Mount Nansen June 2014
Groundwater Monitoring and Sampling

Prepared for:
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November 2014

HEMMERA | 20 YEARS 1994–2014

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1.0 INTRODUCTION

Hemmera Envirochem Inc. ("Hemmera") and Ecological Logistics & Research Ltd. (Hemmera / ELR) were retained by the Government of Yukon (GY), Assessment and Abandoned Mines (AAM) to conduct a groundwater monitoring and sampling program at the Mount Nansen Site in June of 2014. This report summarizes the activities conducted, the field conditions encountered, and the *in-situ* and laboratory analytical results for the program.

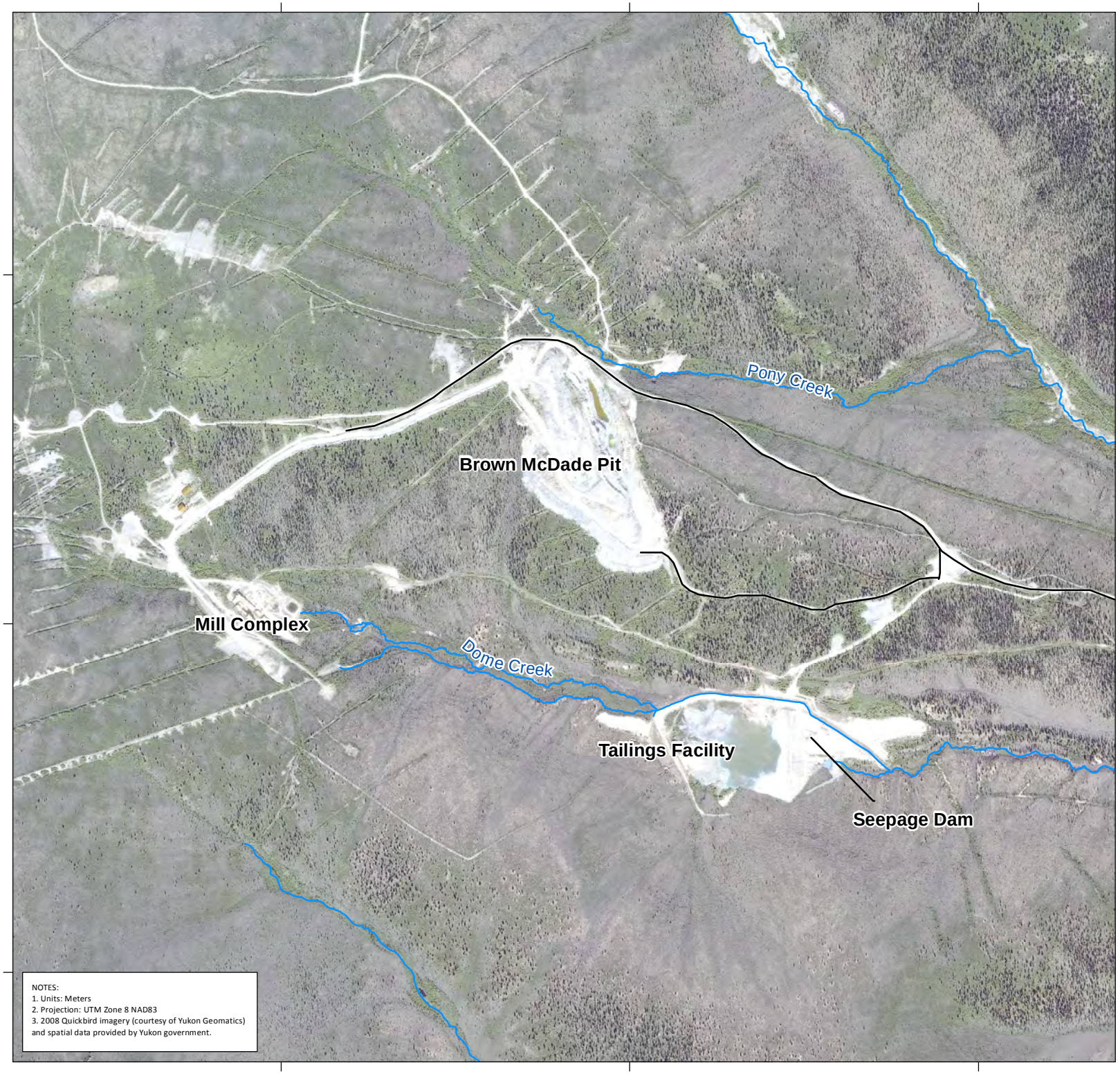
1.1 SITE LOCATION

The Mount Nansen Site (the Site) is located approximately 45 km west of the Town of Carmacks (70 km by road). This Type II abandoned mine site consists of three (3) primary areas of existing infrastructure: the Brown McDade Pit, a Mill Complex, and a Tailings Facility (**Figure 1-1**). Previously installed groundwater sampling stations exist throughout much of the site, a subset of which were sampled during the June 2014 groundwater monitoring and sampling program. The groundwater monitoring locations included in this program are described in **Sections 1.2 and 1.3**.

1.2 SCOPE OF WORK

The scope of work included the coordination and execution of the spring groundwater monitoring and sampling program and the preparation of this report. The report provides a summary of the monitoring and sampling activities, methodologies (including and deviations), laboratory analytical results, comparison to the applicable guidelines, and recommendations relating to sample procedures and monitoring well condition. This report does not provide an interpretation of the analytical results or provide recommendations relating to contaminated groundwater. Groundwater sampling at the Mount Nansen site was conducted over a four (4) day period, between June 26 and 29, 2014. Sampling was conducted by a team of four (4) field staff from Hemmera/ELR (Aaron Nicholson, Rusto Martinka, Andrew Brown, and Michelle McKay). A total of 65 groundwater wells were included in the June sampling event (**Table 1-1**).

