Dissolved (mg/L)	0.00146	0.00047		<0.00010	
	Cobalt (Co)-Dissolved (mg/L)	0.00080	<0.00010		<0.00010	
	Copper (Cu)-Dissolved (mg/L)	0.00455	0.00102		0.00071	
	Iron (Fe)-Dissolved (mg/L)	1.30	<0.010		<0.010	
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050		<0.000050	
	Lithium (Li)-Dissolved (mg/L)	0.00072	0.00718		<0.00050	
	Magnesium (Mg)-Dissolved (mg/L)	12.3	87.0		<0.10	
	Manganese (Mn)-Dissolved (mg/L)	0.277	0.000167		<0.000050	
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010		<0.000010	
	Molybdenum (Mo)-Dissolved (mg/L)	0.000517	0.00254		<0.000050	
	Nickel (Ni)-Dissolved (mg/L)	0.00399	0.0286		<0.00050	
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050		<0.050	
	Potassium (K)-Dissolved (mg/L)	0.20	1.16		<0.10	
	Selenium (Se)-Dissolved (mg/L)	0.00036	0.00148		<0.00010	
	Silicon (Si)-Dissolved (mg/L)	5.55	4.72		<0.050	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010		<0.000010	
	Sodium (Na)-Dissolved (mg/L)	1.39	3.71		1.47	
	Strontium (Sr)-Dissolved (mg/L)	0.0743	0.539		0.00097	

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	Sample ID Description Sampled Date Sampled Time Client ID	L1522214-21 SW 23-SEP-14 16:20 TRAVEL BLANK		
Grouping	Analyte			
WATER				
Total Metals	Strontium (Sr)-Total (mg/L)	<0.00020		
	Sulfur (S)-Total (mg/L)	<0.50		
	Thallium (TI)-Total (mg/L)	<0.000010		
	Tin (Sn)-Total (mg/L)	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010		
	Uranium (U)-Total (mg/L)	<0.000010		
	Vanadium (V)-Total (mg/L)	<0.0010		
	Zinc (Zn)-Total (mg/L)	<0.0030		
Dissolved Metals	Dissolved Mercury Filtration Location			
	Dissolved Metals Filtration Location			
	Aluminum (AI)-Dissolved (mg/L)			
	Antimony (Sb)-Dissolved (mg/L)			
	Arsenic (As)-Dissolved (mg/L)			
	Barium (Ba)-Dissolved (mg/L)			
	Beryllium (Be)-Dissolved (mg/L)			
	Bismuth (Bi)-Dissolved (mg/L)			
	Boron (B)-Dissolved (mg/L)			
	Cadmium (Cd)-Dissolved (mg/L)			
	Calcium (Ca)-Dissolved (mg/L)			
	Chromium (Cr)-Dissolved (mg/L)			
	Cobalt (Co)-Dissolved (mg/L)			
	Copper (Cu)-Dissolved (mg/L)			
	Iron (Fe)-Dissolved (mg/L)			
	Lead (Pb)-Dissolved (mg/L)			
	Lithium (Li)-Dissolved (mg/L)			
	Magnesium (Mg)-Dissolved (mg/L)			
	Manganese (Mn)-Dissolved (mg/L)			
	Mercury (Hg)-Dissolved (mg/L)			
	Molybdenum (Mo)-Dissolved (mg/L)			
	Nickel (Ni)-Dissolved (mg/L)			
	Phosphorus (P)-Dissolved (mg/L)			
	Potassium (K)-Dissolved (mg/L)			
	Selenium (Se)-Dissolved (mg/L)			
	Silicon (Si)-Dissolved (mg/L)			
	Silver (Ag)-Dissolved (mg/L)			
	Sodium (Na)-Dissolved (mg/L)			
	Strontium (Sr)-Dissolved (mg/L)			

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	Sample ID Description Sampled Date Sampled Time Client ID	L1522214-1 SW 21-SEP-14 18:50 E7	L1522214-2 SW 22-SEP-14 15:40 E7	L1522214-3 SW 21-SEP-14 18:00 E8	L1522214-4 SW 22-SEP-14 15:20 E8	L1522214-5 SW 21-SEP-14 15:30 GWCC-1
Grouping	Analyte					
WATER						
Dissolved Metals	Sulfur (S)-Dissolved (mg/L)	94.3		16.7		435
	Thallium (TI)-Dissolved (mg/L)	<0.000010		<0.000010		0.000092
	Tin (Sn)-Dissolved (mg/L)	<0.00010		<0.00010		<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010		<0.010		<0.010
	Uranium (U)-Dissolved (mg/L)	0.00251		0.00102		0.00684
	Vanadium (V)-Dissolved (mg/L)	<0.0010		<0.0010		<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.0024		0.0034		0.0073

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	Sample ID Description Sampled Date Sampled Time Client ID	L1522214-6 SW 22-SEP-14 14:30 GWCC-1	L1522214-7 SW 21-SEP-14 15:00 GWCC-2	L1522214-8 SW 22-SEP-14 14:35 GWCC-2	L1522214-9 SW 21-SEP-14 13:35 GWCC-3	L1522214-10 SW 22-SEP-14 14:40 GWCC-3
Grouping	Analyte					
WATER						
Dissolved Metals	Sulfur (S)-Dissolved (mg/L)		314		139	
	Thallium (TI)-Dissolved (mg/L)		0.000065		0.000058	
	Tin (Sn)-Dissolved (mg/L)		<0.00010		<0.00010	
	Titanium (Ti)-Dissolved (mg/L)		<0.010		<0.010	
	Uranium (U)-Dissolved (mg/L)		0.00311		0.00146	
	Vanadium (V)-Dissolved (mg/L)		<0.0010		<0.0010	
	Zinc (Zn)-Dissolved (mg/L)		0.0053		0.0024	

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	Sample ID Description Sampled Date Sampled Time Client ID	L1522214-11 SW 21-SEP-14 14:25 GWCC-4	L1522214-12 SW 22-SEP-14 14:30 GWCC-4	L1522214-13 SW 22-SEP-14 09:25 R3	L1522214-14 SW 21-SEP-14 19:55 R6	L1522214-15 SW 22-SEP-14 15:45 R6
Grouping	Analyte					
WATER						
Dissolved Metals	Sulfur (S)-Dissolved (mg/L)	79.2		105	17.3	
	Thallium (TI)-Dissolved (mg/L)	0.000062		<0.000010	<0.000010	
	Tin (Sn)-Dissolved (mg/L)	<0.00010		<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010		<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.000937		0.00621	0.00105	
	Vanadium (V)-Dissolved (mg/L)	<0.0010		<0.0010	<0.0010	
	Zinc (Zn)-Dissolved (mg/L)	0.0012		0.0013	0.0026	

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	Sample ID Description Sampled Date Sampled Time Client ID	L1522214-16 SW 22-SEP-14 12:15 R7	L1522214-17 SW 21-SEP-14 DUP2	L1522214-18 SW 22-SEP-14 DUP2	L1522214-19 SW 21-SEP-14 FB1	L1522214-20 SW 22-SEP-14 FB1 GC
Grouping	Analyte					
WATER						
Dissolved Metals	Sulfur (S)-Dissolved (mg/L)	15.6	136		<0.50	
	Thallium (TI)-Dissolved (mg/L)	<0.000010	0.000059		<0.000010	
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010		<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010		<0.010	
	Uranium (U)-Dissolved (mg/L)	0.000099	0.00145		<0.000010	
	Vanadium (V)-Dissolved (mg/L)	0.0011	<0.0010		<0.0010	
	Zinc (Zn)-Dissolved (mg/L)	0.0022	0.0025		<0.0010	

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	Sample ID Description Sampled Date Sampled Time Client ID	L1522214-21 SW 23-SEP-14 16:20 TRAVEL BLANK				
Grouping	Analyte					
WATER						
Dissolved Metals	Sulfur (S)-Dissolved (mg/L)					
	Thallium (TI)-Dissolved (mg/L)					
	Tin (Sn)-Dissolved (mg/L)					
	Titanium (Ti)-Dissolved (mg/L)					
	Uranium (U)-Dissolved (mg/L)					
	Vanadium (V)-Dissolved (mg/L)					
	Zinc (Zn)-Dissolved (mg/L)					

Sample Comment:

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Additional Comments for Sample Listed:

Samplenum Matrix Report Remarks

L1522214-19 Water Note: Results confirmed by repeat analysis

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Dissolved Organic Carbon	MS-B	L1522214-1, -11, -13, -14, -17, -3, -5, -7, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1522214-1, -11, -13, -14, -16, -17, -19, -3, -5, -7, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1522214-1, -11, -13, -14, -16, -17, -19, -3, -5, -7, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1522214-1, -11, -13, -14, -16, -17, -19, -3, -5, -7, -9
Matrix Spike	Dissolved Organic Carbon	MS-B	L1522214-16
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1522214-1, -11, -13, -14, -16, -17, -19, -3, -5, -7, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1522214-1, -11, -13, -14, -16, -17, -19, -3, -5, -7, -9
Matrix Spike	Barium (Ba)-Total	MS-B	L1522214-16, -17, -19
Matrix Spike	Manganese (Mn)-Total	MS-B	L1522214-16, -17, -19
Matrix Spike	Sodium (Na)-Total	MS-B	L1522214-16, -17, -19
Matrix Spike	Strontium (Sr)-Total	MS-B	L1522214-16, -17, -19

Qualifiers for Individual Parameters Listed:

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Test Method References:

spectrophotometry (EPA Method 245.7).

ALS Test Code	Matrix	Test Description	Method Reference**
ANIONS-NO2-IC-WR	Water	Nitrite Nitrogen by Ion Chromatography	EPA 300.1
This analysis is carried out 1.0, April 1999 and from "D Dionex 2003. Nitrate is det	using proced etermination ected by UV	ures adapted from EPA Method 300.1, "Determination of Inorganic Anions in Environmental Waters Using a H absorbance.	of Inorganic Anions by Ion Chromatography", Revision lydroxide-Selective Column", Application Note 154 v.19,
ANIONS-NO3-IC-WR	Water	Nitrate Nitrogen by Ion Chromatography	EPA 300.1
This analysis is carried out 1.0, April 1999 and from "D Dionex 2003. Nitrate is det	using proced etermination ected by UV	ures adapted from EPA Method 300.1, "Determination of Inorganic Anions in Environmental Waters Using a H absorbance.	of Inorganic Anions by Ion Chromatography", Revision Iydroxide-Selective Column", Application Note 154 v.19,
ANIONS-SO4-IC-WR	Water	Sulphate by Ion Chromatography	EPA 300.1
This analysis is carried out 1.0, April 1999 and from "D Dionex 2003.	using proced etermination	ures adapted from EPA Method 300.1, "Determination of Inorganic Anions in Environmental Waters Using a H	of Inorganic Anions by Ion Chromatography", Revision Iydroxide-Selective Column", Application Note 154 v.19,
CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out determined by filtering the s	using proced sample throug	ures adapted from APHA Method 5310 "Total Organic on the state of the	Carbon (TOC)". Dissolved carbon (DOC) fractions are
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out	using proced	ures adapted from APHA Method 5310 "Total Organic	Carbon (TOC)".
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness (also known as T Dissolved Calcium and Mag	otal Hardnes	s) is calculated from the sum of Calcium and Magnesiu entrations are preferentially used for the hardness calc	m concentrations, expressed in CaCO3 equivalents. sulation.
HG-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7
This analysis is carried out American Public Health Ass States Environmental Prote involves a cold-oxidation of analysis is by cold vapour a	using proced sociation, and ection Agency the acidified atomic fluores	ures adapted from "Standard Methods for the Examinar with procedures adapted from "Test Methods for Evalu (EPA). The procedures may involve preliminary samp sample using bromine monochloride prior to reduction cence spectrophotometry or atomic absorption spectro	tion of Water and Wastewater" published by the uating Solid Waste" SW-846 published by the United le treatment by filtration (EPA Method 3005A) and of the sample with stannous chloride. Instrumental photometry (EPA Method 245.7).
HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7
This analysis is carried out American Public Health Ass States Environmental Prote reduction of the sample with	using proced sociation, and ection Agency h stannous ch	ures adapted from "Standard Methods for the Examina I with procedures adapted from "Test Methods for Evalu (EPA). The procedure involves a cold-oxidation of the noride. Instrumental analysis is by cold vapour atomic	tion of Water and Wastewater" published by the uating Solid Waste" SW-846 published by the United acidified sample using bromine monochloride prior to fluorescence spectrophotometry or atomic absorption

Dissolved Metals in Water by CRC ICPMS

APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A). **MET-DIS-LOW-ICP-VA** Water **Dissolved Metals in Water by ICPOES** EPA 3005A/6010B This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma optical emission spectrophotometry (EPA Method 6010B). MET-T-CCMS-VA Total Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A Water This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A). **MET-TOT-LOW-ICP-VA** Water Total Metals in Water by ICPOES EPA 3005A/6010B This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B). J. ENVIRON. MONIT., 2005, 7, 37-42, RSC NH3-F-VA Water Ammonia in Water by Fluorescence This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al. P-T-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample. **Dissolved Sulfur in Water by ICPOES** S-DIS-ICP-VA Water EPA SW-846 3005A/6010B This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B). Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample. S-TOT-ICP-VA Water Total Sulfur in Water by ICPOES EPA SW-846 3005A/6010B This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B). Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample. Water TKN in Water by Fluorescence APHA 4500-NORG D. **TKN-F-VA** This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection. **TSS-MAN-WR** Total Suspended Solids by Gravimetric Water APHA 2540 D This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids are determined by filtering a sample through a glass fibre filter and drying the filter at 104 degrees celsius. ** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code Laboratory Location

MET-D-CCMS-VA

Water

WR

ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

10-152910 10-152911

VA

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. mg/kg - milligrams per kilogram based on dry weight of sample. mg/kg wwt - milligrams per kilogram based on wet weight of sample. mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample. mg/L - milligrams per litre. < - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory. UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION. Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

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APPENDIX 3

Hydrological Monitoring Data Summaries

Stream Flow & Discharge Calculation

ELR Project No.	14-183		
Site / Location:	R1		
Stream Name:	Clinton Creek		
Station Name:	R1		
Date and Time:	20 Sep. 2014 @ 10:00		
Staff:	AN + AB		gical Logistics
UTM Coordinates:	07W 0510718 7147525	C 14	escaren Eca.
Technique:	Swoffer Meter	Left Bank	4.3
Temp., Water/Air (°C)	NC / 3	Right Bank	0.4
Crossing Number	1	Wet.Width	3.9

		a			David Aven	Panel
Station No.	Distance	Station	Depth (m)	Velocity @	Panel Area	Discharge
	(m)	Width (m)		60% (m/s)	(m ⁻)	(m³/s)
0	4.30	0.100	0.00	0.00	0.000	0.0000
1	4.10	0.200	0.05	0.16	0.010	0.0016
2	3.90	0.200	0.09	0.27	0.018	0.0049
3	3.70	0.200	0.14	0.34	0.028	0.0095
4	3.50	0.200	0.16	0.38	0.032	0.0122
5	3.30	0.200	0.19	0.41	0.038	0.0156
6	3.10	0.200	0.17	0.40	0.034	0.0136
7	2.90	0.200	0.20	0.45	0.040	0.0180
8	2.70	0.200	0.22	0.55	0.044	0.0242
9	2.50	0.200	0.20	0.51	0.040	0.0204
10	2.30	0.200	0.20	0.49	0.040	0.0196
11	2.10	0.200	0.19	0.51	0.038	0.0194
12	1.90	0.200	0.18	0.54	0.036	0.0194
13	1.70	0.200	0.18	0.50	0.036	0.0180
14	1.50	0.200	0.16	0.49	0.032	0.0157
15	1.30	0.200	0.16	0.44	0.032	0.0141
16	1.10	0.200	0.16	0.40	0.032	0.0128
17	0.90	0.200	0.13	0.31	0.026	0.0081
18	0.70	0.200	0.10	0.18	0.020	0.0036
19	0.50	0.200	0.04	0.00	0.008	0.0000
20	0.30	0.100	0.00	0.00	0.000	0.0000
21	0.30					

Mean Depth (m)	0.14
Mean Velocity (m/s)	0.35

Discharge (m³/s)

0.2506



Stream Flow & Discharge Calculation

ELR Project No.	14-183		
Site / Location:	R1		
Stream Name:	Clinton Creek		
Station Name:	R1		
Date and Time:	20 Sep. 2014 @ 10:00		
Staff:	AN + AB		gical Logistics esearch 1 td
UTM Coordinates:	07W 0510718 7147525	α ((
Technique:	Swoffer Meter	Left Bank	4.3
Temp., Water/Air (°C)	NC / 3	Right Bank	0.4
Crossing Number	2	Wet.Width	3.9

	D ¹ · ·				Dowol Aven	Panel
Station No.	Distance	Station	Depth (m)	velocity @		Discharge
	(m)	Width (m)		60% (m/s)	(m⁻)	(m³/s)
0	4.30	0.100	0.00	0.00	0.000	0.0000
1	4.10	0.200	0.04	0.23	0.008	0.0018
2	3.90	0.200	0.09	0.25	0.018	0.0045
3	3.70	0.200	0.14	0.37	0.028	0.0104
4	3.50	0.200	0.16	0.43	0.032	0.0138
5	3.30	0.200	0.18	0.48	0.036	0.0173
6	3.10	0.200	0.18	0.44	0.036	0.0158
7	2.90	0.200	0.20	0.50	0.040	0.0200
8	2.70	0.200	0.22	0.53	0.044	0.0233
9	2.50	0.200	0.20	0.65	0.040	0.0260
10	2.30	0.200	0.20	0.61	0.040	0.0244
11	2.10	0.200	0.19	0.54	0.038	0.0205
12	1.90	0.200	0.19	0.51	0.038	0.0194
13	1.70	0.200	0.19	0.52	0.038	0.0198
14	1.50	0.200	0.17	0.45	0.034	0.0153
15	1.30	0.200	0.16	0.49	0.032	0.0157
16	1.10	0.200	0.16	0.40	0.032	0.0128
17	0.90	0.200	0.13	0.31	0.026	0.0081
18	0.70	0.200	0.10	0.21	0.020	0.0042
19	0.50	0.200	0.04	0.00	0.008	0.0000
20	0.30	0.100	0.00	0.00	0.000	0.0000
21	0.30					

Mean Depth (m)	0.14
Mean Velocity (m/s)	0.38

Discharge (m³/s)

0.2730


ELR Project No.	14-183			
Site / Location:	R2			
Stream Name:	Easter Creek			
Station Name:	R2			
Date and Time:	20 Sep. 2014 @ 11:45			
Staff:	AN + AB		& Research td	
UTM Coordinates:	07W 0512023 7148061	u na	Escuren Eco.	
Technique:	Swoffer Meter	Left Bank	0.75	
Temp., Water/Air (°C)	NC / 8	Right Bank	2.65	
Crossing Number	1	Wet.Width	1.9	

Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity @ 60% (m/s)	Panel Area	Panel Discharge
	(,	Width (III)		00/0 (11/3)	(111)	(m³/s)
0	0.75	0.050	0.00	0.00	0.000	0.0000
1	0.85	0.100	0.14	0.00	0.014	0.0000
2	0.95	0.100	0.15	0.49	0.015	0.0074
3	1.05	0.100	0.14	0.49	0.014	0.0069
4	1.15	0.100	0.17	0.48	0.017	0.0082
5	1.25	0.100	0.18	0.47	0.018	0.0085
6	1.35	0.100	0.15	0.29	0.015	0.0044
7	1.45	0.100	0.12	0.32	0.012	0.0038
8	1.55	0.100	0.10	0.33	0.010	0.0033
9	1.65	0.100	0.06	0.36	0.006	0.0022
10	1.75	0.100	0.07	0.35	0.007	0.0025
11	1.85	0.100	0.07	0.24	0.007	0.0017
12	1.95	0.100	0.07	0.30	0.007	0.0021
13	2.05	0.100	0.05	0.39	0.005	0.0020
14	2.15	0.100	0.04	0.26	0.004	0.0010
15	2.25	0.100	0.04	0.17	0.004	0.0007
16	2.35	0.100	0.04	0.11	0.004	0.0004
17	2.45	0.100	0.02	0.00	0.002	0.0000
18	2.55	0.100	0.01	0.00	0.001	0.0000
19	2.65	0.050	0.00	0.00	0.000	0.0000
20	2.65					

Mean Depth (m)	0.08
Mean Velocity (m/s)	0.25

Discharge (m³/s)



ELR Project No.	14-183			
Site / Location:	R2			
Stream Name:	Easter Creek			
Station Name:	R2			
Date and Time:	20 Sep. 2014 @ 11:45			
Staff:	AN + AB		& Research td	
UTM Coordinates:	07W 0512023 7148061	α	Escuren Eco.	
Technique:	Swoffer Meter	Left Bank	0.75	
Temp., Water/Air (°C)	NC / 8	Right Bank	2.65	
Crossing Number	2	Wet.Width	1.9	

Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity @ 60% (m/s)	Panel Area	Panel Discharge
	(11)	wiath (iii)		00/0 (11/3)	(111)	(m³/s)
0	0.75	0.050	0.00	0.00	0.000	0.0000
1	0.85	0.100	0.13	0.00	0.013	0.0000
2	0.95	0.100	0.14	0.53	0.014	0.0074
3	1.05	0.100	0.14	0.54	0.014	0.0076
4	1.15	0.100	0.15	0.57	0.015	0.0086
5	1.25	0.100	0.17	0.54	0.017	0.0092
6	1.35	0.100	0.15	0.45	0.015	0.0068
7	1.45	0.100	0.12	0.36	0.012	0.0043
8	1.55	0.100	0.11	0.34	0.011	0.0037
9	1.65	0.100	0.08	0.35	0.008	0.0028
10	1.75	0.100	0.07	0.41	0.007	0.0029
11	1.85	0.100	0.07	0.30	0.007	0.0021
12	1.95	0.100	0.06	0.27	0.006	0.0016
13	2.05	0.100	0.05	0.29	0.005	0.0015
14	2.15	0.100	0.04	0.31	0.004	0.0012
15	2.25	0.100	0.04	0.20	0.004	0.0008
16	2.35	0.100	0.04	0.10	0.004	0.0004
17	2.45	0.100	0.02	0.00	0.002	0.0000
18	2.55	0.100	0.01	0.00	0.001	0.0000
19	2.65	0.050	0.00	0.00	0.000	0.0000
20	2.65					

Mean Depth (m)	0.08
Mean Velocity (m/s)	0.28

Discharge (m³/s)



ELR Project No.	14-183			
Site / Location:	R3			
Stream Name:	Wolverine Creek			
Station Name:	R3			
Date and Time:	22 Sep. 2014			
Staff:	AN + AB	Ecolo & R	& Research Ltd	
UTM Coordinates:	07W 0513952 7148677	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	lesearen Eld.	
Technique:	Swoffer Meter	Left Bank	0.2	
Temp., Water/Air (°C)	NC / 2	Right Bank	2.05	
Crossing Number	1	Wet.Width	1.85	

	Distance	Station		Valacity @	Danel Area	Panel
Station No.			Depth (m)			Discharge
	(m)	wiath (m)		60% (m/s)	(m)	(m³/s)
0	0.20	0.045	0.00	0.00	0.000	0.0000
1	0.29	0.085	0.02	0.14	0.002	0.0002
2	0.37	0.095	0.02	0.16	0.002	0.0003
3	0.48	0.100	0.02	0.19	0.002	0.0004
4	0.57	0.091	0.03	0.25	0.003	0.0007
5	0.66	0.095	0.04	0.27	0.004	0.0010
6	0.76	0.095	0.04	0.25	0.004	0.0009
7	0.85	0.090	0.05	0.29	0.005	0.0013
8	0.94	0.090	0.05	0.32	0.005	0.0014
9	1.03	0.095	0.07	0.34	0.007	0.0023
10	1.13	0.095	0.09	0.38	0.009	0.0032
11	1.22	0.090	0.09	0.41	0.008	0.0033
12	1.31	0.090	0.08	0.41	0.007	0.0030
13	1.40	0.095	0.08	0.54	0.008	0.0041
14	1.50	0.095	0.09	0.56	0.009	0.0048
15	1.59	0.090	0.09	0.57	0.008	0.0046
16	1.68	0.090	0.08	0.48	0.007	0.0035
17	1.77	0.095	0.06	0.37	0.006	0.0021
18	1.87	0.095	0.03	0.21	0.003	0.0006
19	1.96	0.090	0.02	0.09	0.002	0.0002
20	2.05	0.045	0.00	0.00	0.000	0.0000
21	2.05					

Mean Depth (m)	0.05
Mean Velocity (m/s)	0.30

Discharge (m³/s)



ELR Project No.	14-183			
Site / Location:	R3			
Stream Name:	Wolverine Creek			
Station Name:	R3			
Date and Time:	22 Sep. 2014			
Staff:	AN + AB	ECOIC & R	& Research Ltd	
UTM Coordinates:	07W 0513952 7148677	un	escaren Etd.	
Technique:	Swoffer Meter	Left Bank	0.2	
Temp., Water/Air (°C)	NC / 2	Right Bank	2.05	
Crossing Number	2	Wet.Width	1.85	

Station No.	Distance	Station	Depth (m)	Velocity @	Velocity @ Panel Area	Panel Area	Panel Discharge
	(m)	Width (m)	,	60% (m/s)	(m²)	(m³/s)	
0	0.20	0.045	0.00	0.00	0.000	0.0000	
1	0.29	0.085	0.02	0.20	0.002	0.0003	
2	0.37	0.095	0.02	0.20	0.002	0.0004	
3	0.48	0.100	0.03	0.23	0.003	0.0007	
4	0.57	0.091	0.03	0.29	0.003	0.0008	
5	0.66	0.095	0.04	0.25	0.004	0.0010	
6	0.76	0.095	0.05	0.27	0.005	0.0013	
7	0.85	0.090	0.05	0.30	0.005	0.0014	
8	0.94	0.090	0.06	0.33	0.005	0.0018	
9	1.03	0.095	0.08	0.37	0.008	0.0028	
10	1.13	0.095	0.10	0.42	0.010	0.0040	
11	1.22	0.090	0.09	0.43	0.008	0.0035	
12	1.31	0.090	0.09	0.45	0.008	0.0036	
13	1.40	0.095	0.08	0.55	0.008	0.0042	
14	1.50	0.095	0.08	0.64	0.008	0.0049	
15	1.59	0.090	0.09	0.61	0.008	0.0049	
16	1.68	0.090	0.07	0.50	0.006	0.0032	
17	1.77	0.095	0.05	0.40	0.005	0.0019	
18	1.87	0.095	0.03	0.26	0.003	0.0007	
19	1.96	0.090	0.02	0.09	0.002	0.0002	
20	2.05	0.045	0.00	0.00	0.000	0.0000	
21	2.05						

Mean Depth (m)	0.05	Disch
Mean Velocity (m/s)	0.32	

Discharge (m³/s)



ELR Project No.	14-183			
Site / Location:	R4			
Stream Name:	Eagle Creek			
Station Name:	R4			
Date and Time:	19 Sep. 2014 @ 17:55			
Staff:	AB + AN		& Research Ltd	
UTM Coordinates:	07W 0515981 7415344	Q.1.		
Technique:	Swoffer Meter	Left Bank	0.35	
Temp., Water/Air (°C)	NC / 8	Right Bank	1.9	
Crossing Number	1	Wet.Width	1.55	

					Dowol Aven	Panel
Station No.	Distance	Station	Depth (m)	Velocity @		Discharge
	(m)	width (m)		60% (m/s)	(m⁻)	(m³/s)
0	0.35	0.040	0.00	0.00	0.000	0.0000
1	0.43	0.080	0.07	0.27	0.006	0.0015
2	0.51	0.075	0.04	0.70	0.003	0.0021
3	0.58	0.075	0.04	0.82	0.003	0.0025
4	0.66	0.080	0.02	0.50	0.002	0.0008
5	0.74	0.078	0.04	0.88	0.003	0.0027
6	0.82	0.075	0.04	0.78	0.003	0.0023
7	0.89	0.078	0.04	0.60	0.003	0.0019
8	0.97	0.080	0.03	0.39	0.002	0.0009
9	1.05	0.080	0.03	0.49	0.002	0.0012
10	1.13	0.075	0.03	0.20	0.002	0.0005
11	1.20	0.075	0.01	0.27	0.001	0.0002
12	1.28	0.080	0.03	0.60	0.002	0.0014
13	1.36	0.080	0.02	0.36	0.002	0.0006
14	1.44	0.075	0.07	0.21	0.005	0.0011
15	1.51	0.075	0.06	0.73	0.005	0.0033
16	1.59	0.080	0.06	0.86	0.005	0.0041
17	1.67	0.080	0.06	0.61	0.005	0.0029
18	1.75	0.075	0.07	0.34	0.005	0.0018
19	1.82	0.075	0.08	0.56	0.006	0.0034
20	1.90	0.040	0.00	0.00	0.000	0.0000
21	1.90					

Mean Depth (m)	0.04
Mean Velocity (m/s)	0.48

m³/s)



ELR Project No.	14-183				
Site / Location:	R4				
Stream Name:	Eagle Creek				
Station Name:	R4				
Date and Time:	19 Sep. 2014 @ 17:55				
Staff:	AB + AN		& Research Ltd		
UTM Coordinates:	07W 0515981 7415344	α ((escar err Ecd.		
Technique:	Swoffer Meter	Left Bank	0.35		
Temp., Water/Air (°C)	NC / 8	Right Bank	1.9		
Crossing Number	2	Wet.Width	1.55		

					Dowol Aven	Panel
Station No.	Distance	Station	Depth (m)	Velocity @		Discharge
	(m)	Width (m)		60% (m/s)	(m⁻)	(m³/s)
0	0.35	0.040	0.00	0.00	0.000	0.0000
1	0.43	0.080	0.06	0.39	0.005	0.0019
2	0.51	0.075	0.05	0.67	0.004	0.0025
3	0.58	0.075	0.04	0.87	0.003	0.0026
4	0.66	0.080	0.02	0.62	0.002	0.0010
5	0.74	0.078	0.03	0.82	0.002	0.0019
6	0.82	0.075	0.04	0.78	0.003	0.0023
7	0.89	0.078	0.04	0.33	0.003	0.0010
8	0.97	0.080	0.03	0.32	0.002	0.0008
9	1.05	0.080	0.02	0.48	0.002	0.0008
10	1.13	0.075	0.03	0.23	0.002	0.0005
11	1.20	0.075	0.01	0.17	0.001	0.0001
12	1.28	0.080	0.03	0.63	0.002	0.0015
13	1.36	0.080	0.02	0.28	0.002	0.0004
14	1.44	0.075	0.07	0.45	0.005	0.0024
15	1.51	0.075	0.05	0.50	0.004	0.0019
16	1.59	0.080	0.06	0.87	0.005	0.0042
17	1.67	0.080	0.06	0.63	0.005	0.0030
18	1.75	0.075	0.07	0.37	0.005	0.0019
19	1.82	0.075	0.08	0.56	0.006	0.0034
20	1.90	0.040	0.00	0.00	0.000	0.0000
21	1.90					

Mean Depth (m)	0.04	Discharge (m ³ /s)
Mean Velocity (m/s)	0.47	





ELR Project No.	14-183				
Site / Location:	R7				
Stream Name:	Porcupine Creek				
Station Name:	R7				
Date and Time:	22 Sep. 2014 @ 12:10				
Staff:	AN + AB		Ecological Logistics		
UTM Coordinates:	07W 0513026 7145669	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	escaren Etd.		
Technique:	Swoffer Meter	Left Bank	0.3		
Temp., Water/Air (°C)	NC / 3	Right Bank	1		
Crossing Number	1	Wet.Width	0.7		

Distance	Station		Velocity @	Panel Area	Panel
(m)	Width (m)	Depth (m)	60% (m/s)	(m ²)	Discharge
(111)	wiath (iii)		00% (11/3)	(11)	(m³/s)
0.30	0.035	0.00	0.00	0.000	0.0000
0.37	0.070	0.02	0.00	0.001	0.0000
0.44	0.070	0.07	0.00	0.005	0.0000
0.51	0.070	0.10	0.00	0.007	0.0000
0.58	0.070	0.10	0.05	0.007	0.0004
0.65	0.070	0.11	0.05	0.008	0.0004
0.72	0.070	0.11	0.04	0.008	0.0003
0.79	0.070	0.10	0.02	0.007	0.0001
0.86	0.070	0.07	0.00	0.005	0.0000
0.93	0.070	0.06	0.00	0.004	0.0000
1.00	0.035	0.00	0.00	0.000	0.0000
1.00					
	Distance (m) 0.30 0.37 0.44 0.51 0.58 0.65 0.72 0.79 0.86 0.93 1.00 1.00	Distance (m) Station Width (m) 0.30 0.035 0.37 0.070 0.44 0.070 0.51 0.070 0.58 0.070 0.65 0.070 0.72 0.070 0.86 0.070 0.93 0.070 1.00 0.35 1.00	Distance (m) Station Width (m) Depth (m) 0.30 0.035 0.00 0.37 0.070 0.02 0.44 0.070 0.10 0.51 0.070 0.10 0.58 0.070 0.11 0.72 0.070 0.11 0.72 0.070 0.11 0.72 0.070 0.10 0.86 0.070 0.07 0.93 0.070 0.06 1.00 0.035 0.00 1.00 . .	Distance (m) Station Width (m) Depth (m) Velocity @ 60% (m/s) 0.30 0.035 0.00 0.00 0.37 0.070 0.02 0.00 0.44 0.070 0.07 0.00 0.51 0.070 0.10 0.00 0.58 0.070 0.10 0.05 0.65 0.070 0.11 0.05 0.72 0.070 0.11 0.02 0.86 0.070 0.11 0.02 0.86 0.070 0.10 0.02 0.86 0.070 0.06 0.00 1.00 0.035 0.00 0.00 1.00 0.035 0.00 0.00	Distance (m) Station Width (m) Depth (m) Velocity @ 60% (m/s) Panel Area (m ²) 0.30 0.035 0.00 0.00 0.000 0.37 0.070 0.02 0.00 0.001 0.44 0.070 0.07 0.00 0.005 0.51 0.070 0.10 0.00 0.007 0.58 0.070 0.11 0.05 0.008 0.72 0.070 0.11 0.04 0.008 0.72 0.070 0.11 0.02 0.007 0.86 0.070 0.10 0.02 0.007 0.86 0.070 0.06 0.00 0.004 1.00 0.035 0.00 0.00 0.00 1.00 0.035 0.00 0.00 0.00

Mean Depth (m)	0.07	Discharge (m ³ /s
Mean Velocity (m/s)	0.01	



ELR Project No.	14-183				
Site / Location:	R7				
Stream Name:	Porcupine Creek				
Station Name:	R7				
Date and Time:	22 Sep. 2014 @ 12:10				
Staff:	AN + AB		& Research Ltd		
UTM Coordinates:	07W 0513026 7145669	<u></u> α τ	Escaren Eca.		
Technique:	Swoffer Meter	Left Bank	0.3		
Temp., Water/Air (°C)	NC / 3	Right Bank	1		
Crossing Number	2	Wet.Width	0.7		

Distance	Station	Depth (m)	Velocity @	Panel Area	Panel Discharge
(m)	Width (m)		60% (m/s)	(m²)	(m ³ /s)
0.30	0.035	0.00	0.00	0.000	0.0000
0.37	0.070	0.02	0.00	0.001	0.0000
0.44	0.070	0.07	0.00	0.005	0.0000
0.51	0.070	0.09	0.07	0.006	0.0004
0.58	0.070	0.10	0.05	0.007	0.0004
0.65	0.070	0.11	0.06	0.008	0.0005
0.72	0.070	0.11	0.04	0.008	0.0003
0.79	0.070	0.11	0.01	0.008	0.0001
0.86	0.070	0.09	0.00	0.006	0.0000
0.93	0.070	0.06	0.00	0.004	0.0000
1.00	0.035	0.00	0.00	0.000	0.0000
1.00					
	Distance (m) 0.30 0.37 0.44 0.51 0.58 0.65 0.72 0.79 0.86 0.93 1.00 1.00	Distance Station (m) Width (m) 0.30 0.035 0.37 0.070 0.44 0.070 0.51 0.070 0.58 0.070 0.65 0.070 0.72 0.070 0.79 0.070 0.86 0.070 0.93 0.070 1.00 0.35 1.00	Distance (m) Station Width (m) Depth (m) 0.30 0.035 0.00 0.37 0.070 0.02 0.44 0.070 0.07 0.51 0.070 0.09 0.58 0.070 0.10 0.65 0.070 0.11 0.72 0.070 0.11 0.79 0.070 0.11 0.79 0.070 0.11 0.79 0.070 0.11 0.86 0.070 0.06 1.00 0.035 0.00 1.00 0.035 0.00	Distance (m) Station Width (m) Depth (m) Velocity @ 60% (m/s) 0.30 0.035 0.00 0.00 0.37 0.070 0.02 0.00 0.44 0.070 0.07 0.00 0.51 0.070 0.10 0.05 0.58 0.070 0.11 0.06 0.72 0.070 0.11 0.04 0.79 0.070 0.11 0.01 0.86 0.070 0.11 0.01 0.86 0.070 0.11 0.01 0.86 0.070 0.06 0.00 1.00 0.035 0.00 0.00 1.00 0.035 0.00 0.00 1.00 0.035 0.00 0.00	Distance (m) Station Width (m) Depth (m) Velocity @ 60% (m/s) Panel Area (m ²) 0.30 0.035 0.00 0.00 0.00 0.37 0.070 0.02 0.00 0.001 0.44 0.070 0.07 0.00 0.005 0.51 0.070 0.09 0.07 0.006 0.58 0.070 0.10 0.05 0.007 0.65 0.070 0.11 0.04 0.008 0.72 0.070 0.11 0.04 0.008 0.79 0.070 0.11 0.01 0.008 0.79 0.070 0.11 0.01 0.008 0.86 0.070 0.06 0.00 0.004 1.00 0.035 0.00 0.00 0.00 1.00 0.035 0.00 0.00 0.00

Mean Depth (m)	0.07	Discharge (m ³ /s)
Mean Velocity (m/s)	0.02	



ELR Project No.	14-183		
Site / Location:	E1		
Stream Name:	Clinton Creek		
Station Name:	E1		
Date and Time:	19 Sep. 2014 @ 11:35		
Staff:	AN + AB	LCOIO & R	gical Logistics
UTM Coordinates:	07W 0513645 7147111	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	escaren Eca.
Technique:	Swoffer Meter	Left Bank	0.65
Temp., Water/Air (°C)	NC / 3 no sun, 8 with sun	Right Bank	9.5
Crossing Number	1	Wet.Width	8.85