At each well (sampling station) headspace gas concentrations were measured, basic well and water level parameters were measured (Depth-to-Water, Depth-to-Bottom, well diameter, and well stick-up height), the well was purged, then field water quality parameters were measured. Finally, water quality samples were collected for laboratory analysis. A detailed description of the sampling methods and water quality parameters monitored and sampled for is provided in **Section 2**, below.



Groundwater Monitoring Program
June 2014 Mount Nansen Site

elr Ecological Logistics & Research Ltd.

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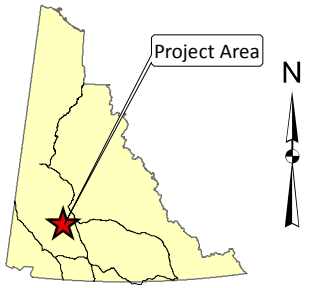
Assessment and Abandoned Mines

Legend

Watercourses



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250 125 0 250
Meters

November, 2014

Hemerra Project: 1343-005-03
ELR Project: 14-175

FIGURE 1-1
Site Location - Mount Nansen Site

Table 1-1 Summary of Samples Collected at each Well Location

Area	Well Name	UTM (Zone 08N)		Status[1]	Sample Collected	QA/QC Sample Collected
		Easting	Northing			
Dome Creek	GSI-DC-01B	387675	6881124	Insufficient Volume	-	-
	GSI-DC-02B	387839	6881129	Insufficient Volume	-	-
	GSI-DC-03B	388107	6881079	Insufficient Volume	-	-
	GSI-DC-05B	388725	6880836	Insufficient Volume	-	-
	GSI-DC-06B	389788	6880567	Good	✓	-
	GSI-DC-07B	390065	6880641	Good	✓	-
	GSI-DC-08-B	390311	6880583	Frozen	-	-
	GSI-DC-09-B	390614	6880494	Good	✓	-
	GSI-DC-10-B	390859	6880452	Good	✓	-
Mill Complex	GSI-HA-01A	387842	6881132	Insufficient Volume	-	-
	GSI-HA-02A	387861	6881129	Insufficient Volume	-	-
	GSI-HA-03A	387878	6881131	Insufficient Volume	-	-
	GSI-HA-04A	387916	65881130	Insufficient Volume	-	-
	GSI-HA-05A	387898	6881125	Insufficient Volume	-	-
	MW09-16	387992	6881094	Good	✓	Duplicate
	MW09-17	388075	6880970	Good	✓	-
	MW09-18	388054	6880986	Good	✓	-
	MW09-19	388051	6881016	Good	✓	-
Brown McDade Pit	CH-P-13-01/10	388657	6881116	Frozen	-	-
	CH-P-13-03/10	389145	6881105	Damaged[2]	-	-
	CH-P-13-03/50	389143	6881105	Good	✓	-
	CH-P-13-04/10	389138	6881472	Insufficient Volume	-	-
	CH-P-13-04/35	389138	6881472	Obstruction[2]	-	-
	CH-P-13-05/50	388954	6881466	Good	✓	Duplicate
	GLL07-01	388851	6881777	Frozen	-	-
	GLL07-02	389069	6881703	Dry	-	-
	GLL07-03	388959	6881477	Good	✓	-
	MP14-01	N/A	N/A	Not installed	-	-
	MW09-13	389006	6881665	Frozen	-	-
	MW09-14	389006	6881663	Frozen	-	-
	MW09-15	388915	6881723	Frozen	-	-
Pony Creek	GSI-PC-01-B	388720	6881918	Destroyed[2]	-	-
	GSI-PC-02-B	388907	6881786	Dry	-	-
	GSI-PC-03-B	389256	6881706	Insufficient Volume	-	-