	Distance	Station		Velocity @	Panel Area	Panel
Station No.	(m)	Width (m)	Depth (m)	60% (m/s)	(m ²)	Discharge
	(11)	width (iii)		0070 (III73)	(m)	(m³/s)
0	0.65	0.220	0.00	0.00	0.000	0.0000
1	1.09	0.440	0.17	0.03	0.075	0.0022
2	1.53	0.445	0.24	0.23	0.107	0.0246
3	1.98	0.445	0.28	0.26	0.125	0.0324
4	2.42	0.440	0.30	0.03	0.132	0.0040
5	2.86	0.445	0.19	0.25	0.085	0.0211
6	3.31	0.445	0.17	0.43	0.076	0.0325
7	3.75	0.440	0.14	0.28	0.062	0.0172
8	4.19	0.440	0.13	0.10	0.057	0.0057
9	4.63	0.445	0.09	0.12	0.040	0.0048
10	5.08	0.445	0.11	0.39	0.049	0.0191
11	5.52	0.440	0.15	0.65	0.066	0.0429
12	5.96	0.440	0.18	0.29	0.079	0.0230
13	6.40	0.445	0.06	0.02	0.027	0.0005
14	6.85	0.445	0.09	0.25	0.040	0.0100
15	7.29	0.440	0.06	0.48	0.026	0.0127
16	7.73	0.440	0.07	0.28	0.031	0.0086
17	8.17	0.445	0.08	0.00	0.036	0.0000
18	8.62	0.445	0.03	0.00	0.013	0.0000
19	9.06	0.440	0.02	0.00	0.009	0.0000
20	9.50	0.220	0.00	0.00	0.000	0.0000
21	9.50					

Mean Depth (m)	0.12	D
Mean Velocity (m/s)	0.19	

Discharge (m³/s)



ELR Project No.	14-183		
Site / Location:	E1		
Stream Name:	Clinton Creek		
Station Name:	E1		
Date and Time:	19 Sep. 2014 @ 11:35		
Staff:	AN + AB		search I td
UTM Coordinates:	07W 0513645 7147111		escuren Etd.
Technique:	Swoffer Meter	Left Bank	0.65
Temp., Water/Air (°C)	NC / 3 no sun, 8 with sun	Right Bank	9.5
Crossing Number	2	Wet.Width	8.85

	D :	Charles			Donal Area	Panel
Station No.	Distance		Depth (m)			Discharge
	(m)	wiath (m)		60% (m/s)	(m⁻)	(m³/s)
0	0.65	0.220	0.00	0.00	0.000	0.0000
1	1.09	0.440	0.13	0.18	0.057	0.0103
2	1.53	0.445	0.22	0.16	0.098	0.0157
3	1.98	0.445	0.31	0.39	0.138	0.0538
4	2.42	0.440	0.32	0.04	0.141	0.0056
5	2.86	0.445	0.19	0.25	0.085	0.0211
6	3.31	0.445	0.18	0.48	0.080	0.0384
7	3.75	0.440	0.14	0.27	0.062	0.0166
8	4.19	0.440	0.15	0.11	0.066	0.0073
9	4.63	0.445	0.08	0.11	0.036	0.0039
10	5.08	0.445	0.10	0.30	0.045	0.0134
11	5.52	0.440	0.15	0.59	0.066	0.0389
12	5.96	0.440	0.16	0.26	0.070	0.0183
13	6.40	0.445	0.06	0.06	0.027	0.0016
14	6.85	0.445	0.07	0.25	0.031	0.0078
15	7.29	0.440	0.06	0.53	0.026	0.0140
16	7.73	0.440	0.07	0.30	0.031	0.0092
17	8.17	0.445	0.08	0.00	0.036	0.0000
18	8.62	0.445	0.03	0.00	0.013	0.0000
19	9.06	0.440	0.02	0.00	0.009	0.0000
20	9.50	0.220	0.00	0.00	0.000	0.0000
21	9.50					

Mean Depth (m)	0.12	Discha
Mean Velocity (m/s)	0.20	

Discharge (m³/s)



ELR Project No.	14-183		
Site / Location:	E2		
Stream Name:	Clinton Creek		
Station Name:	E2		
Date and Time:	19 Sep. 2014 @ 15:10		
Staff:	AN + AB		search I td
UTM Coordinates:	07W 0514149 7147076	C 11	Escuren Eco.
Technique:	Swoffer Meter	Left Bank	1.5
Temp., Water/Air (°C)	NC / 6	Right Bank	7.2
Crossing Number	1	Wet.Width	5.7

Station No.	Distance	Station	Denth (m)	Velocity @	Panel Area	Panel Discharge
	(m)	Width (m)	Deptil (III)	60% (m/s)	(m²)	(m ³ /s)
0	1.50	0.145	0.00	0.00	0.000	0.0000
1	1.79	0.285	0.05	0.22	0.014	0.0031
2	2.07	0.285	0.07	0.35	0.020	0.0070
3	2.36	0.285	0.11	0.45	0.031	0.0141
4	2.64	0.285	0.17	0.62	0.048	0.0300
5	2.93	0.285	0.16	0.78	0.046	0.0356
6	3.21	0.285	0.24	0.75	0.068	0.0513
7	3.50	0.285	0.24	0.82	0.068	0.0561
8	3.78	0.285	0.26	0.78	0.074	0.0578
9	4.07	0.285	0.25	0.63	0.071	0.0449
10	4.35	0.285	0.26	0.49	0.074	0.0363
11	4.64	0.285	0.19	0.56	0.054	0.0303
12	4.92	0.285	0.16	0.46	0.046	0.0210
13	5.21	0.285	0.15	0.28	0.043	0.0120
14	5.49	0.285	0.14	0.26	0.040	0.0104
15	5.78	0.285	0.11	0.16	0.031	0.0050
16	6.06	0.285	0.07	0.12	0.020	0.0024
17	6.35	0.285	0.09	0.05	0.026	0.0013
18	6.63	0.285	0.10	0.08	0.029	0.0023
19	6.92	0.285	0.00	0.00	0.000	0.0000
20	7.20	0.140	0.00	0.00	0.000	0.0000
21	7.20					

Mean Depth (m)	0.13
Mean Velocity (m/s)	0.37

Discharge (m³/s)



ELR Project No.	14-183		
Site / Location:	E2		
Stream Name:	Clinton Creek		
Station Name:	E2		
Date and Time:	19 Sep. 2014 @ 15:10		
Staff:	AN + AB		gical Logistics
UTM Coordinates:	07W 0514149 7147076	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
Technique:	Swoffer Meter	Left Bank	1.5
Temp., Water/Air (°C)	NC / 6	Right Bank	7.2
Crossing Number	2	Wet.Width	5.7

Station No.	Distance	Station	Donth (m)	Velocity @	Panel Area	Panel Discharge
Station No.	(m)	Width (m)	Depth (m)	60% (m/s)	(m²)	(m ³ /s)
0	1.50	0.145	0.00	0.00	0.000	0.0000
1	1.79	0.285	0.04	0.16	0.011	0.0018
2	2.07	0.285	0.09	0.03	0.026	0.0008
3	2.36	0.285	0.12	0.42	0.034	0.0144
4	2.64	0.285	0.16	0.63	0.046	0.0287
5	2.93	0.285	0.17	0.66	0.048	0.0320
6	3.21	0.285	0.23	0.71	0.066	0.0465
7	3.50	0.285	0.24	0.77	0.068	0.0527
8	3.78	0.285	0.26	0.75	0.074	0.0556
9	4.07	0.285	0.22	0.81	0.063	0.0508
10	4.35	0.285	0.25	0.53	0.071	0.0378
11	4.64	0.285	0.19	0.56	0.054	0.0303
12	4.92	0.285	0.19	0.42	0.054	0.0227
13	5.21	0.285	0.17	0.27	0.048	0.0131
14	5.49	0.285	0.14	0.26	0.040	0.0104
15	5.78	0.285	0.11	0.19	0.031	0.0060
16	6.06	0.285	0.09	0.06	0.026	0.0015
17	6.35	0.285	0.09	0.10	0.026	0.0026
18	6.63	0.285	0.10	0.09	0.029	0.0026
19	6.92	0.285	0.00	0.00	0.000	0.0000
20	7.20	0.140	0.00	0.00	0.000	0.0000
21	7.20					

Mean Depth (m)	0.14
Mean Velocity (m/s)	0.35

Discharge (m³/s)



ELR Project No.	14-183				
Site / Location:	E3				
Stream Name:	Wolverine Creek				
Station Name:	E3				
Date and Time:	19 Sep. 2014 @ 16:30				
Staff:	AB + AN		& Research Ltd		
UTM Coordinates:	07W 0514178 7147189	u Research Ed.			
Technique:	Swoffer Meter	Left Bank	3.3		
Temp., Water/Air (°C)	NC / 8	Right Bank	1.3		
Crossing Number	1	Wet.Width	2		

	Distance	Charles			Donal Area	Panel
Station No.	Distance		Depth (m)			Discharge
	(m)	wiath (m)		60% (m/s)	(m ⁻)	(m³/s)
0	3.30	0.050	0.00	0.00	0.000	0.0000
1	3.20	0.100	0.08	0.07	0.008	0.0006
2	3.10	0.100	0.15	0.09	0.015	0.0014
3	3.00	0.100	0.17	0.12	0.017	0.0020
4	2.90	0.100	0.19	0.12	0.019	0.0023
5	2.80	0.100	0.23	0.08	0.023	0.0018
6	2.70	0.100	0.24	0.14	0.024	0.0034
7	2.60	0.100	0.28	0.15	0.028	0.0042
8	2.50	0.100	0.29	0.13	0.029	0.0038
9	2.40	0.100	0.27	0.11	0.027	0.0030
10	2.30	0.100	0.23	0.14	0.023	0.0032
11	2.20	0.100	0.26	0.23	0.026	0.0060
12	2.10	0.100	0.24	0.16	0.024	0.0038
13	2.00	0.100	0.23	0.26	0.023	0.0060
14	1.90	0.100	0.17	0.24	0.017	0.0041
15	1.80	0.100	0.23	0.26	0.023	0.0060
16	1.70	0.100	0.08	0.15	0.008	0.0012
17	1.60	0.100	0.05	0.11	0.005	0.0006
18	1.50	0.100	0.02	0.00	0.002	0.0000
19	1.40	0.100	0.01	0.00	0.001	0.0000
20	1.30	0.050	0.00	0.00	0.000	0.0000
21	1.30					

Mean Depth (m)	0.16
Mean Velocity (m/s)	0.12

Discharge (m³/s)



ELR Project No.	14-183				
Site / Location:	E3				
Stream Name:	Wolverine Creek				
Station Name:	E3				
Date and Time:	19 Sep. 2014 @ 16:30				
Staff:	AB + AN		& Research Ltd		
UTM Coordinates:	07W 0514178 7147189	et Research Ed.			
Technique:	Swoffer Meter	Left Bank	3.3		
Temp., Water/Air (°C)	NC / 8	Right Bank	1.3		
Crossing Number	2	Wet.Width 2			

Station No.	Distance	Station	Depth (m)	Velocity @	Panel Area	Panel Discharge
	(m)	wiath (m)		60% (m/s)	(m)	(m³/s)
0	3.30	0.050	0.00	0.00	0.000	0.0000
1	3.20	0.100	0.08	0.08	0.008	0.0006
2	3.10	0.100	0.14	0.08	0.014	0.0011
3	3.00	0.100	0.17	0.11	0.017	0.0019
4	2.90	0.100	0.19	0.10	0.019	0.0019
5	2.80	0.100	0.22	0.07	0.022	0.0015
6	2.70	0.100	0.24	0.12	0.024	0.0029
7	2.60	0.100	0.27	0.13	0.027	0.0035
8	2.50	0.100	0.27	0.14	0.027	0.0038
9	2.40	0.100	0.26	0.14	0.026	0.0036
10	2.30	0.100	0.28	0.17	0.028	0.0048
11	2.20	0.100	0.23	0.18	0.023	0.0041
12	2.10	0.100	0.24	0.18	0.024	0.0043
13	2.00	0.100	0.23	0.24	0.023	0.0055
14	1.90	0.100	0.23	0.25	0.023	0.0057
15	1.80	0.100	0.11	0.18	0.011	0.0020
16	1.70	0.100	0.09	0.18	0.009	0.0016
17	1.60	0.100	0.04	0.14	0.004	0.0006
18	1.50	0.100	0.02	0.00	0.002	0.0000
19	1.40	0.100	0.01	0.00	0.001	0.0000
20	1.30	0.050	0.00	0.00	0.000	0.0000
21	1.30					

Mean Depth (m)	0.16
Mean Velocity (m/s)	0.12

Discharge (m³/s)



ELR Project No.	14-183				
Site / Location:	E4				
Stream Name:	Clinton Creek				
Station Name:	E4				
Date and Time:	19 Sep. 2014 @ 18:35				
Staff:	AB + AN		Ecological Logistics & Research Ltd		
UTM Coordinates:	07W 0515950 7145287	C 11	di Nescal en Ed.		
Technique:	Swoffer Meter	Left Bank	0.2		
Temp., Water/Air (°C)	NC / 8	Right Bank	6.15		
Crossing Number	1	Wet.Width	5.95		

					Dowol Aven	Panel
Station No.	Distance	Station	Depth (m)	Velocity @		Discharge
	(m)	width (m)		60% (m/s)	(m⁻)	(m³/s)
0	0.20	0.150	0.00	0.00	0.000	0.0000
1	0.50	0.300	0.12	0.66	0.036	0.0238
2	0.80	0.300	0.09	0.81	0.027	0.0219
3	1.10	0.300	0.12	0.73	0.036	0.0263
4	1.40	0.300	0.14	0.54	0.042	0.0227
5	1.70	0.300	0.22	0.83	0.066	0.0548
6	2.00	0.300	0.19	0.04	0.057	0.0023
7	2.30	0.300	0.23	0.69	0.069	0.0476
8	2.60	0.300	0.24	0.57	0.072	0.0410
9	2.90	0.300	0.26	0.34	0.078	0.0265
10	3.20	0.300	0.17	0.64	0.051	0.0326
11	3.50	0.300	0.13	0.42	0.039	0.0164
12	3.80	0.300	0.14	0.52	0.042	0.0218
13	4.10	0.300	0.17	0.30	0.051	0.0153
14	4.40	0.300	0.19	0.10	0.057	0.0057
15	4.70	0.300	0.18	0.45	0.054	0.0243
16	5.00	0.300	0.14	0.74	0.042	0.0311
17	5.30	0.300	0.12	0.68	0.036	0.0245
18	5.60	0.300	0.10	0.07	0.030	0.0021
19	5.90	0.300	0.07	0.26	0.021	0.0055
20	6.20	0.150	0.00	0.00	0.000	0.0000
21	6.20					

Mean Depth (m)	0.14	Discharge (m ³ /s)
Mean Velocity (m/s)	0.45	



ELR Project No.	14-183				
Site / Location:	E4				
Stream Name:	Clinton Creek				
Station Name:	E4				
Date and Time:	19 Sep. 2014 @ 18:35				
Staff:	AB + AN		Ecological Logistics & Research Ltd		
UTM Coordinates:	07W 0515950 7145287	C 10	di Nescar en Ed.		
Technique:	Swoffer Meter	Left Bank	0.2		
Temp., Water/Air (°C)	NC / 8	Right Bank	6.15		
Crossing Number	2	Wet.Width	5.95		

					Demol Arres	Panel
Station No.	Distance	Station	Depth (m)	Velocity @		Discharge
	(m)	Width (m)		60% (m/s)	(m ⁻)	(m³/s)
0	0.20	0.150	0.00	0.00	0.000	0.0000
1	0.50	0.300	0.13	0.68	0.039	0.0265
2	0.80	0.300	0.08	0.80	0.024	0.0192
3	1.10	0.300	0.12	0.86	0.036	0.0310
4	1.40	0.300	0.15	0.53	0.045	0.0239
5	1.70	0.300	0.23	0.85	0.069	0.0587
6	2.00	0.300	0.19	0.06	0.057	0.0034
7	2.30	0.300	0.22	0.77	0.066	0.0508
8	2.60	0.300	0.26	0.67	0.078	0.0523
9	2.90	0.300	0.27	0.39	0.081	0.0316
10	3.20	0.300	0.17	0.68	0.051	0.0347
11	3.50	0.300	0.14	0.38	0.042	0.0160
12	3.80	0.300	0.15	0.48	0.045	0.0216
13	4.10	0.300	0.17	0.35	0.051	0.0179
14	4.40	0.300	0.19	0.14	0.057	0.0080
15	4.70	0.300	0.17	0.47	0.051	0.0240
16	5.00	0.300	0.14	0.70	0.042	0.0294
17	5.30	0.300	0.10	0.63	0.030	0.0189
18	5.60	0.300	0.11	0.06	0.033	0.0020
19	5.90	0.300	0.07	0.26	0.021	0.0055
20	6.20	0.150	0.00	0.00	0.000	0.0000
21	6.20					

Mean Depth (m)	0.15	Discharge (m ³ /s)
Mean Velocity (m/s)	0.46	



ELR Project No.	14-183		
Site / Location:	E7		
Stream Name:	Clinton Creek		
Station Name:	E7		
Date and Time:	21 Sep. 2014 @ 18:40		
Staff:	AN + AB		gical Logistics
UTM Coordinates:	07W 0519400 7142042	C 10	
Technique:	Swoffer Meter	Left Bank	5.35
Temp., Water/Air (°C)	NC / 6	Right Bank	0.65
Crossing Number	1	Wet.Width	4.7

	Distance	Charlin			Donal Area	Panel
Station No.	Distance	Station	Depth (m)	velocity @		Discharge
	(m)	Width (m)		60% (m/s)	(m⁻)	(m³/s)
0	5.35	0.120	0.00	0.00	0.000	0.0000
1	5.11	0.235	0.03	0.13	0.007	0.0009
2	4.88	0.235	0.12	0.40	0.028	0.0113
3	4.64	0.238	0.17	0.52	0.040	0.0210
4	4.41	0.230	0.19	0.51	0.044	0.0223
5	4.18	0.233	0.24	0.66	0.056	0.0368
6	3.94	0.235	0.22	0.68	0.052	0.0352
7	3.71	0.235	0.25	0.75	0.059	0.0441
8	3.47	0.235	0.24	0.62	0.056	0.0350
9	3.24	0.235	0.24	0.70	0.056	0.0395
10	3.00	0.235	0.24	0.73	0.056	0.0412
11	2.77	0.235	0.25	0.76	0.059	0.0447
12	2.53	0.235	0.25	0.55	0.059	0.0323
13	2.30	0.235	0.20	0.64	0.047	0.0301
14	2.06	0.235	0.23	0.60	0.054	0.0324
15	1.83	0.235	0.23	0.59	0.054	0.0319
16	1.59	0.235	0.24	0.68	0.056	0.0384
17	1.36	0.235	0.19	0.65	0.045	0.0290
18	1.12	0.235	0.19	0.53	0.045	0.0237
19	0.89	0.235	0.07	0.14	0.016	0.0023
20	0.65	0.120	0.00	0.00	0.000	0.0000
21	0.65					

Mean Depth (m)	0.18
Mean Velocity (m/s)	0.52

Discharge (m³/s)



ELR Project No.	14-183		
Site / Location:	E7		
Stream Name:	Clinton Creek		
Station Name:	E7		
Date and Time:	21 Sep. 2014 @ 18:40	F ull	
Staff:	AN + AB		search I td
UTM Coordinates:	07W 0519400 7142042		
Technique:	Swoffer Meter	Left Bank	5.35
Temp., Water/Air (°C)	NC / 6	Right Bank	0.65
Crossing Number	2	Wet.Width	4.7

					Demol Arres	Panel
Station No.	Distance	Station	Depth (m)	Velocity @		Discharge
	(m)	width (m)		60% (m/s)	(m⁻)	(m³/s)
0	5.35	0.120	0.00	0.00	0.000	0.0000
1	5.11	0.235	0.03	0.19	0.007	0.0013
2	4.88	0.235	0.12	0.46	0.028	0.0130
3	4.64	0.238	0.17	0.54	0.040	0.0218
4	4.41	0.230	0.19	0.52	0.044	0.0227
5	4.18	0.233	0.24	0.63	0.056	0.0352
6	3.94	0.235	0.22	0.71	0.052	0.0367
7	3.71	0.235	0.23	0.72	0.054	0.0389
8	3.47	0.235	0.24	0.63	0.056	0.0355
9	3.24	0.235	0.25	0.70	0.059	0.0411
10	3.00	0.235	0.24	0.82	0.056	0.0462
11	2.77	0.235	0.25	0.79	0.059	0.0464
12	2.53	0.235	0.25	0.53	0.059	0.0311
13	2.30	0.235	0.20	0.62	0.047	0.0291
14	2.06	0.235	0.23	0.57	0.054	0.0308
15	1.83	0.235	0.24	0.58	0.056	0.0327
16	1.59	0.235	0.23	0.63	0.054	0.0341
17	1.36	0.235	0.19	0.64	0.045	0.0286
18	1.12	0.235	0.20	0.46	0.047	0.0216
19	0.89	0.235	0.07	0.14	0.016	0.0023
20	0.65	0.120	0.00	0.00	0.000	0.0000
21	0.65					

Mean Depth (m)	0.18
Mean Velocity (m/s)	0.52

Discharge (m³/s)



ELR Project No.	14-183		
Site / Location:	GWCC - 3		
Stream Name:	NA		
Station Name:	GWCC - 3		
Date and Time:	21 Sep. 2014 @ 13:35		
Staff:	AN + AB	ECOIO & R	gical Logistics
UTM Coordinates:	07W 0513882 7147038	Q.1.	escaren Eca.
Technique:	Volumetric Flow Rate	Left Bank	N/A
Temp., Water/Air (°C)	NC / NC	Right Bank	N/A
Crossing Number	N/A	Wet.Width	N/A

Measureme nt No.	Volume (L)	Time (s)	Velocity (L/s)	Discharge (m³/s)
0	1.000	2.00	0.5000	0.000500
1	1.000	1.50	0.6667	0.000667
2	1.000	1.50	0.6667	0.000667
3	1.000	1.50	0.6667	0.000667
4	1.000	1.50	0.6667	0.000667

Mean Depth (m)	N/A
Mean Velocity (m/s)	N/A

Average Discharge (m³/s)

ELR Project No.	14-183		
Site / Location:	GWCC - 5		
Stream Name:	NA		
Station Name:	GWCC - 5		
Date and Time:	19 Sep. 2014 @ 14:00		
Staff:	AN + AB		search Itd
UTM Coordinates:	07W 0513984 7147127		escaren Eca.
Technique:	Swoffer Meter	Left Bank	0.65
Temp., Water/Air (°C)	NC / NC	Right Bank	1.3
Crossing Number	1	Wet.Width	0.65

Station No.	Distance Stat tation No. (m) Widt	Station	Depth (m)	th (m) Velocity @	Panel Area	Panel Discharge
	(11)	wiath (m)		00% (11/5)	(m)	(m³/s)
0	0.65	0.045	0.00	0.00	0.000	0.0000
1	0.74	0.090	0.06	0.01	0.005	0.0001
2	0.83	0.095	0.06	0.00	0.006	0.0000
3	0.93	0.095	0.06	0.11	0.006	0.0006
4	1.02	0.090	0.04	0.14	0.004	0.0005
5	1.11	0.090	0.04	0.10	0.004	0.0004
6	1.20	0.090	0.04	0.00	0.004	0.0000
7	1.29	0.045	0.00	0.00	0.000	0.0000
8	1.29					

Mean Depth (m)	0.04	Discharge (m ³ /s)	0.0015
Mean Velocity (m/s)	0.05		



ELR Project No.	14-183		
Site / Location:	GWCC - 5		
Stream Name:	NA		
Station Name:	GWCC - 5		
Date and Time:	19 Sep. 2014 @ 14:00		
Staff:	AN + AB	Ecolo & R	gical Logistics esearch 1 td
UTM Coordinates:	07W 0513984 7147127	Q.1.	escar err Ecd.
Technique:	Swoffer Meter	Left Bank	0.65
Temp., Water/Air (°C)	NC / NC	Right Bank	1.3
Crossing Number	2	Wet.Width	0.65

Station No.	Distance Station		Depth (m)	Velocity @	Panel Area	Panel Discharge
	(11)	width (III)		0070 (1175)	(111)	(m³/s)
0	0.65	0.045	0.00	0.00	0.000	0.0000
1	0.74	0.090	0.05	0.00	0.005	0.0000
2	0.83	0.095	0.06	0.00	0.006	0.0000
3	0.93	0.095	0.06	0.08	0.006	0.0005
4	1.02	0.090	0.06	0.16	0.005	0.0009
5	1.11	0.090	0.04	0.13	0.004	0.0005
6	1.20	0.090	0.04	0.00	0.004	0.0000
7	1.29	0.045	0.00	0.00	0.000	0.0000
8	1.29					

Mean Depth (m)	0.04	Discharge (m ³ /s)	0.0018
Mean Velocity (m/s)	0.05		



APPENDIX 4 Sampling Field Notes

	elr
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Surface Water Sample Sheet

Date and Time (24bm)	20 S 1 201 -	17:14- 17:4	14-103 Cill	ton Creek I	nonitoring	AN	i snupler
Date and Time (24nr)	12 Sept Loing	12:15- 16.20	5		- 1 0 014	AB	: notes
Sample ID	KI - She	w reterence	site est	ablished	Sept 2000	2	
Sampling Method:	Grab		Other!		MEET	_	
WX - Overa	nst, light wind, occ	casional					
5	noullain ~3°c	Surfac	e Water S	Samples			······
	_		Collected	No. of	Preserved	Field	
	Parameters		(Y/N)	bottles	(Y/N)	filtered	Comments
	Total Matala					(Y/N)	
	Dissolved Metals		Y V	[[+ [<u>γ</u>	N	l plastic, l vial
Το	Dissolved Fields				<u>γ</u>	Y	
Disso	ved Organic Carbon (DOC)		<u> </u>	G. Cha		v	1 Martir 0 ass
and the second s	Nitrare/Nitrite/Sulphate		1 VIA	C. Che			
Total Nitro	gren/Ammonia/Total Phospho	rus	Y	1	Y	N	1 Ameber glass
			· · · · · · · · · · · · · · · · · · ·	<u> </u>	1		
	- ben. Chem		Y	(N	N	1 L plastic
			1				
			/	hottles	total	`	
	······						
							·····
		Duplicato	o and Eicle	J Blaula			
		Dupiicate	s and Field	з віанк			
			Duplicate	No. of	Decom/od?	Field filtered	Dualiante Name ID. a.a. Dua I
	NO		Collected?	bottles	(Y/N)	(Required)	(do not use the station name)
			(Y/N)	oottics		(Y/N)	
······································	Duplicate		NIA				
			Field Blanks	NIf	Durana	Field	
	No		Made up?	hottles	(Y/N)	filtered?	Field Blank ID (e.g., FB1)
	· ·		(Y/N)	0011103	(1/13)	(Y/N)	
	Field Blank		N/A	and a state of the	a d ange began star mark "nakkari senasagan ter	en gen Kamman diter kanden (d. en kilgel i en formandet en son ander en son andere en son andere en son andere	na fanan ar mar in de fan de bener a se a fan a se an
		Field	Paramete	ers			·
vvater Temp. (°C)	1.%						
pH	6.12		1999 1997 1997 1997 1997 1997 1997 1997	adara a diserang menang menang menang menang menang kanang menang menang menang menang menang menang menang me			· · · ·
² Conductivity (µS/cm)	113.3			Speci	fic Conductiv	/ity (µS/cm):	203.6
ORP (mV)	NOT RECORDED.	NOT REQUIR	EÒ				
Turbidity (NTU)	NOT RECORDED.	NOT REQUIT	ZED				
) Dissolved O- (mall)	[/] / ~~						
	10.15		and a supply of the Article State (and the State St	na dalam na bandan maring yang manayan Kabilan yak			
Dissolved On (% Sat)							
	72.00%0		YSI	+ sample	location	from mide	the of channel
λ		Misce	llaneous	nformatio	on		
Photo Numbers		(GD La					
UTM Coordinates		Zone	on hl	E: 05	12011		N: 7145LIA
Waypoint name	82 8-2 2 :	!	01	v.	1 3 VLQ Datum		110069
Observations	-1 JEVT 701-1	- Also se	e K3+	K) acce			strack for hike detail
	Located ~ LOm U	pstream on 10.	ingine (re.	ek thom	rathet int	to UNNAL	ed lake on creek,
	upstrem & wash	rock pile	1 10 10 10 10 10 10 10 10 10 10 10 10 10			1649944744474447444444444444444444444444	
		1					

A or Sur	face Wate	er Samol	- Sheet		
Date and Time (24hr)	E: 14-183 Clin	ton Creek N	Ionitoring	(1343 San	. 605.04 Hummerc
Sample ID El (and DUP)	2)	····, , , ··· ,	-	N.	ites: AB
Sampling Method: Grab	Other?			-	
		•			
Surra	ice water:	ampies		Field	I
Parameters	Collected (Y/N)	No. of bottles	Preserved (Y/N)	filtered (Y/N)	Comments
Total Metals (And Werlory)	<u> </u>	2	Ч	N	Metals plastic, Hg Vial
Dissolved Metals (ard marcury)	<u> </u>	2	<u> </u>	Y	
Dissolved Organic Carbon (DOC)		1	<u> </u>	V	
Nitrare/Nitrite/Sulphate		<u> </u>		/	ample glass
Total Nitrogren/Ammonia/Total Phosphorus	Y	1	Ч	N	Amber alass
)
(Tonged Clinical and I I I		6			1 L plastic
20 Sept 2014 a 15:10					
· · · · · · · · · · · · · · · · · · ·					
		<u> </u>	total		
Duplicat	es and Field	l Blank		I	
Filling + preservations Filling + preservations Frenchem collected 20 Sept 2014 a	Duplicate Collected? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered (Required) (Y/N)	Duplicate Name ID, e.g., Dup I (do not use the station name)
Duplicate	Y	6+1	SEC. COM	nents	PUP1
	Field Blanks Made up? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered? (Y/N)	Field Blank ID (e.g., FB1)
Field Blank 🛛 🔿	NTA.				
Field	d Paramete	rs		_	
Water Temp. (°C) 1.6	1 . 1	1 1 00			
d Conductivity (uS(m) 2.22 a	t Calibra	<u>te 020</u>	ATE pH	<u> </u>	-/ Hennera 1ST, 21 Sup 1
O(1)O(1)O(1)O(1)O(1)O(1)O(1)O(1)O(1)O(1)		speci		vity (µs/cm):	440.2

Dissolved O_2 (mg/L) 1.11 (AS)					
Dissolved O_2 (% Sat.) 99.3 (AS) $\frac{9}{6}$ L	cellaneous l	nformatio	on	ELR VE	I calibrated 19 Sep
Photo Numbers $ \langle_{0} ?_{2} - \neg \rangle + A A and a and a a a a a a a a a a $				erecept	pm prove
UTM Coordinates AN GPS Zone	:07 W/	E: 05	-13645		N: 713 714711
Waypoint name El Sept 2014			Datum:	NAD 83	071 1 1 1 1
Observations ~ Moved El location from St	iope of w	ark loc	ordinates	in orde	ir to avoid
hazard areas described i	N' AAM	So fety	Manuel	re: Dre	s Structure 41 And
		(mm)		. 1	
waste rock slope is stabili	ries. 71/11	locatio	in is m	10m de	in stream

- '885 1 2 1.770 607

r and Gen (Lim col	lected 20	Sopt 2014	a 15-15
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13:45

(Grab)

() elr	
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Surface Water Sample Sheet

Hennera 1343-005.04 ELR PROJECT NUMBER AND NAME: 14-183 Clinton Creek Monitoring

19 5ept 2014 Date and Time (24hr)

Sample ID GW((-5 Sample: AN Notes: AB

Sampling Method:

Other?

	Surta	ice water :	amples			
	Parameters	Collected (Y/N)	No. of bottles	Preserved (Y/N)	Field filtered (Y/N)	Comments
	Total Metals (and herryry)	Ч	2	Y	N	Inhohe + I vial
	Dissolved Metals (and hereign)	Ч	7	Y	N	
ľ	Total Suspended Solids (TSS)					
	Dissolved Organic Carbon (DOC)	Y		M	N	Louber alast
	Nitrare/Nitrite/Sulphate					
ſ	Total Nitrogren/Ammonia/Total Phosphorus	V	ſ	М	N	1 autor class
ľ						1
ľ			6			
Ì	General Alenista, collected 20 Sept 2014	4	1	N	N	1 IL aleste
ľ	1 C 15:15					
ľ	> relatively shallow flow in creek so		And a second			
ŀ	Philu ally to fill area dem battle	Total	~			
ł	341 fill of under ched (along /					
ł	free flouing to be are					
ł	The glowing water					
ŀ		-				
ŀ						
L	Dunlicat	es and Field	Blank			
Г				1		
		Duplicate	No. of	Preserved	Field filtered	Duplicate Name ID, e.g. Dup I
	No	Collected?	hottles	(Y/N)	(Required)	(do not use the station name)
		.(Y/N)	botties		(Y/N)	(ao not use the station name)
ŀ	Duplicate	N/A				and the second
┟		Field Blanks			Eield	
	NI A	Made up?	No. of	Preserved?	filtered?	Field Blank ID (e.g. FBI)
	100	(Y/N)	bottles	(Y/N)	(Y/N)	
ŀ	Field Blank				(11.1)	
L	Field	d Paramete	rs			
1 8	Water Temp. (°C)					
sa.		1. vr 1.		1. 1. 110-	• · · · · · · · · · · · · · · · · · · ·	7 20 (1) 167 21
ζw	Opri Oppi probler 151 Wan't callib	(ate, 16dive	not rela	rale UPD	ATE pti-	1.25 4/ Hembern 121,21
R	Conductivity (μ S/cm) <u>584</u>		Speci	fic Conductiv	vity (µS/cm):	892
114	Sep) ORP (mV) not recorded					
Ľ.	/ Turbidity (NTU) hat celocided					
64					n lithe free group of the second s	
4	Dissolved O_2 (mg/L) $3.3(\varphi$ (A5)			***	naan an gullega qualan kina an a	
.l va	Dissolved O2 (% Sat.) 29.9 (AS) 9.					
~	Mise	cellaneous l	nformatio	on		
,T	Photo Numbers 177 - 180 (AN (above)					
	LITM Coordinates () (() (")) + () Tan		Ε. Λ.	r1 2001	1	NI: 7/1/71/27
		U W.	E. ()	21 2104		N. 119 112)
	vvaypoint name 1/ (ow	AN GPS	<u> </u>	Datum:	NAD 83	
	Observations AN selected location based o	r best nb	ility to	, collect	hydrologi	1 Sanole. Sanole
	collected a putlet of mal	Fourme	ctic avai	lin. (~	150 len	(th) observed in
	to the to the total tota				·/ <u>·</u> /	f of an and a second
	port i cranna i isce plata	1			I C C-	aund plasse call Ef D. 947 449 4394
	Le l'a dema de denvel in est abr	6V (11 10	ound, please can ELN: 007.000.0380
	is loss algole in chankel in pour and					

	AND Gen Chem 2	o sept 2019	15.25			
(0)	er –	Surface Wate	er Sampl	e Sheet		
•		Himnerg	1343-00	5.04		
Date	and Time (24hr) 19 Such 2014 (5.0)	D NAME: 14-183 CIII	ton Creek I	Tonitoring	5	J. ANJ
Dutt	Sample ID F_7	y		-	2014	, AB
:	Sampling Method: (Grab)	Other?			<i>к</i> .	stes nu
					-	
		Surface Water S	Samples			
	Parameters	Collected (Y/N)	No. of bottles	Preserved (Y/N)	Field filtered (Y/N)	Comments
	Total Metals + MUVCUIN	Ч	141	Ч	N	1 plastic + Ivial
	Dissolved Metals - Melcury	<u> </u>	1+1	<u> </u>	Ч	1 plastic + 1 vial
	Total Suspended Solids (TSS)					
	Dissoived Organic Carbon (DOC)	¥		<u> ` </u>	<u>↓ </u>	Lamberglass
	Total Nitrogren/Ammonia/Total Phosphorus	\	۱		N	lader has
		L		·		inder ginsi
			6			· · · · ·
	Sameral (lawister) (allected		1		N	1 11 1 - 1
	20 Seat 2014 @ 15:25		•	••		- i i pastic
			7			· · · · · · · · · · · · · · · · · · ·
	Du	plicates and Field	Blank	1	L	
	NO	Duplicate Collected? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered (Required) (Y/N)	Duplicate Name ID, e.g., Dup I (do not use the station name)
	Duplicate	N/A	and the second			1900 (1900 1910) - 1910
	• -	Field Blanks	No. of	Preserved?	Field	
	$N \circ$	Made up?	bottles	(Y/N)	filtered?	Field Blank ID (e.g., FB1)
	Field Blank				<u>(17N)</u>	and a second
L		Field Paramete	ers	J	1	
Ń	/ater Temp. (°C)ሪ. 3		1			
. \	pH not recorded, pH probe on	YSI won't cal	brote -	VPDATE	pH=7-39	21 Sept 2014 12:20 - M.
Con	ductivity (μ S/cm) \leq_{O} \leq_{O}		Spec	ific Conducti	vity (µS/cm):	741
1	ORP (MV) NOT RECORDED					
	Turbidity (NTU)					
. e)	P					
Dis:	solved O_2 (mg/L) O_2 (Ac)					
Diss Diss	solved O_2 (mg/L) 1.61 (As)			Andread Sarah C. A. Secondar Sarah and Anno Anno Anno Anno Anno Anno Anno An		
Diss Diss	solved O ₂ (mg/L) 1.81 (As) plved O ₂ (% Sat.) 16.6 (As) 70 L	- Miscellaneous I	nformati	on		
Diss Diss but n	provided $O_2 (mg/L)$ $1.61 (AS)$ plved $O_2 (\% Sat.)$ $16.6 (AS) \%$	Miscellaneous I	nformati	on		
	solved O_2 (mg/L) 1.81 (AS) plved O_2 (% Sat.) 16.6 (AS) 70 L Photo Numbers 181 - 184 (AN C_{q1} TM Coordinates AIN C.25	Miscellaneous I nera) Zone: 07 W	nformati / E: 0	on 514144		N: 7/47076
	solved O_2 (mg/L) 1.61 (AS) blved O_2 (% Sat.) 1.61 (AS) Photo Numbers 161 (AS) 9/0 L Photo Numbers 161 - 164 (AN Can TM Coordinates AW C.PS Waypoint name E7 SEPT 2014	Miscellaneous I nura) Zone: 07 W	nformati / E: Ø	on 5 14 14 q Datum:	NAD 83	N: 7147076
	solved O_2 (mg/L) 1.81 (As) plved O_2 (% Sat.) 16.6 (As) 90 L Photo Numbers $966 - 189$ (AN Call TM Coordinates AW CPS Waypoint name E2 SEPT 2019 Observations 256 cool (a)	Miscellaneous I nera) Zone: 07 W	nformati	on 514149 Datum:	NAD 83	N: 7147076