Area	Well Name	UTM (Zone 08N)		Status[1]	Sample Collected	QA/QC Sample Collected
		Easting	Northing			
Pony Creek	GSI-PC-04-B	389586	6881660	Insufficient Volume	-	-
	GSI-PC-05-B	389713	6881661	Dry	-	-
	MP09-01	N/A	N/A	Unable to Locate	-	-
	MP09-02	388867	6881816	Good	✓	-
	MP09-03	388956	6881739	Insufficient Volume	-	-
	MP09-08	389160	6881718	Good	✓	-
Seepage Dam	W14103083BH01	389522	6880669	Frozen	-	-
	W14103083BH02	389561	6880665	Insufficient Volume	-	-
	W14103083BH04	389544	6880666	Frozen	-	-
Tailings Facility	MP09-04	389575	6880609	Good	✓	-
	MP09-05	389548	6880590	Good	✓	-
	MP09-09	389240	6880681	Good	✓	-
	MP09-10	389241	6880684	Good	✓	-
	MP09-11	389220	6880614	Good	✓	-
	MP09-12	389220	6880614	Good	✓	-
	MP09-14	389138	6880722	Insufficient Volume	-	-
	MW09-01	389391	6880557	Obstruction[2]	-	-
	MW09-02	389393	6880557	Good	✓	Duplicate
	MW09-03	389421	6880555	Good	✓	-
	MW09-04	389420	6880557	Good	✓	-
	MW09-05	389413	6880656	Unable to Access	-	-
	MW09-06	N/A	N/A	Unable to Locate[3]	-	-
	MW09-07	389322	6880699	Good	✓	-
	MW09-08	389620	6880576	Good	✓	Duplicate
	MW09-11	389037	6880711	Dry	-	-
	MW09-20	389592	6880586	Dry	-	-
	MW09-21	389536	6880577	Good	✓	-
	MW09-22	389495	6880549	Good	✓	-
	MW09-23	389459	6880553	Good	✓	-
	MW09-24	389561	6880624	Good	✓	-
	W14103083BH03	389132	6880730	Insufficient Volume	-	-

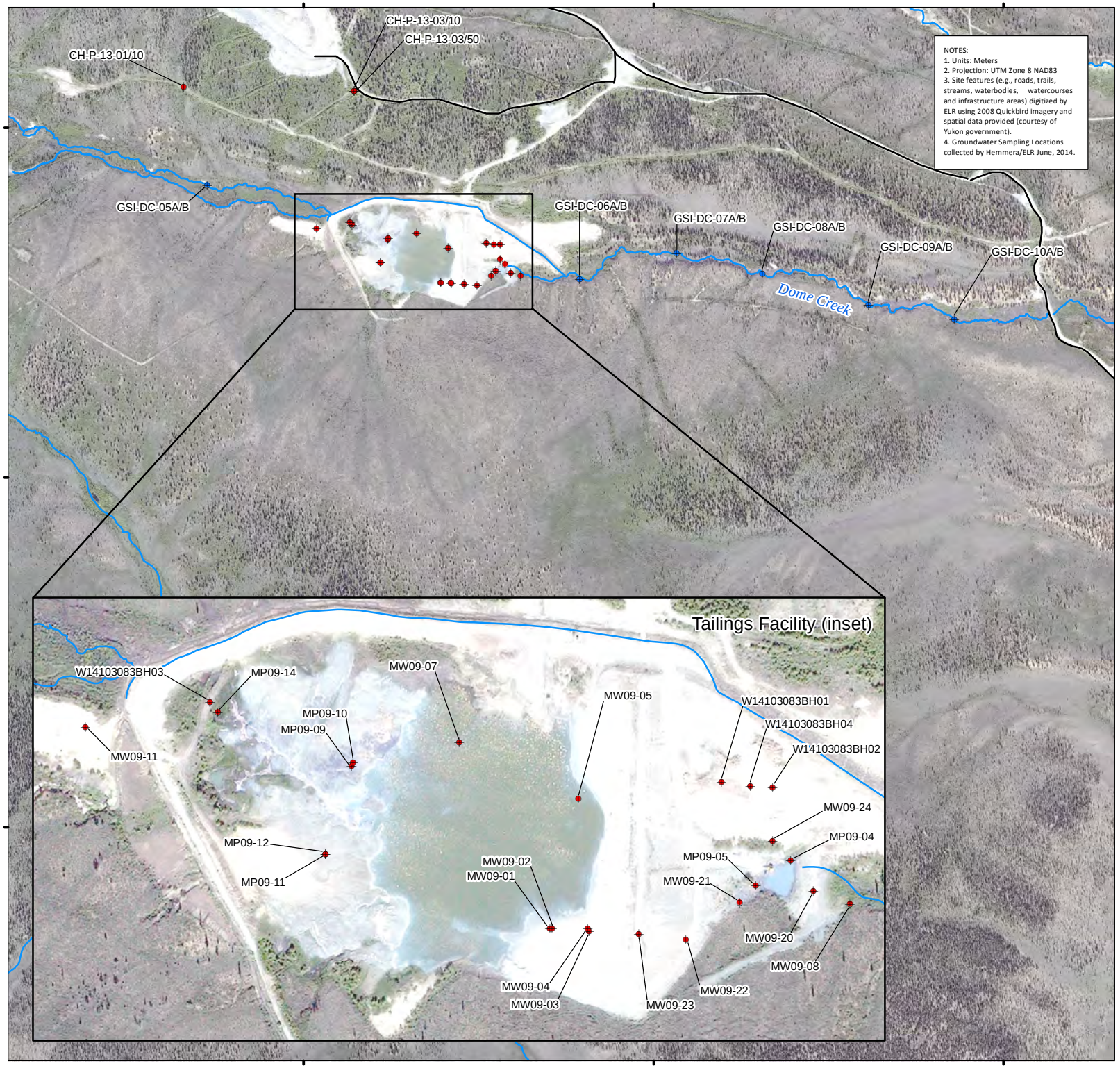
Notes: [1] Insufficient Volume as defined by AAM where less than two litres of water could be purged from the well, and where less than two litres of water was present after allowing the well to recharge.

[2] Further details concerning damaged, degraded, or obstructed wells are provided in Section 3.2.

[3] Well MW09-06 was noted as 'submerged' during 2013 (as described in the Scope of Work). Based on field observations, this is the likely reason for that well not being located during the spring 2014 program.

1.3 SAMPLE SITES

Groundwater wells monitored during the spring event was conducted across six (6) areas of the Mount Nansen site (**Table 1-1**). The majority of spring well sites were located around previous infrastructure areas including the tailings facility (25 wells; including tailings facility and seepage pond/dam), the Brown McDade Pit (13 wells) and the Mill Complex (9 wells). Spring groundwater sampling was also completed via targeted drive-point piezometer installations in the vicinity of Dome and Pony Creeks (9 sample sites in each creek). **Table 1-1** describes the location, status of wells and sample recovery for groundwater wells included in the spring sampling program. The well locations are also illustrated in **Figures 1-2** and **1-3**. Photographs of each sample site are included in **Appendix A**.