If found, please call ELR: 867.668.6386

Surf	ace Wate	er Sampl	e Sheet		
FIR PROJECT NUMBER AND NAME	~ (343 · 14-183 Clin	- 005 . 04 ton Creek I	{ Monitoring		ñ .
Date and Time (24hr) 1954 Such 7014: 16:70	: 14-163 Cim	ton Creek I	monitoring	5	inuples: HN
Sample ID E_{2}			-	i	Votes: AB
Sampling Method: Grad	- Other?			-	
Wx-overcest, no mind ~ & C Surfac	e Water S	amples			
Parameters	Collected (Y/N)	No. of bottles	Preserved (Y/N)	Field filtered (Y/N)	Comments
Total Metals + mercer	1	1+1	Ч	N	I plastic + 1 vial
Dissolved Metals - mercury	Ч	1 + [<u> </u>		·
l otal Suspended Solids (155)					1 L
Nitrare/Nitrite/Sulphate	- "(1	<u> </u>		1 olmber
Total Nitrogren/Ammonia/Total Phosphorus	1	1	<u> </u>	N	amples
		۰			
			~		
		6			
			<u> </u>		
			-		
5 Eeneval Climistry, collected 20 Sept 2014	Ч	١	N	N	I L plastic
0 15:25	-				1
Duplicate	s and Field	l Blank			
N o	Duplicate Collected? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered (Required) (Y/N)	Duplicate Name ID, e.g., Dup I (do not use the station name)
Duplicate	N/A-	and the second division of the second divisio			
N 0	Field Blanks Made up? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered? (Y/N)	Field Blank ID (e.g., FB1)
Field Blank	NIA	-	•		Construction and a second s
Field	Paramete	rs			
Water Temp. (°C) <u>5.9</u>					
trs pH pH probe on 15t month calibrate	property, no	t recorde	d. UPDATO	E pH = 7.6	7 on Hummera 45I, 21 Sept
$R = \frac{192.3}{2}$	5	Speci	itic Conducti	vity (µS/cm):	778.8
ORP (MV) NOT RECORDED	andr-da an alf-an-si de ana anis de anora an sa sinona ana		*****		
Iurbidity (NIU) NOT RECORDED			al na mar an		
Dissolved O_2 (mg/L) $, 9 \& (As)$					
$\frac{1}{101.5} (A_5) \frac{9}{0} L$					
See Photo Numbers 185-189 (AN AN)	ellaneous I	nformatio	on		
UTM Coordinates CED SCOT DOWN Zone	07 W	F· /1×	silling		N: 147149
Waypoint name AND AND CPC	~ I W	-, V3	Datum'		
Observations ~ 4 h h h h h h h h h h h h h h h h h h	<u></u>	1 (1)	1		
() prolent of con	nvenze	W Chy	Ten 1824	et nh	MOINNING

	lak		Surface Wate	r Samol	e Sheet		
V	191	Hamala	1343-005	- 114	e oneee		
		ELR PROJECT NUMBER AN	D NAME: 14-183 Clin	ton Creek I	Monitoring	Sau	oler: AN
Da	te and Time (24hr)	19 Sept 2014; 17	:35			A 1 0	Hac: AB
	Sample ID	Ry				,0 U	
	Sampling Method:	Grab	Other?			_	
Μĸ	- ovucansti no	wird, ages	Surface Water S	amples			
		Parameters	Collected (Y/N)	No. of bottles	Preserved (Y/N)	Field filtered (Y/N)	Comments
		Total Metals (and mercury	5 7	(+(Y	N	+ plastic, I vial
		Dissolved Metals (and merco	~~~ Y	1+1	Y		
	Total	Suspended Solids (TSS)	1				
	Dissolve	ed Organic Carbon (DOC)	<u>\</u>	1		4	lamber glass
	Nit	trare/Nitrite/Sulphate					/
			<u>``</u>	1	. .		lanburglass
				(
					1		·····
				J		0/	
	Teneral (Limistry, collected			N		1 16 plastic
	(19 0 13.40			-		
		Du	plicates and Field	Blank		,	
			Duplicate			Field filtered	
		NO	Collected?	No. of	Preserved?	(Required)	Duplicate Name ID, e.g., Dup
		γ	(Y/N)	bottles	(Y/N)	(Y/N)	(do not use the station name)
		Duplicate	N/A				· · · · · · · · · · · · · · · · · · ·
			Field Blanks			Field	,
		NO	Made up?	No. of	Preserved?	filtered?	Field Blank ID (e.g., FB1)
		, ·	(Y/N)	Dottles	(17/N)	(Y/N)	
		Field Blank	NIA				
		9 d	Field Paramete	rs			
era (13 F.		<u></u>	<u>- 7117 (1 116</u>
E G	unductivity (uS/am)	we recorded, probe a	er 722 ment e	Cattorne C	$\sim 0 \text{PD}$	tie pr	7191 Hemper 13
on		196.6		spec		νιτ <u>γ</u> (μ5/cm).	165.9
1-1)		not recorded					
USTS		not recorded	•				
1	issolved O ₂ (mg/L)	13.08 (AS)					
	valued O (% Set)	104 6 1AS 7.	L				
Dis	solved O_2 ($\%$ sat.)		Miscellaneous I	nformati	on		
st Di Dis 215e	pt	· · · · · · · · · · · · · · · · · · ·	T insectiancous i				
Dis Dis Dis Dis Dis	Photo Numbers	189-192 (AN Como					
st Di Dist Dist av 215e	Photo Numbers	189-192 (AN Came (AN GPS)	Zone: 07 W	E: <i>D</i> *	51<921		N: 7145244
st Di Dis on 215e	Photo Numbers UTM Coordinates Waypoint name	189-192 (AN Come (AN GPS) RY SEPT 7014	Zone: 07 W	E: () *	5 598 Datum:	NAD 83	N: 7145344
st Di Dis on 215e	Photo Numbers UTM Coordinates Waypoint name Observations	189-192 (AN Come (AN GPS) RY SEPT 2014	Zone: 07 W	E: () *	515981 Datum:	NAD 83	N: 7145344
st Di Dis an 215 e	Photo Numbers UTM Coordinates Waypoint name Observations	189-192 (AN Come (AN GPS) RY SEPT 2014 Localed - you ups	ra) Zone: 07 W Freen vi confi	E: 0°	515981 Datum: Cliufen	NAD 83 (roek, ,	N: 7145344 an toyle Creek

12:00 Sept 21

		PAND Gen Chem 20 Sep	+ 2014	15:3	5			
)er	Surf	ace Wate	er Sampl	e Sheet			
		Henner	a 1343	.005.00	1	0	Salat	
П	Date and Time (24hr)	19 Sout Pallel 18:20	14-183 Clin	ton Creek i	nonitoring	AN.	i Austra	
	Sample ID	FU			_	140		
	Sampling Method:	Grab	- Other?			lv.	x: overcast, no mind,	~~ ~
			- \A /atau 6			-		
— ——		Surfac	e water :	ampies		Field		1
		Parameters	Collected (Y/N)	No. of bottles	Preserved (Y/N)	filtered (Y/N)	Comments	
		Total Metals	Ч	1+1	~{	N	plastic, I vial	
		Dissolved Metals	4	+	<u> </u>	<u> </u>	l'plastic Ivial	
	Dissolv	l Suspended Solids (155)		1				{
	Ni		1	<u> </u>			I amber 5 kiss	{
	Total Nitrog	ren/Ammonia/Total Phosphorus	N		1	N	lanber aloss	1
]
				6				
						.1)		-
					-			
	5 General (Inmistry collected 20 Sept 2014	Ч	I	N	N	I IL plastic]
		0 15:35						
				Constraint in the second second			ş	
		Duplicate	s and Field	Blank	OTAL		L	l
		810	Duplicate	No. of	Preserved?	Field filtered	Duplicate Name ID. e.g., Dup I	
		NU	Collected?	bottles	(Y/N)	(Required)	(do not use the station name)	
			(1/N)			(1/N)		
		Duplicate	NIA				Construction and a second se	
		610	Field Blanks	No. of	Preserved?	Field	Field Plenk ID (e.g. EP I)	
		100	(Y/N)	bottles	(Y/N)	(Y/N)		
		Field Blank	NIA			()	4	
		Field	Paramete	ers				
eld (Water Temp. (°C)	<u>8,2</u>						-
ders (ṕH_n	lot recorded, pH probe on YST.	vonit cali	brate -	UPDATE	pH=7	.26 W/ Hennera 151	, 12
ELR C	Conductivity (µS/cm)	547		Spec	ific Conducti	vity (µS/cm):	805	21
e	ORP (mV)	NOTRECORDED, NOT REQUIRE	ΞD					
aple)	Turbidity (NTU)	NOT RECORDED, NOT REDURE	\$Þ	a a constant and a second s			****	
₹ { C	Dissolved O ₂ (mg/L)	11.25 (A)						
×uli (D	issolved O_2 (% Sat.)	101.6 (4) 4.1						
- <		Misco	ellaneous	Informati	on			
- GV	Photo Numbers	92. 191 (AN Course)						
7	UTM Coordinates	(AN CDE) ZODE	67.1	F· /s	515650		N: 7145797	
ect	Waypoint name	(rin eys) Zone.	010	<u> </u>	Datum.		···· 1175201	
`	Observations	$\frac{1}{1} \frac{1}{2} \frac{1}$	(1.1	te is	Sector Core	<u></u>	1 = 1 fr-1.	
		LUCATED CUM Upstream to	sh illintar	('226-)	FI P	H. I. I	Clist 1	
		Mise a hydrology assessment	it lacenti	on see	CLK	Mydidesy	K S Hen and D	
		LIEDSOIC ATENICA hydropole b	UTT A) W IN,	ma tron	INTE DAV	In Chron on grouped)	

0	elr
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Surface Water Sample Sheet

	lime (24nr) 20 Sept 2004 10.10)			A	V: SANDLe
	Sample ID R.	<u>-</u>		-	, .	
Sampl	ng Method: Grab	Other?				
WX-	mix sun + doud, no wind ,	Surface Water S	Samples			
		Collected	No. of	Brocomrod	Field	
	Parameters	(Y/N)	bottles	(Y/N)	filtered (Y/N)	Comments
	Total Metals (inc. Mirary	1	1+1	1	N	I plastic + 1 vigl
	Dissolved Metals (INC mercu	ing) 4	1+1	Ч	Y	6 1
	Total Suspended Solids (TSS)	· 4	Gen Ann-		<u> </u>	see Gen Clem
	Dissolved Organic Carbon (DOC)	Ч	١	Ч	Ч	amber class
	Nitrare/Nitrite/Sulphate	Y	Gen Clim-	a na manana kati mata kati manana kati na kati kati kati kati kati kati kati kat	~	See Gen Ulem
	Total Nitrogren/Ammonia/Total Phosphorus	Ч	1	Ч	N	amber glass
	via General Clamistry bottle	<u> </u>	1	M	\mathbb{N}	see Gen Den
	· · · · · · · · · · · · · · · · · · ·		Parameter State and the second second second			2 Il plastic
				TAI		
	•		(((1.10		······
						······
: 						······
		Suplicates and Field	d Blank			· · · · · · · · · · · · · · · · · · ·
	,	Duplicate			Field filtered	
	N/ O	Collected?	No. of	Preserved?	(Required)	Duplicate Name ID, e.g., Du
	$1 \vee$	(Y/N)	bottles	(Y/N)	(Y/N)	(do not use the station name
	Duplicate	W/14-				
		Field Blanks	No. of	Preserved?	Field	
	$\wedge \circ$	Made up?	bottles	(Y/N)	filtered?	Field Blank ID (e.g., FBT)
	Field Diret.	(Y/N)			(Y/N)	1000 1000 1000 1000 1000 1000 1000 100
	Field Blank				AND	ATTEN DE ANTONIO ANTONIO ANTONIO ANTONIO ANTONIO ANTONIO
		Field Paramete	ers			
vvater	lemp. (°C) [, q	21 - 21 - 21 - 21 - 21 - 21 - 21 - 21 -				
eld				. carle		
	print recorded, pH probe	on 157 nont	Calibrate	plapering		
eles Conductiv	ity (µS/cm) 386.6	on 155 nonit	Calibra k Speci	fic Conducti	vity (µS/cm):	692.0
	pm_not_recircled_pH_probe ity (µS/cm)_386.6 ORP (mV) wat RECORDED_NOT_1	en 157 norit	Calibra k Speci	fic Conducti	vity (µS/cm):	692.0
LR Turbic	DRP (mV) Net RECORDED Not I	on 155 nonit	Calibra k Speci	fic Conducti	vity (µS/cm):	692.0
LR Turbio	DRP (mV) Not RECORDED, Not I	en 155 nonit 2EQUIRED REOVIRED	Calibra k Speci	fic Conducti	vity (µS/cm):	692.0
LR Dissolved	$\frac{\text{pH}_{n,f} \text{ recorded, pH}_{rebe}}{386.6}$ $ORP (mV) \xrightarrow{Wot} \text{RECORDED, Not}$ $\frac{\text{dity} (NTU)}{Not} \xrightarrow{RECORDED, Not}$ $O_2 (mg/L) = \left\{3.05 (A_2)\right\}$	en YSJ nonit REQUIRED REQUIRED	<u>Calibra</u> k Speci	fic Conducti	vity (µS/cm):	692.0
LR Dissolved	$\frac{\text{pH}_{n+f} \text{ recorded, pH}_{rebe}}{386.6}$ $ORP (mV) \xrightarrow{Wot} \text{ recorded, pH}_{rebe} Not}$ $\frac{\text{orr}_{P}(mV)}{\text{dity} (NTU)} \xrightarrow{Not} \text{ recorded, Not} Not}$ $\frac{O_2 (mg/L)}{13.05 (A_2)}$ $\frac{O_2 (\% \text{ Sat.})}{100.00} (A_2) = \frac{O_2 (A_2)}{100.00}$	en YSJ nonit REQUIRED REQUIRED	Collibra K Speci	fic Conducti	vity (µS/cm):	692.0
LR Dissolved	$\frac{PH_{n+f} recorded, PH_{probe}}{386.6}$ $ORP (mV) \xrightarrow{Wot} recorded, Not Probe Not Pr$	en (SJ nonit REQUIRED REQUIRED Miscellaneous	Collibra K Speci	fic Conducti	vity (µS/cm):	692.0
Conductiv LR Turbi Dissolved L L	$\frac{PH_{n+f} recorded}{SBG.6}$ $ORP (mV) \xrightarrow{Wot} recorded, PH_{probe}$ $\frac{ORP (mV)}{Wot} recorded, Not I$ $\frac{Vot}{Vot} recorded, Not I$ $\frac{O_2 (mg/L)}{Vot} \frac{13.05 (A)}{Vot}$ $\frac{O_2 (\% Sat.)}{Vot} \frac{OO.0 (A)}{Vot} \frac{OO}{Vot}$	en YSJ vanit REQUIRED REQUIRED Miscellaneous I	Calibra K Speci	fic Conducti	vity (μS/cm):	692.0
Conductiv LR Dissolved L Dissolved Photo	$\frac{PH_{net} recorded}{S} = \frac{PH_{rebe}}{S} = \frac{PH_{reb}}{S} = \frac{PH_{rebe}}{S} = \frac{PH_{rebe}}{S} = \frac{PH_{rebe}}{S} = \frac{PH_{rebe}}{S} = \frac{PH_{rebe}}{S} = \frac{PH_{reb}}{S} = \frac{PH_{reb}}{S} = \frac{PH_{reb}}{S} = \frac{PH_{reb}}{S} = \frac{PH_{reb}}{S} = PH_{re$	en YSI vont REQUIRED REOVIRED Miscellaneous I	Calibra K Speci	fic Conducti	vity (μS/cm):	692.0
Conductiv LR Dissolved Dissolved Photo UTM C	$\frac{PH_{net} recorded}{Steven} = \frac{PH_{rebe}}{Steven} \frac{PH_{rebe}}{Steven} \frac{PH_{rebe}}{Steven} \frac{PH_{rebe}}{Prebe}$ $\frac{PH_{rebe}}{Steven} \frac{PH_{rebe}}{Steven} \frac{PH_{rebe}}{Steven} \frac{PH_{rebe}}{PV} \frac{PH_{reb}}{PV} \frac{PH_{reb}}{PV} \frac{PH_{reb}}{PV$	en (SJ vont REQUIRED REQUIRED Miscellaneous I 1) Zone: 07 W	Collibra K Speci Information E: 05	property fic Conduction	vity (μS/cm):	692.0 N: 7147525
Conductiv LR Dissolved Dissolved L Dissolved UTM C Wayp	$\frac{PH}{Predict} = \frac{PH}{Predict} + PH$	en (ST vont LEQUIRED REOVIRED Miscellaneous I 1) Zone: 07 W EPS)	Collibration Speci Information E: 05	naprice fic Conduction	vity (µS/cm):	692.0 N: 7147525
Conductiv LR Dissolved L Dissolved L Dissolved L Dissolved L Dissolved Dissolved L Dissolved D Dissolved D D D D D D D D D D D D D	$\frac{PR}{Pre} = \frac{PR}{Pre} + P$	en (SJ vont REQUIRED REQUIRED Miscellaneous I) Zone: 07 W EPS) (linter (rect	Collibration Speci Information E: 05	property fic Conducti on 10718 Datum:	NAD 83	692.0 N: 7147525

If found, please call ELR: 867.668.6386

Ng ¹

Surface Water Sample Sheet

	Hemmerg	1343.	-005.04
ELR PROJECT NUMBER	AND NAME: 14-183	Clinton	Creek Monitoring

AB: Notes AN: Sample

Date and Time (24hr)	20 Sept	2014 11:5	5-
Sample ID	R-2		
Sampling Method:		Grab	

Other?