Groundwater Sampling Program
June 2014 Mount Nansen Site

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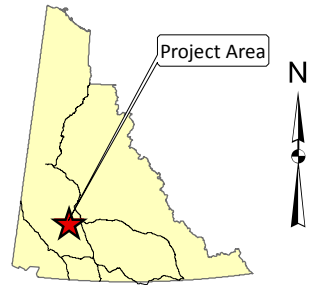
Legend

Groundwater Sampling Locations

- Drive Point
- Monitoring Well
- Watercourses



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Meters

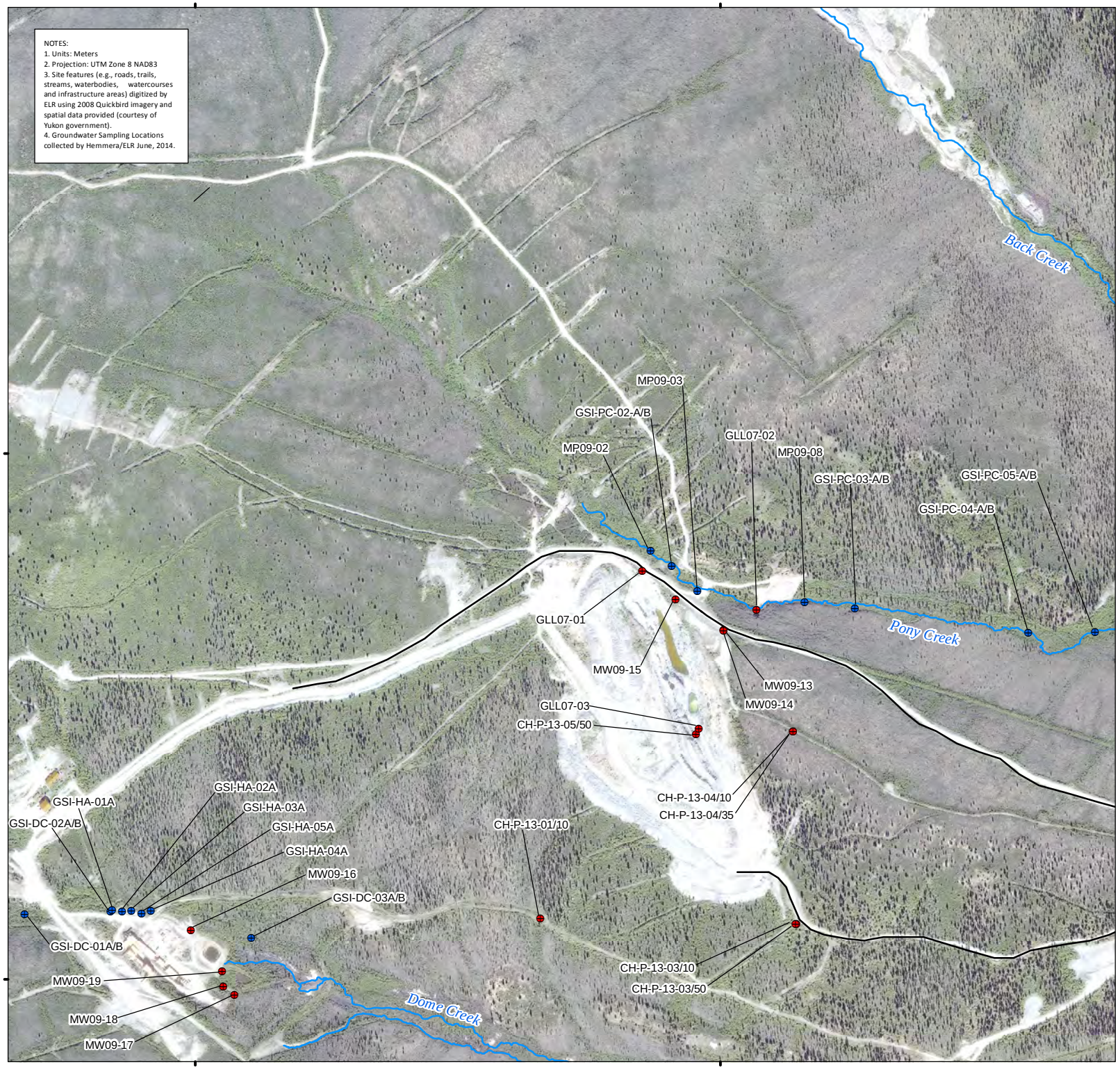
November, 2014

Hemmerra Project: 1343.005-03

FIGURE 1-2

Groundwater Sampling Locations

Dome Creek and Tailings Facility



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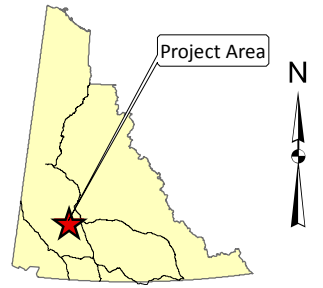

Scale: 1:10,000

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Meters

November, 2014

Hemmera Project: 1343.005-03

FIGURE 1-3

Groundwater Sampling Locations

Mill Complex and Brown McDade Pit

2.0 METHODOLOGY

2.1 PROTOCOLS

Groundwater purging, monitoring and sampling conducted by Hemmera/ELR was in accordance with the Groundwater Sampling Standard Operating Procedures included in the document *Scope of Work: Groundwater Sampling Program – Mount Nansen Site June 2014*. At no time during the spring program did field methodologies deviate from the prescribed sampling procedures. These procedures were consistent with Yukon Environment's Protocol for the Contaminated Sites Regulation #7 - Sampling and Decommissioning (Yukon Environment, March 2011). Methods used were also consistent with the ASTM D4448-01 Standard Guide for Sampling Groundwater Monitoring Wells (ASTM, 2013), and the D6452-99 Guide for Purging Methods for Wells used for Groundwater Quality Investigations (ASTM, 2012).

2.2 WELL MEASUREMENTS AND PURGING

Upon arriving at each well, headspace gases were measured prior to any other well measurements. Oxygen (%), carbon dioxide (ppm), and methane (%LEL) were measured using a RAE Systems MultiRAE Four-Gas Monitor with photoionization detector (PID).

The well structure and casing of each well were inspected for damage, closure, and general conditions. Several measurements were then recorded from each well, including Depth-to-Water (DTW; m), Depth-to-Bottom (DTB; m), well diameter (cm), and well stick-up height (m).

DTB and DTW were measured using either a Solinst - Model 102 Water Level Meter (for 2.54 cm diameter wells) or a Heron Water Tape (for wells with diameter greater than 2.54 cm). DTB and DTW were measured from (in hierarchical order): 1) a black mark drawn on the top of the well; 2) the bottom of the most significant notch found on the top of the PVC if a mark was not present; or 3) a line that was drawn on the highest point of the well if no distinguishable point of measure was present. Stick-up height was measured from the lowest point on the bottom of the well casing to the highest point (or distinguishing mark) on the well. Water level meters were rinsed between each sample site with de-ionized water.

Following initial inspection and monitoring, groundwater wells were purged and sampled using dedicated equipment including high density polyethylene (HDPE) tubing and footvalves. In some cases existing tubing found within wells was not considered to be suitable for sampling. In such cases, the existing equipment was removed and new tubing installed. New dedicated tubing was also installed where no dedicated tubing was present. Groundwater wells were purged and sampled using one of three (3) techniques: 1) Hydrolift electric pump using Waterra tubing and footvalve, 2) manual purging using Waterra tubing and footvalve, or 3) GeoPump peristaltic pump. The purging technique chosen for each well was that which would produce the most representative groundwater sample.

Groundwater wells were determined to be sufficiently purged when either three successive field parameter measurements were recorded to be within an allowable tolerance level (as summarized in **Table 2-1**, below) or when a volume of water equivalent to three standing well volumes of water had been purged. Numerous groundwater wells were found to have a limited standing volume or recharge at the time of sampling, which was communicated to AAM during the field program. Instances where less than two litres of water could be purged from the well initially or where less than two litres of water was present after allowing the well to recharge, the well was determined to have an insufficient volume of water for sampling purposes .

Groundwater turbidity (NTU) was also measured prior to sampling (described below in **Section 2.3**) and was used as an indication of sample quality. Where possible samples were not collected until turbidity levels were less than 50 NTU. Purge volumes and purge rates were measured using a graduated container and stop watch.

All well measurements, purging details, and additional field notes were recorded on customized field forms in order to minimize the potential for field errors; this information is presented in **Table 3-1**.