WX - mix Sun related, he wind, ~ 6° C Surface Water Samples

Parameters	Collected (Y/N)	No. of bottles	Preserved (Y/N)	Field filtered (Y/N)	Comments
Total Metals (+ mercury)	Y	1+1	Y	N	1 plastic, lvial
Dissolved Metals (+ wercury)	Ч	1+1	Y	Y	
Total Suspended Solids (TSS)	VIA	GEN	CHEN	A california construction and the	Same and a second se
Dissolved Organic Carbon (DOC)	7)	У	Y	I amber alass
Nitrare/Nitrite/Sulphate	VIA	GEN	CHEI	ν	the second s
Total Nitrogren/Ammonia/Total Phosphorus	Y	l	У	N	1 ruber alass
	,				, , , , , , , , , , , , , , , , , , ,
Lo General Clemistry	Ч	Į	N	N	1 IL plastic
	,				1
	•				
		7 T	STAL		
		ŧ			

Duplicates and Field Blank

NO	Duplicate Collected? (Y/N)	No. of . bottles	Preserved? (Y/N)	Field filtered (Required) (Y/N)	Duplicate Name ID, e.g., Dup 1 (do not use the station name)
Duplicate	NIA				
N O	Field Blanks Made up? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered? (Y/N)	Field Blank ID (e.g., FB1)
Field Blank	N/A	and the second	ىيىتىمەرلىقىنىڭ ئۆتىن _{ىتىرىك} ىيەردىنىت	and the second	

Field Parameters

Water Temp. (°C)	1.00			
pH	not recorded, pt/ probe on Y	SI nont calibra	k preparty	
Conductivity (µS/cm)	353.6		Specific Conductivit	у (µS/cm): 634.9
ORP (mV)	NOT RECORDED, NOT	REGULRED		
Turbidity (NTU)	Not RECORDED NOT	REALIRED		
Dissolved O_2 (mg/L)	13.10 (A)		ť.	
Dissolved O ₂ (% Sat.)	100 4 (4) %	, L		
		Miscellaneous Infe	ormation	£
Photo Numbers	201 - 204 (AN GARERA)			
UTM Coordinates	AN GPS	Zone: 07 5	E: 0512023	N:7148061
Waypoint name	\$ RZ SEPT ZOIH		Datum: I	NAD 83
Observations	Located - 50 m upstrau	n of Easter Cre.	ek outflow int	o Hudgeon Lake
	Also a hydrology assi	essnert station	See ELR	Hydrology Field Form
	Location moved in 10.	n upstream us	2013 685 (0-0	ords in order to
	be at confined channel 1	lo cation, above	braid fork	If found, please call ELR: 867.668.6386
	Water Temp. (°C) pH Conductivity (µS/cm) ORP (mV) Turbidity (NTU) Dissolved O ₂ (mg/L) Dissolved O ₂ (% Sat.) Photo Numbers UTM Coordinates Waypoint name Observations	Water Temp. (°C) 1.8 pH nd recorded, pH probe on Y Conductivity (µS/cm) 353.6 ORP (mV) NOT RECORDED, NOT Turbidity (NTU) NOT RECORDED, NOT Dissolved O ₂ (mg/L) 13.10 (A) Dissolved O ₂ (% Sat.) 166.4 Dissolved O ₂ (% Sat.) 166.4 Photo Numbers 201.204 (AN GALERA) UTM Coordinates AN EPS Waypoint name & RZ SEPT ZO14 Observations Located - 50 m upstrav Also a hydrolegy ASS. Location moved - 10. be at confined channel 1	Water Temp. (°C) [.?] pH nd recorded, pH probe on YSI nort calibra Conductivity (µS/cm) 353.6 ORP (mV) NOT RECORDED, NOT REGULEED Turbidity (NTU) NOT RECORDED, NOT REGULEED Dissolved O2 (mg/L) [].]0 (]] Dissolved O2 (mg/L) [].]0 (]] Dissolved O2 (% Sat.) [GG · 4] (]] Dissolved O2 (% Sat.) [GG · 4] (]] Miscellaneous Info Photo Numbers 201 · 204 (]] Waypoint name []] R R 2 SEPT ZO14 Observations [] Localed ~ 50 m upstram af Enster (rec Also a hydrolegy assessment station Localed ~ 10m upstram vs be at confined chunnel [] or of ion, above	Water Temp. (°C) 1.8 pH nd recorded, pH probe on YSI nont celebrate peoply Conductivity (µS/cm) 353.6 ORP (mV) NGT RECORDED, NGT REQUIRED Turbidity (NTU) NGT RECORDED, NGT REQUIRED Dissolved O2 (mg/L) 13.10 (A) Dissolved O2 (mg/L) 13.10 (A) Dissolved O2 (% Sat.) 100 · 4 Not RECORDED, NGT REQUIRED Dissolved O2 (% Sat.) 100 · 4 Not RECORDED, NGT REQUIRED Dissolved O2 (% Sat.) 100 · 4 Not RECORDED, NGT REQUIRED Dissolved O2 (% Sat.) 100 · 4 Dissolved O2 (% Sat.) 100 · 4 UTM Coordinates AN EPS Zone: 07 V E: 0512023 Waypoint name & RZ SEPT ZO14 Datum: 1 Observations Located - 50 m upstram of Enster Creek cateflan int Also A hydrolegy Assessment station, See ELR Location movid ~ 10 m upstrem vs 2013 6PS (one be at continual channel location, above braid (fork

Or

Surface Water Sample Sheet

Hembern 1343-005.04 ELR PROJECT NUMBER AND NAME: 14-183 Clinton Creek Monitoring

Date and Time (24hr)	20 Sept 2014 14:30	
Sample ID	SL	

Grab

AN: Sangler AB: notes Wx - nostly clear, sunny, no mind ~ 1202

Sampling Method:

Other?

Collected (YM)No. of bottlesPreserved (YM)Fildered (Kreed (YM)Comments (Kreed (YM)Total MetalsY1 + 1YW1 - plantice (YM)Disobred MetalsY1 + 1YW1 - plantice (YM)Disobred Organic Carbon (DOC)Y1 - 1YWDisobred Organic Carbon (DOC)Y1 - 1YYDisobred Organic Carbon (DOC)Y1 - 1WNumeroNameodiationY1 - 1NTotal NorganicAmonial Total ProgramY1 - 1Disobred Organic Carbon (DOC)Y1 - 1NoY1 - 1NumeroNameodiationY1 - 1Disobred Organic Carbon (DOC)Y1 - 1NoCalcecoldY1 - 1Disobred Organic Carbon (DOC)Y1 - 1NoCalcecoldY1 - 1Disobred Organic Carbon (DOC)Y1 - 1NoCalcecoldNo. ofPressnedfDisobred Organic Carbon (DOC)Y1 - 1NoCalcecoldNo. ofPressnedfNoCalcecoldNo. ofPressnedfDuplicate Name ID, e.g. Dup 1EditionNo. ofNoCalcecoldNo. ofPressnedfNoField BlankNo. ofPressnedfNoField BlankNo. ofPressnedfDisobred Organic State All states and Field BlankNo. ofPressnedfNoField BlankNo. of <th></th> <th>164944</th> <th>Surfa</th> <th>ce Water S</th> <th>Samples</th> <th></th> <th></th> <th></th>		164944	Surfa	ce Water S	Samples			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			Parameters	Collected (Y/N)	No. of bottles	Preserved (Y/N)	Field filtered (Y/N)	Comments
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			Total Metals	N	1 +1	4	N	1 plastic + l'vial
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			Dissolved Metals	Ч	1+1	Ч	Y	h., 11
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		To	tal Suspended Solids (TSS)	VIAE	FEN C	HEM -		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Disso	lved Organic Carbon (DOC)	Y	(<u> </u>	<u> </u>	(Amber glass
$\frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}} = 1$		Total Nitr	Nitrare/Nitrite/Sulphate	VIA	FEN CI	HEM -		
$\frac{1}{2} \frac{1}{2} \frac{1}$				1			14	1 Ahberglass
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		D Genera	al (limistry	Y	1	N	N	1 IL pkstic
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$\frac{1}{ V } = \frac{1}{ V } = \frac{1}$								
$\frac{ }{ } = \frac{ }{ } = \frac{ }{ } = \frac{ }{ } = \frac{ }{ } = \frac{ }{ } = \frac{ }{ $					710	PIAL		
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$\begin{array}{ c c c c c c c c c c c c c c c c c c c$								
Duplicates and Field BlankNoDuplicate Collected (YN)No. of bottlesPreserved? (P(N))Field filtered (P(N))Duplicate Name ID, e.g., Dup I (go not use the station name)DuplicateN/AImage: State S								
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	r		Duplicate	es and Field	Blank	F		
Duplicate N/A NO Field Blanks NO Field Blanks NO Field Blanks NO Field Blanks N/A Field Blanks NO Field Blanks N/A Field Blanks NO Field Blanks N/A No. of Field Blank N/A PH ndt (cord ded, pH probe on VG) worth (nlbraling property) UPPATE, pH = 7.82 on Hernitan [S1], property ORP (mV) IOIE Specific Conductivity (USICm): IS39 ORP (mV) NOT RECORDED, Not REQUIRED Specific Conductivity (USICm): IS39 Or (MV) Not RECORDED, Not REQUIRED Photo Report Photo Report Outflow Not Record ED, Not REQUIRED Photo Report Photo Report Obsolved O2 (% Sat) IM-2 (A) 9a L Photo Report Obsolved O2 (% Sat) IM-2 (A) 9a L Photo Report Obsolved O2 (% Sat) IM-2 (A) 9a L Photo Report Obsolved O2 (% Sat) IM-2 (A) 9a L Photo Report Obsolved O2 (% Sat) IM-2 (A) 9a L Photo Report Obsolved O2 (% Sat) IM-2 (A) 9a L Photo Report Obsolved O2 (% Sat) IM-2 <td< td=""><td></td><td></td><td>No</td><td>Duplicate Collected? (Y/N)</td><td>No. of bottles</td><td>Preserved? (Y/N)</td><td>Field filtered (Required) (Y/N)</td><td>Duplicate Name ID, e.g., Dup I (do not use the station name)</td></td<>			No	Duplicate Collected? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered (Required) (Y/N)	Duplicate Name ID, e.g., Dup I (do not use the station name)
Image Field Blanks No. of bottes Preservel? (V/N) Field Blank ID (eg., FB1) Field Blank N/A Field Blank ID (eg., FB1) Field Blank N/A Preservel? (Y/N) Preservel? (Y/N) Preservel? (Y/N) Preservel? Field Blank ID (eg., FB1) Preservel? (Y/N) Preservel?	ŀ		Duplicate	NIA				3
Field Blank N/A Field Blank Field Parameters Ald Water Temp. (°C) 7.1. PH nd record ced. pH probe on VSI wort collobrate property VPDATE, pH = 7.82 on Heinham [S], phone Conductivity (µS/cm): 1014 Specific Conductivity (µS/cm): 1539 ORP (mV) NOT RECORDED, NOT RECOURED OPA RECORDED, Not RECORDED, Not RECOURED OPA RECORDED, Not RECORDED			No	Field Blanks Made up? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered? (Y/N)	Field Blank ID (e.g., FBI)
Field Parameters Field Parameters Water Temp. (°C) 7.1 pH nd retorded, pH probe on VSI won't calibrate property UPDATE, pH = 7.82 on Herriton [S], pH nd retorded, pH probe on VSI won't calibrate property UPDATE, pH = 7.82 on Herriton [S], pH nd retorded, pH probe on VSI won't calibrate property UPDATE, pH = 7.82 on Herriton [S], pH nd retorded, pH probe on VSI won't calibrate property UPDATE, pH = 7.82 on Herriton [S], pH nd retorded, pH probe on VSI won't calibrate property UPDATE, pH = 7.82 on Herriton [S], pH nd retorded, pH probe on VSI won't calibrate property (USCm): [539 215cp ORP (m) NOT RECORDED, NOT RECOURED Turbidity (NTU) NOT RECORDED, NOT RECOURED Dissolved O2 (mg/L) 13.06 (A) the Dissolved O2 (mg/L) 13.06 (A) Turbidity (NTU) NOT RECORDED, NOT RECOURED Nor Recorded (A) go L Dissolved O2 (% Sat.) 114.2 (A) 90 L Miscellaneous Information here to the very floring at cf Intel water floring in to the water floring at cf Intel water floring in to the water floring at cf Intel water floring in to the water floring at cf Intel water floring in to the water floring at cf Intel water floring in to the water floring at cf Intel water floring in to the water floring at cf Intel water floring in to the water floring in to the water floring at cf Intel water floring in to the water floring in to the water floring at cf Intel water floring in to the water floring in the flori			Field Blank	NIA				
Water Temp. (°C) 7.1 pH nd (clouded, pH probe on VSI word Calibrate property UPDATE, pH = 7.82 on Homem ISI, pH nd (clouded, pH probe on VSI word Calibrate property UPDATE, pH = 7.82 on Homem ISI, Specific Conductivity (uS/cm) 10/4 Specific Conductivity (uS/cm): 1539 21/549 ORP (mV) Not RECORDED, Not REQUIRED Turbidity (NTU) Not RECORDED, Not REGULRED (L) Dissolved O2 (mg/L) 13.06 (A) H Dissolved O2 (% Sat.) 114.2 (A) 9/0 L Miscellaneous Information Near when Alexing in to the usst Approach: 215 221 Site: 222-227 UTM Coordinates Waypoint name SL SEPT 2014 Observations VSI 6 ~ 0.6 m digth, ~ 0.6 m free 'shore' lake appears staghard, lots algae, ving noticeble 'swampy' adore in mid to store Staght from VSI forction Main MAD 83 Observations VSI 6 ~ 0.6 m digth, ~ 0.6 m free 'shore' lake appears staghard, lots algae, ving noticeble 'swampy' adore in mid to store Staght from VSI forction Wainshe digths along 'shore'', from C I m deep extending 2 m from store Variable digths along 'shore'', from C I m deep extending 2 m from store Variable digths along 'shore'', from C I m deep extending 2 m from store		\frown	Field	l Paramete	ers			
PH nd recorded, pH probe on VSI won't Calibrate property UPDATE, pH = 7.82 on Hennien ISI, Sec. Conductivity (uS/cm) 1014 ORP (mV) NOT RECORDED, NOT REQUIRED of Turbidity (NTU) NOT RECORDED, NOT RECOURSED (Conductivity (uS/cm)) 13.06 (A) (Conductivity (uS/cm)) 13.06 (A) (eld	Water Temp. (°C)	7.1					11111111111111111111111111111111111111
CRP (mV) NOT RECORDED, NOT REQUIRED of Turbidity (NTU) NOT RECORDED, NOT REQUIRED Not RECORDED, NOT REQUIRED (L) Dissolved O ₂ (mg/L) 13.06 (A) H Dissolved O ₂ (% Sat.) 114.2 (A) 90 L Miscellaneous Information hear water flowing in to the unstr Photo Numbers Approach: 215 221 Site: 222-227 UTM Coordinates Waypoint name SL SEPT 2014 Observations YSI a ~ 0.6 m depth, ~ 0.6 m from 'shore' lake appears stagmant, Lots algae, virg noticelike 'swampy'' adeve in mid as store. Swapt from YSI location & Approach entry flow waster to cle pile do not approach from secting the nells subject to the water flowing of the nells subject to the water flowing in the flow waster to cle pile do not approach from secting the nells subject to the water flowing in from States and the water is the flow of the master is the section of the states of the section of the master is the section of the section of the master is the section of the master is the section of the master is the section of the section of the master is the section of the master is the section of the master is the section. Waypendent and the flow of the section of the section of the section of the master is the section of the master is the section of the section	icr	pΗ Conductivity (μS/cm)	not recorded, pH probe on 157 m. 1014	enit calibr	nte prope Specif	1.1 UPF fic Conductiv	ν <u>ΑΤΕ</u> , β vity (μS/cm):	H= 7.82 on Himney 15] 1539 215.
et Turbidity (NTU) NOT RECORDED, Nor REQUIRZED No. 1 Dissolved O ₂ (mg/L) 13.06 (A) H Dissolved O ₂ (% Sat.) 114.2 (A) 90 L Miscellaneous Information Photo Numbers Approach: 215 221 Site: 222-227 UTM Coordinates (AN GPS) Zone: OT W E: 0513824 Waypoint name SL SEPT 2014 Observations YSI a ~ 0.6 m depth, ~ 0.6 m From Shore, lake appears staghaet, 105 algae, virg noticeble 'swampy" edour in mud ca store. Saple from YSI location & Approach enty from waske rock gile, do not approach from Store, jit halls subject to the Variable dipths along "shore", from C In deep extending > In from Store, in Store	t	ORP (mV)	NOT RECORDED, NOT REQUI	ZEÙ		ner men anter para de la construcción de la cifer e versa de la construcción de la constru		()
Le 1 Dissolved O ₂ (mg/L) 13.06 (3) Dissolved O ₂ (% Sat.) H Dissolved O ₂ (% Sat.) 114.2 (3) 90 L Miscellaneous Information Photo Numbers Approach: 215 - 221 Site: 222-227 UTM Coordinates Waypoint name SL SEPT 2014 Observations YSI G ~ 0.6 m depth, ~ 0.6 m From "Shore" lake appears stagmant, 10ts algae, virg neticeble "Swampy" edeur in mud on shore. Supple from YSI location Nord Shore Stagmant, pit halls subject to the Variable digth, along "Shore", from 4 In deep extending 2 In from Shore". Variable digth, along "Shore", from 4 In deep extending 2 In from Shore". Variable digth, along "Shore", from 4 In deep extending 2 In from Shore".	of		NOT RECORDED. NOT REQU	4RED			na hana dan dari berka da Kiri dan da na da Kirana na da na na na da	
Dissolved O ₂ (% Sat.) 114.2 (3) 90 L Miscellaneous Information Photo Numbers Approach: 215 221 Site: 222-227 UTM Coordinates (AN GPS) Zone: ON W E: 0513324 N: 7146703 Waypoint name SL SEPT 2014 Observations YSI a ~ 0.6m depth ~ 0.6m from "shore", lake appears stagnaut, 10ts algae, ving noticeble "summy" adave in mid an shore. Swale from YSI location & Afgreneth only form wask rock pile, do not approach from softh, fit halls subject to the Variable dipths alway "shore", from 6 Im deep extending > Im from shore Variable dipths alway "shore", from 6 Im deep extending > Im from shore Waypoint dipths alway "shore", from 6 Im deep extending > Im from shore Variable dipths alway "shore", from 6 Im deep extending > Im from shore Waypoint dipths alway "shore", from 6 Im deep extending > Im from shore Waypoint dipths alway "shore", from 6 Im deep extending > Im from shore Waypoint dipths alway "shore", from 6 Im deep extending > Im from shore Waypoint dipths alway "shore", from 6 Im deep extending > Im from shore Waypoint dipths alway "shore", from 6 Im deep extending > Im from shore Waypoint dipths alway "shore", from 6 Im deep extending > Im from shore Waypoint dipths alway "shore", from 6 Im deep extending > Im from shore Waypoint dipths alway "shore", from 6 Im deep extending > Im from shore Waypoint dipths alway "shore", from 6 Im deep extending > Im from shore Waypoint dipths alway "shore", from 6 Im deep extending > Im from shore Waypoint dipths alway "shore", from 6 Im deep extending > Im from shore Waypoint dipths alway "shore", from 6 Im deep extending > Im from shore Waypoint dipths alway "shore", from 6 Im deep extending > Im from shore Waypoint from Shore Shore Shore Shore Shore Man from Shore Sho	lei	\rightarrow Dissolved O ₂ (mg/L)	13.06 (A)	4.98.7		p> be	aver dam	Appears to block lake
Miscellaneous Information hear where flowing in to the west Photo Numbers Approach: 215 221 Site: 223-227 UTM Coordinates (AN GPS) Zone: ON W E: 0513824 N: 7146703 Waypoint name SL SEPT 2014 Datum: NAD 83 Observations 151 a ~ O. len depth, ~ O. len from "shore" lake appears staghart, Ids algae, vicy noticeable "swampy" adars in mid on shore. Sange from 151 location & Approach only from waste cock pile, do not approach from softh, pit halls subject to to Variable dipths along "shore", from 6 Im deep extending > Im from shore, Variable dipths along "shore", from 6 Im deep extending > Im from shore, Variable dipths along "shore", from 6 Im deep extending > Im from shore, Variable dipths along "shore", from 6 Im deep extending > Im from shore, Variable dipths along "shore", from 6 Im deep extending > Im from shore, Variable dipths along "shore", from 6 Im deep extending > Im from shore, Variable dipths along "shore", from 6 Im deep extending > Im from shore, Variable dipths along "shore", from 6 Im deep extending > Im from shore, Variable dipths along "shore", from 6 Im deep extending > Im from shore, Variable dipths along "shore", from 6 Im deep extending > Im from shore, Variable dipths along "shore", from 6 Im deep extending > Im from shore, Variable dipths along "shore", from 6 Im deep extending > Im from shore, Variable dipths along the minimum shore is the see) > Im from shore, Variable dipths along the from shore is the first shore.	d.	Dissolved O ₂ (% Sat.)	114.2 (3) % -			(Oi	t-flow, i	ally trickle water flowing ake to the east. Con
Photo Numbers Approach: 215 - 221 Site: 222-227 UTM Coordinates (AN GPS) Zone: ON W E: 0513824 N: 7146703 Waypoint name SL SEPT 2014 Datum: NAD 83 Observations 151 a ~ 0.6 m depth ~ 0.6 m from "shore" lake appears staghart, lots algae, ving noticeable "swampy" adapt in mud on shore. Sangle from 151 location & Approach only from waste rock pile do not approach from so-th, pit halls subject for the Variable digths along "shore", from 6 Im deep extending > Im from shore, Variable digths along "shore", from 6 Im deep extending > Im from shore, Variable digths along "shore", from 6 Im deep extending > Im from shore, Variable digths along "shore", from 6 Im deep extending > Im from shore, Variable digths along "shore", from 6 Im deep extending > Im from shore, Variable digths along "shore", from 6 Im deep extending > Im from shore, Variable digths along "shore", from 6 Im deep extending > Im from shore, Variable digths along "shore", from 6 Im deep extending > Im from shore, North of the much of the much of shore, for the shore, North of the form the much of the second	W	21520	Misc	ellaneous	nformatio	on I	near whter	flowing in to the west
UTM Coordinates (AN GPS) Zone: 07 W E: 0513924 N: 7146703 Waypoint name SL SEPT 2014 Datum: NAD 83 Observations 151 a ~ 0.6m depth, ~ 0.6m from "shore" lake appears stagnant, lots algae, ving noticeble "swampy" adars in mid a shore. Shape from 151 location & Afgroach only from waste rock pile, do not approach from softh, git halls subject to to variable digths along "shore", from 6 2m deep extending > 2m from shore, shore, when we do it (22) 2m too myrky to see) > 2m from shore,	5 0	Photo Numbers	Approach: 215 - 22	5.	c 223	-227		'
Waypoint name SL SEPT 2014 Observations 151 a ~ 0.6 m depth, ~ 0.6 m from "shore", lake appears staghaut, Lots algae, ving noticeble "swampy" adars in mid on shore. Sangle from 151 location & Afgroadh only form waste cock pile, do not approach from so-th, pit halls subject to the Variable dipths along "shore", from 6 2m deep extending > 2m from shore, Variable dipths along "shore", from 6 2m deep extending > 2m from shore, Normal Law Shore, along the mucky to see) > 2m from shore,	ł	UTM Coordinates	(AN GPS) Zone	: on w	E: 05	13824		N: 7146702
Observations 151 a ~ O. En depth, ~ O. En from "shore" lake appears stagnant, lots algae, viry noticeble "swampy" adars in mid on shore. Saple from 151 locition & Approach only form waste rock pile, do not apprench from so-th, pit halls subject to to Variable dipths along "shore", from 6 Im deep extending > Im from shore, have along the mining to my the my the see) > In from shore,		Waypoint name	SL SEPT JOIN			Datum:	NAD 83	
Lots algae, viry indicable "swampy" adar in mid on shore. Saudi from 'YSI location & Approach only from waste rock pile, do not apprench from so-th, fit halls subject to r & Variable diplies along "shore", from 6 Im deep extending > Im from shore, whereas de la (3>) Im too marky to see) > In from shore,		Observations	151 a ~ 0.6m depth, ~	0.6 m	from 'sl	nore", le	ike appe.	sis staghant,
La Variable diplhs along "shore", from 6 Im deep extending > Im from shore,			lots algae, viry noticeable Approach any from waster	ock pile	do no	in mud	ch from s	ra. Sundi from YST location ra-th, pit walls subject to
		La Varia	Whe dipths along "shore", fro	m 4 1m multip to	deep ext see) >	ending > 1 In fern	In front "share"	ound, please call ELR: 867.668.6386 Share ,

		- AND Gen Clem collect	rd 22 Su	st Zoly	019.0	10	X	
A		Losin C	E FO DUP	2 aud	FB1QC	(new to	ibo Power) DI/2	
	ver		Surface Wate	rface Water Sample Sheet			I jug IIZ	- 0
			Hemmern	1343-003	5.04		OV.	E K m
	Date and Time (24hr)) 21 Sel 2 Mili 12:35	ME: 14-163 CIII	NO Creek P		PB:	holes	
	Sample ID	- <u> </u>	17.00 1 (MC	POLTI	(V	AN.	Sampler	
	Sampling Method	Grab	Other?					
	WX - Mix Sum	(de la la de la contrata de la	~700			-	80	
		recovery, mostly cloudy, notional Si	urface Water S	Samples			,	. ş
		Parameters	Collected (Y/N)	No. of bottles	Preserved (Y/N)	Field filtered (Y/N)	Comments	
		Total Metals (and Mercury)	Ч	1 + 1	<u> </u>	N.	I plastic Irial]
	Та	Dissolved Metals (<u> </u>	1 + 1	<u> </u>	Ч	цю	-
	Disso	olved Organic Carbon (DOC)		SEN CHE		Y	Lamber alass	
		Nitrare/Nitrite/Sulphate	VIA (EN CH	en -	· · · · · · · · · · · · · · · · · · ·		
	Total Nitr	ogren/Ammonia/Total Phosphorus	Ч		Y	N	1 suber glass	\$. · ·
				1		۸/		-
		+ 2014 Q ULLAN		· [VIASTIC	-
	<u> </u>	4, ~ C 1 1 1 1 1 1 1						
		Dunlí	icates and Field	Blank				
		Dupi]
		DUP 2	Duplicate Collected? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered (Required) (Y/N)	Duplicate Name ID, e.g., Dup I (do not use the station name)	
		Duplicate		6+1	some of	parent	Dup2	
		FB1 / FB1GC	Field Blanks Made up? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered? (Y/N)	Field Blank ID (e.g., FB1)	
		Field Blank	NØ		544.2.05	parent	FRI	
				1	SAME AS		1 10 44	
\$ hc	> lab supplied DI,	used senled Turbo Power DI F	ield Paramete	ers	SAMENS]
Ø hc	Water Temp. (°C)	Used seriled Turbo Power PST 1 7.9	ield Paramete	ers	SAMERS	1	· N &	
the ld	Water Temp. (°C) PH	Used seriled Turbo Power DI <u>7.9</u> <u>7.17</u>	Field Paramete	ers			A 2 2	}
© hc eld durs	Dido Sopplied DI, Water Temp. (°C) pH Conductivity (µS/cm)	Used seriled Turbo Power DI 7.9 7.17 629	Field Paramete	s rs Speci	fic Conducti	vity (µS/cm):	923	}
eld turs million Q	Dido Seggited DI, Water Temp. (°C) pH Conductivity (μS/cm) ORP (mV) Turbidity (ΝΤΙΙ)	NOT RECORDED, NOT RE	Field Paramete	Speci	fic Conducti	vity (µS/cm):	923	}
eld turs when Q	Diffective of the separate of	NOT RECORDED, NOT REC	Field Paramete QUIRED SUIRED	Speci	fic Conducti	vity (µS/cm):	923	I - -
eld durs minn Q of eqt	Water Temp. (°C) Water Temp. (°C) pH Conductivity (µS/cm) ORP (mV) Turbidity (NTU) Dissolved O ₂ (mg/L)	NOT RECORDED, NOT REC 4.45 (A)	GUIRED	speci	fic Conducti	vity (µS/cm):	923	I
eld turs at ept t le	Dissolved O2 (% Sat.)	Not RECORDED, Not REC 4.45 (A) 36.6 (A) 10	Field Paramete	Speci	fic Conducti	vity (µS/cm):	923	I
eld eld elvs of ept d pla	Dissolved O2 (% Sat.)	NOT RECORDED, NOT REC 4.45 (A) 36.6 (A) 9/0	Field Paramete QUIRED SUIRED Miscellaneous	Speci	fic Conducti	vity (µS/cm):	923	1 - - -
eld turs of of pla	Dissolved O2 (% Sat.) Photo Numbers	Not RECORDED, Not REC 4.45 (A) 36.6 (A) 228-231 (AN (Awro)	Field Paramete QUIRED SUIRED	Speci Informatio	fic Conducti	vity (µS/cm):	123	I • • •
eld alus minun of of ept d ofe	Dissolved O2 (% Sat.) Photo Numbers	Not RECORDED, Not REC 4.45 (A) 36.6 (A) 228-231 (AN (Aury) AN EPS 2000 A	Field Paramete ωικέρ δυικεή Miscellaneous I Zone: 6η γ	Speci Informatic	fic Conducti	vity (µS/cm):	923 N: 7147638	
eld alus mien of of ale	Dissolved O2 (% Sat.) Photo Numbers Waypoint name Observations	Vied Serled Turbo Power DI 7.9 7.17 629 NOT RECORDED, NOT REC NOT RECORDED, NOT REC 4.45 (A) 36.6 (A) 9/0 228-231 (AN (Awra) AN EPS GWIC 3 SEPT 2014 So (a) 10	Field Paramete QUIRED SUIRED Miscellaneous I Zone: 07 W	Speci Informatic E: 05	fic Conducti	vity (µS/cm):	N: 7147638	
eld altrs mitern of ept d of	Dissolved O2 (% Sat.) Photo Numbers UTM Coordinates Waypoint name Observations	1000 Daniel 1000	Field Paramete QUIRED SUIRED SUIRED SUIRED SUIRED	Informatic E: 05	fic Conducti fic Conducti	vity (µS/cm): NAD 83 (fnded c	923 N: 7147038	.
eld eld elvs mirr of ept d pla	Dissolved O2 (% Sat.) Photo Numbers UTM Coordinates Waypoint name Observations	1000 Dama 1000 Dama	Field Paramete QUIRED SUIRED Miscellaneous I Zone: ON W from slope a estimations (Informatic E: 05 Kuve . I Corducted	fic Conducti fic Conducti 73882 Datum: P (1900) afty Science	NAD 83 (finded a night of	N: 7147038 (104) e site (104) (c site in	
eld alus ,mien of d .gle	Dissolved O2 (% Sat.) Photo Numbers UTM Coordinates Waypoint name Observations	1000 Daniel 1000	Field Paramete QUIRED	E: 05 E: 05	fic Conducti fic Conducti 73882 Datum: Datum: afty se plank (c.	NAD 83 (finded completed	N: 7147038 N: 7147038 S(ange) & site ((cd)) & site in bound, please call ELR: 867.668.6386	

Surface Water Sample Sheet

GUCC-3 21 Sept 2014 AB/AN p2/2

Flow Rate estimations, All modified seep/flow channel to direct all flow into 1 L plastic bettle ~ top cut aF.

Time to fill 1L (5 trials),

- 1) 2 seconds
 2) 1.5 seconds
 3) 1.5 "
 4) 1.5 "
- 5) 1.5 ...

* 5th seepage site observed along toe of waste rock dump. Seepage contributes to inflow of beauer pond, (see site diagrams · 6wcc-3 · 6wcc-2). Underground flows seeps into pre-existing channel (no measurable volume).

Site Diagram



	AND Gen Clim collected	1 22 Sep	+ 2014	a 14:30					
	1-100 L	I				01/2	ONE		
Nor	Sur	face Wate	er Sample	e Sheet		Y I law	~ / ~		
	H								
	ELR PROJECT NUMBER AND NAM	AW: Sampler							
Date and Time (24	nr) 21 Sept 2014: 14:25 -14	.35			AB: N	lotes			
Sample	ID Gwcc y	, , , , , , , , , , , , , , , , , , ,		-					
Sampling Metho	d: Grab								
1.0			·		-				
WK - Mik	such + cloud, no wind ~ 70% Surfa	ce Water 9	Samples						
	Guila			1	Field		٦		
	Parameters	Collected	No. of	Preserved	filtered	Comments			
		(Y/N)	bottles	(Y/N)	(Y/N)				
	Total Metals	N	1+1	V	N	loleste luid	1		
	Dissolved Metals (and in travery)	V	1+1	Ú.	Y	Labortic, Livial	1		
	Total Suspended Solids (TSS)	VIA GE	IN CHE	in -		provide the second s	1		
Di	ssolved Organic Carbon (DOC)	Ý	(M	Y	I ambr plass	1		
er many	Nitrare/Nitrite/Sulphate	VIA E	EN C+	EM -			1		
Total N	itrogren/Ammonia/Total Phosphorus	Y	1	Y		Lawber alass]		
				*)]		
			6						
	δ <i>ι</i>				<u> </u>		_		
un Gen.	Un collected 22 Supt 2014	<u> </u>		N	$\square N$		4		
	@ 14:30				.l		4		
			and provide the second s				4		
			7 70	PIAL			-		
		+			<u> </u>				
							-		
	····						-		
	Duplicat	es and Field	l Blank	1			7		
		T		Γ	1	· · · · · · · · · · · · · · · · · · ·]		
	. /	Duplicate	No. of	Preserved?	Field filtered	Duplicate Name ID, e.g., Dup I			
	NO	(Y/N)	bottles	(Y/N)	(Requirea)	(do not use the station name)			
		(1/14)							
	Duplicate	N/A -				**************************************			
		Field Blanks	No. of	Preserved?	Field				
	NO	Made up?	bottles	(Y/N)	filtered?	Field Blank ID (e.g., FBI)			
	Field Plank	(Y/N)			(Y/N)		4		
		d Paramete	rs]		
Water Temp (°									
ield (- <u> </u>						-		
Millis Conduction (1991	<u> </u>		r ·	fin (*	view (~ 10,	-		
when) Conductivity (µS/cr	<u>502</u>	Specific Conductivity (µS/cm): フノウ							
	NOT RECORDED. NOT REQUIRED	>							
Turbidity (NTL	" NOT RECORDED, NOT REQUIRE	<i>eo</i>							
λ Dissolved O ₂ (mg/	4) 1.48 (A)			****					
Dissolved O_2 (% Sat	(b, 3) $(b, 3)$ $(b, 3)$								
	Mise	cellaneous	Informatio	on					
Photo Numbe	rs 232-235 (AN (and)								
UTM Coordinate	es 7one	: 07 \./	E: 05	13968		N: 7147/157	•		
Waynoint nam	Ne Chippe W SEDE TANK (AAK	Les V V	~ ,	Datum	NAD 83	13-15, 11 11 6	() //		
Obsorvation	WIL 7 SERT 2014 (AN	(17)	<u> </u>		· • • • • • • • • • • • • • • • • • • •	and he lip stream from	, cwll		
Observation	10 Location marked or existing + tude	<u>d crange</u>	tlag ~/	LD. VIN	1 miniscult	+10w rate, uncentified,			
	derived Lunder) builders and fall	is above	. See the	tos. No	s hay to	confine and estimate	-		
	+low rate. Sparple collected fre	on small	pool (~	-Ocn deep	, 20 cm + 20	o coul at base of seep	-		
	" almost stagnant mater. Don't b	race Smalle	er, but fro	an experie	nce it lifte	ound, please call ELR: 867.668.6386			
	would record no measurable veloci	ity.		I					
Surface hater Sample Shedt

EWCC-4 21 5-004 AB/AN p2/2



v)er	ELR PROJECT NUMBER AND NAME	face Wate Hemmura : 14-183 Clin	er Sample ۱343 - ۵۵ ton Creek M	e Sheet 오.오니 Ionitoring	KW As	:Sampler P/Z . Notes
Date and Time (24hr)	21 Sept 2014; 15:00			-		
Sample ID	Gwcc - Z	-				
Sampling Method:	Grab	Other?			-	
Aller hir Sules	aland partial 2900					
	Surfac	ce Water S	Samples	1		F
	Parameters	Collected (Y/N)	No. of bottles	Preserved (Y/N)	Field filtered (Y/N)	Comments
· · · · · · · · ·	Total Metals (and herevery)	Ч	(+1	Ч	N	I plastic, lvial
	Dissolved Metals (and mercury)	<u> </u>	+	Ч	Y	Volastic, I vial
Tot	al Suspended Solids (TSS)	VIA	EN CI	IEM -		
Dissol	ved Organic Carbon (DOC)		1	<u> </u>	Y	I compare alass
Total Nitro			AEN CI		λ /	
	Brenzannioniar rotar rhosphorus	<u> ` </u>		1	N	1 ambur glass
		1	10	[·
			×			
is Een Clen co	illected 22 Sept 2014 @ 14:35					1,12 plastic
						· 1
Miseep to she	allow to allow tull anion		1101	RL		
HIE LU	(It ten tun), collected					
	t only					
-						
	Duplicate	es and Field	Blank			
	NO	Duplicate Collected? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered (Required) (Y/N)	Duplicate Name ID, e.g., Dup 1 (do not use the station name)
	Duplicate	NIA				
	N 9	Field Blanks Made up?	No. of bottles	Preserved? (Y/N)	Field filtered?	Field Blank ID (e.g., FB1)
	Field Blank	(Y/N)			(Y/N)	with a second
	Field	Paramete	ers	l		
Water Temp. (°C)	5.6					
∮ \рН	7.33					
^{(∧} Conductivity (µS/cm)	1156		Speci	fic Conducti	vity (µS/cm):	1834
/ ORP (mV)	NOT RECORDED NOT REQUIRED					
< Turbidity (NTU)	NOT RECORDED NOT REDUIRE	D				
Dissolved O ₂ (mg/L)	5.71 (A)					
$ \frac{1}{2} $ Dissolved O ₂ (% Sat.)	45.7 (A3) 1/0					
	Misc	ellaneous	Informatio	on		
Photo Numbers			*****	and a school of states and a school of the		1994/1997 1997 1997 1997 1997 1997 1997 1997
UTM Coordinates	KN GPS Zone:	ON W	΄ E: β /	513899	en en en sen an el en son a regel en son an en en en en en en el en de	N: 7146968
Waypoint name	GWCL 2 SEPT 2014		en fan de systemet yn	Datum:	NAD 83	1997 - 1977 - 1977 - 1977 - 1978 - 1978 - 1978 - 1979 - 1979 - 1979 - 1979 - 1970
Observations	On shore of benuir pond, e for	slope	w talus	(builders	above. 1	Old fuded orange flag
		1.11			1 aut	sure for a l'er T
v	Vgite D marked. Slaw, Swall	trickle 1	indu pur	laus DU	1 CAR I C	2(2) W Grab JANAL

La Anothe similar seep through boulders + talus ~ 10 m doser to (linden creek



PAND 6. Chem Surface Water Sample Sheet . collected 22 Sept. 2014 @ 14:30

ELR PROJECT NUMBER AND NAME: 14-183 Clinton Creek Monitoring Herning 1343-005.04

21 Sept 2014 15:30 - 15:40 Date and Time (24hr)

Grab

Sample ID GWCC-1

Sampling Method:

Other?

AN: Notes

Surface Water Samples

	Parameters	Collected (Y/N)	No. of bottles	Preserved (Y/N)	Field filtered (Y/N)	Comments
	Total Metals (and Mercury)	Ч	[+]	Y	N	1 plastic Ivial
	Dissolved Metals	Y	1+1	Y	Y	fi fi
	Total Suspended Solids (TSS)	VIA Ge	never ch	em		a construction of the second
	Dissolved Organic Carbon (DOC)	Y	}	Y	Y	1 Amber glass
	Nitrare/Nitrite/Sulphate	VIA 6. C	HEM.	AND I DESCRIPTION OF A DESCRIPTION	and the second	a state of the product of the state of the s
	Total Nitrogren/Ammonia/Total Phosphorus	Y	1	Y	N	1 Ambier glass
						5
	۲ ^۲	У	1	2	N	1 1L Plastic
	La General Climistry collected 22 Sept 2014		7 701	AL		
	Q 14:30					
						· · · · · · · · · · · · · · · · · · ·
	Duplicate	s and Field	Blank			
	Nº	Duplicate Collected? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered (Required) (Y/N)	Duplicate Name ID, e.g., Dup I (do not use the station name)
	Duplicate	NA	<u> </u>	, al and a state of the state o		
	NO	Field Blanks Made up? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered? (Y/N)	Field Blank ID (e.g., FB1)
	Field Blank	ŇА	••••••••••••••••••••••••••••••••••••••			name and an and a start and
	Field	Paramete	rs			
/	Water Temp. (°C) 4.1					
/	pH J_J4					

all field parameters recorded to Hemm Collected Collected of sample ~ 21 Sept

I.	7.06			
Conductivity (µS/cm)	1434		Specific Conductivity (μS/cm): ఎ386
ORP (mV)	NOT RECORDED			
) Turbidity (NTU)	NOT REIORDED			
Dissolved O ₂ (mg/L)	3.57			
Dissolved O_2 (% Sat.)	27.3			
		Miscellaneous Ir	formation	
Photo Numbers				
UTM Coordinates		Zone: 07 W	E: 0513902	N: 7146960
Waypoint name	AN GPS	an una sun rauna municipa numera antenana per transmissione promotione de conservation de conservation de la c	Datum: NA	\D 83
Observations	On shore of beau	ver pond, for of was	te rock dump. Se	epage emerging into
	pond from large	boulder patch. Source	e is pressured	to be Porcupine Creek.
	~ 4m of shove lo	ne = observed seeps	rope ~ 0.1. o.d m/	found, please call ELR: 867.668.63
	Sample collect in Pre-existing flagging Site was flagged C	was absent. UTM's the time of sample	and photos match .	previous report (2013).
	1			

Site Diagnamm.

* refer to site diagramme on field form GWCC-2.

I.

		911001-11		ŗ	1667 ·	
ver	Sur	face Wate	er Sample	e Sheet		Ani Sandan
· · · ·		Himhern F: 14-183 Clin	1343-00 ton Creek N	5.04		and shaper
Date and Time (24br)			ton creek r	lonitoring		AB: Notes
	<u>Cl Sept 2014 18:00 = 10</u>	. 10		•		
Sample ID	<u> </u>	_				
Sampling Method:	Grab	Other!				
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Dissolved C	Organic Carbon (DOC)	<u></u> Υ	1		<u> </u>	lamber glass
Nitrar	re/Nitrite/Sulphate	VIAE	EN CH	SM	B 1	
Total Nitrogren/	Ammonia/Total Phosphorus	<u> </u>	1	<u> </u>	N	lamber glass
			la			
Geia Chum	collected 22 Sept 2014			- <u>N</u>	R.I	11 alastic
A 15	20		<u> </u>			2 - p145116
			Contraction and Contraction			
			TC	OTAL		
			1			
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	No	Duplicate Collected? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered (Required) (Y/N)	Duplicate Name ID, e.g., Dup (do not use the station name)
		AL/A				
	Duplicate	1 10/11 -				A STREET AND A STREET
	Duplicate	Field Blanks	No. of	Preserved	Field	
	Duplicate NO	Field Blanks Made up?	No. of bottles	Preserved? (Y/N)	Field filtered?	Field Blank ID (e.g., FB I)
		Field Blanks Made up? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered? (Y/N)	Field Blank ID (e.g., FB I)
	Duplicate NO Field Blank	Field Blanks Made up? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered? (Y/N)	Field Blank ID (e.g., FB1)
(Water Temp (°C) 5	Duplicate NO Field Blank Field	Field Blanks Made up? (Y/N) N/CA Deramete	No. of bottles	Preserved? (Y/N)	Field filtered? (Y/N)	Field Blank ID (e.g., FB1)
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If found, please call ELR: 867.668.6386

		AND Gen Clem collecter	& Sapt 22	2014 0	15:40		
	Solr	Si	urface Wate	er Sample	e Sheet		
			Hennera 13	43-005	.04		
		ELR PROJECT NUMBER AND NA	ME: 14-183 Clin	ton Creek N	1onitoring	ANI Sa	rd nor
	Date and Time (24hr)	21 Sept 2014, 18:50-19:00	0		-	AB: N.	otes
	Sampling Method:	Grab	 Other?				
	hrt - mix sun	+cloud, sun setting, light wind a	n river, r	600		-	
	[Sur	face Water :	amples	1	Field	
		Parameters	Collected (Y/N)	No. of bottles	Preserved (Y/N)	filtered (Y/N)	Comments
		Total Metals (and hercury)	Ч	141	4	N	I plastic I vial
		Dissolved Metals (and meleury)	<u> </u>	1+1	<u> </u>	1	I plastic I vial
		tal Suspended Solids (188)	<u>V14</u>	GEN L	lem		
				CEN	1150m		nmber glass
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						14	ample ginss
				6			
	Lo Gen Chin	c-llicted 22 Sept 2014 C	1	1	N	N	IL plastic
	· · · · ·	15:40					
					N7.		
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	······································	Supicate	Field Blanks			Field	
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			(Y/N)	bottles	(Y/N)	(Y/N)	
		Field Blank	N/A.				٢٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠
		Fie	eld Paramete	ers			
n Gield	Water Temp. (°C)	6.2					
atelers	Hq PH	7.69	n admassara kalenda da sa ma'ad majkaran Ana sa da marian ma'ara a				a seri ya co fengena meningi. Africi di wa fengi kabupat dana camana na na mana mana mana mana man
Childen Williams	 Conductivity (μS/cm) 	511	***	Speci	fic Conducti	vity (µS/cm):	797
d v	ORP (mV)	NOT RECORDED, NOT RECUI	RED				
124	Turbidity (NTU)	NOT RECORDED, NOT REQUIR	e r				
filme of) Dissolved O_2 (mg/L)	9.66					
2	Dissolved O ₂ (% Sat.)	<u>کې ۷</u>		nativas i vasori di su dan sono - Jaco de sur vanificio da da da da se va			
SAVE		M	iscellaneous	Informatio	nn		
(o // ~	Photo Numbers	157-160 (AN C.)					
	UTM Coordinates	LII LOU [HN (Ghurn)	ne 07 I	F. 05	19UAA		N: 7/1/7
	Waypoint name	AN 471 20	inc. v (W	E, Y)	1 / 700 Datum		114642
	Observations	EI JEVI (019	η	1 5		1170	1.1 1.
		Also a huddle macro	to contribute	LR Kind	youle Ki	ver oh	(linton Lreck
		15t in middle of channel	2 7.5 m	deen deen	rorogy 1	UNI INT	
	comple + -	1		<u>-</u>		lf fo	ound, please call ELR: 867.668.638

	ELR PROJECT NUMBER AND	NAME: 14-183 Clin	ton Creek I	Monitoring		
Date and Time (24hr)	21 Sept. 2014 19:55	20:05		-		
Sample ID	R 6			_		
Sampling Method:	Grab	Other?			_	
ms: Mix sun/cloud,	, sun setting ~ 6°C.	Surface Water S	Samples			
	Parameters	Collected (Y/N)	No. of bottles	Preserved (Y/N)	Field filtered (Y/N)	Comments
	Total Metals (and merc.)	Y	+1	У	N	1 plastic lvial
	Dissolved Metals (11 11)	У	+	У	У	I plastic I vial
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	Nitrare/Nitrite/Sulphate	у у	1	У	N	1 amber glass
	gren/Ammonia/ i otal Phosphorus					
- ben. Ch	em. collected	<u> </u>	1	N	N	1 L plastic
22 Sept	LOIG 0 15-45					
			hofflys	461		
			00011-001	1.1.1.1.1		
	Dupi	licates and Field	Blank	1		
	No	Duplicate Collected? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered (Required) (Y/N)	Duplicate Name ID, e.g., D (do not use the station nam
	Duplicate	N/A	2010 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)			
	No	Field Blanks Made up? (Y/N)	No. of bottles	Preserved? (Y/N)	Field filtered? (Y/N)	Field Blank ID (e.g., FB1
	Field Blank	NA			and we can be a set of the set of	α το δροδού δια διαδιαδιατικά δια δια δροδού του ματοποιού του το πολογουριατικό του το ποριο ματοποιού του τ Το πολογού διαδιαδιαδιαδιαδιαδιαδιαδιαδιαδιαδιαδιαδ
Water Toma (°C)	/ 1	Field Paramete	rs			
pH	<u> </u>					11.5.4.9.9.2.6.4.6.5.9.4.10.4.10.4.10.4.10.4.10.4.10.4.10.4.
Conductivity (uS/cm)	1578		Speci	ific Conducti	vity (uS/cm)	241. 1.
ORP (mV)			5466			~ 10·0
Turbidity (NTU)	Not RECORVED.					aan da waxaa ka ahaa ahaa ahaa ahaa ahaa ahaa ah
	NAI KEIRDER'				Alexandron and Alexandron and a state of our set the set of the se	
Dissolved O ₂ (mg/L)	10.02		é	YSI loca	ted ~1m	from shore, 20 cm
Dissolved O_2 (% Sat.)	80.8					
		Miscellaneous I	nformati	on		
Photo Numbers	261-					
UTM Coordinates	AN 6PS	Zone: 07W	E: ()	519437		N: 7141958
	a a construir de la construir de la construir construir de la construir de la construir de la construir de la c		*//	, , , , , , , , , , , , , , , , , , ,		
Waypoint name	RG SEPT DOIY			Datum:	NAD 83	

()er

Surface Water Sample Sheet

Hennern	1342.	005

04 ELR PROJECT NUMBER AND NAME: 14-183 Clinton Creek Monitoring

Date and Time (24hr)	22	SEPT	2014	09:25	
	6				

AN: Sampler AB: Notes

Sample ID	R3	
Sampling Method:		

Grab

Wx- overcest, he wind, Mik Thin + show ~ 200 Surface Water Samples

Other?

Parameters	Collected (Y/N)	No. of bottles	Preserved (Y/N)	Field filtered (Y/N)	Comments
$Total\;Metals\;\left(+ \cdots + t + f + f \right)$	4	1+1	Y	N	Iplastic, Irral
Dissolved Metals (1 marcorg)	Y	(+)	Y	Y	
Total Suspended Solids (TSS)	N/A	GEN. CE	16m	Prototo Patricia de Las Constantes de 11,2 jugados	and a second
Dissolved Organic Carbon (DOC)	Y	1	Ч	Y	1 amber glass
Nitrare/Nitrite/Sulphate	V°IA-	6. chem	_ ····		
Total Nitrogren/Ammonia/Total Phosphorus	Ϋ́	ł	Ч	N	1 Amberglass
-					0
6. Chem.	·Y	t	ы	И	IL plastic.
	7 60	ttles f	ofal.		
Duplicate	s and Field	d Blank			

Duplicate ield filtered No. of Preserved? Duplicate Name ID, e.g., Dup 1 NO Collected? (Required) bottles (Y/N) (do not use the station name) (Y/N) (Y/N) N/A -Duplicate Field Blanks Field No. of Preserved? No Made up? filtered? Field Blank ID (e.g., FBI) bottles (Y/N) (Y/N) (Y/N) Field Blank MA

		Field Parameters	S	
Water Temp. (°C)	2.(
PН	7.41			
Conductivity (µS/cm)	465.3		Specific Conductivity (µS/cm)	: 827.Z
ORP (mV)	-627.2	d.		
Turbidity (NTU)	NOT RECORDED NOT RE	QUIRED M		
Dissolved O_2 (mg/L)	Not RECORDED, NOT	REQUIRED	10.67 mg/L	
Dissolved O ₂ (% Sat.)	77.5 %		每月5月。	Sample in middle channo
		Miscellaneous In	formation	ŧ
Photo Numbers		(GR Conton)		
UTM Coordinates	(AN EPS)	Zone: 67 🗤	E:	N:
Waypoint name	R3 SEPT 2014	-> Access hile = (23 ALLESS Datum: NAD 83	a-503t 2014
Observations	~ 100 m upstream of	vour thilling st	ung on trolvoine (ril	k in confined
	channel min of smo	inpularass more	h 190 m downstreep	to flooded lake pand
2 million S	ee AN GPS for wallei	maccess which	avoids failings was	st only dire
ς.	eda land improvable an	aller side of crue	(L) If	found, please call ELR: 867.668.6386
	Also a hydrology asso	issuent Station-s	ee ELK hydrology fiel	a form

APPENDIX 5 Comment Log

Response to Comments from Draft Report Version (as Received November 25, 2014).

Comment No.	Page	Comment	Response
1	Cover	Please provide excel spreadsheets used when conducting analysis.	All supporting files provided with final document.
2	1	Additional tributaries flowing into Hudgeon Lake, this should be mentioned, and if in the future, should they be sampled.	There are several additional tributaries that have not been assessed by Hemmera/ELR as they were not included in the scope of work. Their inclusion in future programs may be advisable, but we believe this has been addressed through the potential re-scoping of the Clinton Creek program.
3	1	Please identify Porcupine Pit and Snowshoe Pit on the Map	The map has been edited accordingly.
4	5	Why is there no R5?	In response to your comments on page 5 concerning sample site ID, reference site R5 and exposure sites E5 and E6 were not included in the scope of work. We assume that these may be some previously sampled sites that were decommissioned, however we don't have any project history available to confirm.
5	5	Why is there no E5 and E6?	In response to your comments on page 5 concerning sample site ID, reference site R5 and exposure sites E5 and E6 were not included in the scope of work. We assume that these may be some previously sampled sites that were decommissioned, however we don't have any project history available to confirm.
6	6	As mentioned earlier, is there a name to this creek/tributary? Should we sample it in the future?	See response to comment no. 2.
7	7	As mentioned earlier, is there a name to this creek/tributary? Should we sample it in the future?	See response to comment no. 2.
8	10	May want to include a paragraph explaining that proper deionized water was not used for blanks and steps were taken to reassure validity of results.	Issue has been addressed in this section and in discussion.
9	14	Review this sentence 5 results, yet only 4 sites provided	Report has been revised accordingly.
10	15	Isn't pH a standard test performed within the lab analysis? Why is it not included for all sites?	As per our recent discussions, unfortunately field pH could not be measured at several sites, and lab pH was not requested. Although not in the scope of work, it should have been requested in this particular case. This again would fall under the scope of a review of the sampling program, and I believe that parameters such as pH and conductivity should be included in future events.

Comment No.	Page	Comment	Response
11	19	Why was pH not provided? As well as other typical lab parameters? (e.g. conductivity)	See response to comment no. 10.
12	19	What are the ranges when dependent on pH and water temp?	Table footnotes have been revised to indicate that parameter varies, and ranges have been removed to avoid confusion.
13	20	Interesting to note that most cases where metal levels super-seed CCME levels are those flows feeding into the foot printed area (R1, R2, R3, R6, R7)	Yes. There is evidence of external influence on the site, which indicates the importance of proper reference site documentation.
14	20	For Copper at E8 - May want to re-check After looking at hardness, the value still falls within the given range Does this depend on a range or is it the given calculation below that determines whether it is at an elevated level or not which is dependent on hardness?	In response to your comment concerning a CCME-PAL total copper exceedance for site E8. Concentrations of total copper at this site were 0.00246 mg/l. Total copper concentrations did not exceeded the CCME-PAL guideline of 0.00288 mg/l (based on a hardness 126 mg/l). We have changed the ranges provided in the tables to "Varies" to denote the site-specific conditions for each parameter, so hopefully this will provide more clear information.
15	23	Please provide an explanation for this	Field blank results are discussed in the context of additional confirmatory testing in the report.
16	27	and Porcupine Pit Lake	Report has been changed accordingly.
17	27	According to the table, there were 7 not sampled	Report has been changed accordingly.
18	28	Not what it says in the table says 0.365 m/s	Report has been changed accordingly.
19	31	Several comments regarding field vs lab pH results As mentioned earlier, we were just wondering why pH (among other parameters) wasn't measured in the lab? Wouldn't it be more accurate to relate to lab results? As well, in some instances, field pH was not measured (as a result of instrumentation problems). And in this case, worst case pH situations were used This should also be discussed here.	In respect to using field pH to calculate CCME exceedances, where available, field pH was used to calculate CCME-PAL guidelines for aluminum. Field pH provides the most accurate representation of in-situ conditions and is therefore preferred over laboratory pH for calculating CCME exceedances. For sites where pH data was not available (R1 and R2), CCME-PAL exceedances of aluminum were calculated based on the lowest pH observed during the field program (6.12 pH), resulting in an aluminum guideline of 0.005 mg/l. Field pH during the 2013 Clinton Creek Monitoring program at sample sites R1 and R2 was 8.04 and 7.70, resulting in a CCME-FAL aluminum guideline of 0.1 mg/l.
20	31	Dissolved vs total metals for arsenic are essentially the same 0.0152 vs 0.0148?	These two are essentially the same. The comment that arsenic is primarily in the dissolved form still stands, and the text has been revised to that this reads more clearly.

Comment No.	Page	Comment	Response
21	32	Is selenium a concern? Should we be worried? What are potential impacts if so?	In response to your questions concerning impacts from selenium (Se) contamination, Se is known to be toxic to plants, animals, and humans at higher concentrations. The concentration of total selenium in natural waters is typically less than 0.001 mg/l. The concentration of Se in the study area ranged from 0.00022 mg/l (E8) and 0.00412 mg/l (GWCC-1), with CCME exceedances at both reference and exposure sites. The lowest observed effects level (LOEL) for selenium in water is 0.01 mg/l. CCME-PAL guideline for Se is 0.001 mg/l, using a safety factor of 10. The BC MOE use a slightly higher guideline (0.002 mg/l), using a safety factor of 5. The higher guideline is apparently based on the fact that selenium is an essential element for animal health, and food (not water) is the major source of selenium in the food chain. It's also important to note that we did find concentrations of total selenium above CCME-PAL values at reference sites R1 and R2, indicating elevated concentrations may also be sourced from off-site. This is consistent with data collected in the fall of 2013. Further data would be required to investigate the potential impacts of selenium contamination and whether or not accumulation.
			in the receiving environment is a serious threat to aquatic life. This is something that could be investigated in greater detail through an expanded program.
22	33	May want to include a paragraph explaining that proper deionized water was not used for blanks and steps were taken to reassure validity of results I discussed this with Chris on the phone and he said he would include a section when the results came through (i.e. how the issue was resolved) - As well, could you please provide the new results for the two water samples and a discussion comparing them and confirm that results from the program were good	The discussion has been updated to include the results of the additional confirmatory testing.

Comment No.	Page	Comment	Response
23	34	I noticed in one of the photos (#23) that there was an "unknown/unnamed" ground seep Should this be monitored in the future? Where is this located? I don't recall this presented in the report.	An additional groundwater seepage site was identified in the field at the toe of the waste rock dump (photo 23), similar to GWCC-3 and GWCC-4. The unnamed seep was entering the seepage creek (photo 24) below the surface of the water and therefore it would be difficult to collect samples or conduct flows measurements. Flow measurements and samples could however be collected from the resulting seepage creek. Sample sites GWCC-3 and GWCC-4 also flow into this creek which flows into the beaver pond (photo 19).
			This is another point that should be considered for the next year's program, and could be taken into account separately or as part of a larger program review.
24	34	Not too clear on this recommendation	We have simplified this recommendation to relate only to signs at sample sites.
25	34	I am not sure what this means should this not have been developed as part of the work plan for this year?	This recommendation has been removed.
26	34	We should chose a location and stick with it Was the new location safe? Would this continue to be a representative location to replace the old? If so, stick with it	Agreed about permanently establishing a new Site E1. If possible, this should be part of the overall program review to ensure that this site will be accessible in the long term, and that it is the best appropriate location.
27	34	 Should Hudgeon Lake be sampled? And if so, at what depth? (multiple depths?) As mentioned earlier, should we capture all tributaries entering Clinton Creek? I know there were a few that were not captured 	As per earlier comments, this should be assessed as part of a larger program review to ensure that appropriate samples are being collected.