Table 2-1 Groundwater Sampling – Field Parameter Purging Criteria

Field Parameter	Allowable Variance
Temperature (°C)	3%
pH	+0.1
Conductivity (µS/cm)	3%
Specific Conductivity (µS/cm)	3%

2.3 FIELD PARAMETERS

Hemmera/ELR measured *in-situ* water quality parameters using YSI Professional Plus and field meters, Lamotte 2020e or Hach 2100Q turbidity meters, and Hach DR 2800 Portable Spectrophotometers. Flow-through cells were used in conjunction with the YSI Professional Plus meters to minimize field parameter variability. The *in-situ* water quality parameters recorded at each sample site included; water temperature (^{o}C), specific conductivity (µs/cm), conductivity (µs/cm), ORP (mv), and pH (pH units), sulphide (µg/l), and turbidity (NTU).

During purging, field parameters were monitored at 5 minute intervals, or at volume related intervals (e.g., every 500 mL) in the case of wells with slow recharge. A final set of measurements was recorded at the conclusion of purging.

2.4 GROUNDWATER SAMPLING

Groundwater quality samples were collected and preserved in accordance with laboratory directions, and using techniques consistent with Standard Methods for the Examination of Water and Wastewater (Rice et al., 2012). ALS Global was the analytical subcontractor chosen for this project, and an example summary of the sample set collected at each sample site, including parameters analysed and preservation techniques, is provided in **Table 2-2**.

Table 2-2 Groundwater Sampling – Preservation and Intended Analysis

Bottle Type	Parameters Analyzed	Sample Treatment	Preservative Added
1 L (plastic)	General Chemistry	-	-
120 ml (plastic)	Dissolved Metals	Field Filtered and Preserved	HNO_3
120 Ml (glass vial)	Dissolved Mercury	Field Filtered and Preserved	HCl
250 ml (glass amber)	NH3	Preserved	H_2SO_4
250 ml (glass amber)	TIC – total inorganic carbon	-	-
120 ml (plastic)	Sulphide	Preserved	Zinc Acetate, capped and mixed, then NaOH
120 ml (plastic)	Thyocyanate	Preserved	HNO_3
145 ml (plastic red cap)	Cyanide (total, free, and WAD)	Preserved	NaOH
145 ml (plastic red cap)	Cyanide (total, free, and WAD)	Preserved	NaOH

2.5 DATA ANALYSIS

Groundwater analytical results were compared to the Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Freshwater Aquatic Life (FAL; CCME, 1999). All relevant CCME FAL guidelines are presented in **Table A**.

2.6 QUALITY ASSURANCE AND QUALITY CONTROL

2.6.1 Field QA/QC

Several controls were used by Hemmera/ELR staff while in the field to help ensure that sample integrity was maintained and that data were recorded completely and accurately. All equipment used during the sampling process was dedicated to individual wells, including tubing and Waterra footvalves. The project laboratory provided pre-cleaned sample containers, disposable filters, and disposable syringes. Field staff wore dedicated disposable nitrile gloves for all measurements, purging, and sampling. Water level meters were cleaned using de-ionized water between well locations, and field instruments (YSI field meters and turbidity meters) were checked and/or calibrated before each site visit to ensure the parameters recorded were as accurate as possible.

Project-specific field data sheets were created for the sampling event to help ensure that all required measurements were taken, and that information was recorded correctly. Field data sheets have been included as **Appendix B** of this report.

2.6.2 QA/QC

Analytical QA/QC measures were included in the spring sampling program as outlined in the scope of work and as per standard industry practice. This included the collection of travel blanks, duplicates, and field blanks. Duplicate samples were collected at a minimum rate of 10% of the regular sample collection rate (4 duplicates were collected in relation to 28 sample sites), and a field blank was collected for each day field sampling was conducted (a total of 4 field blanks were collected). Two travel blank accompanied the analytical supplies and samples from the lab to the field and back to the lab again (1 for each shipment).

The variation in sample and sample duplicate values is represented as relative percent difference (RPD). RPD provides a measure of the relative difference between two values in comparison to their mean value, and is calculated as the difference between a sample and its field duplicate over the average of two values. RPD values greater than 20% indicate a potential error that has affected the data precision. RPD was calculated according to the following formula:

$$\%RPD = \left(\frac{\left(\frac{x_1 - x_2}{x_1 + x_2} \right)}{2} \right) X\ 100$$

RPD is not calculated if either the sample or the field duplicate concentration is less than five times the detection limit.

The analytical results for field and travel blanks were reviewed to determine whether any of the parameters tested were detected (i.e., result exceeding the detection limit). In such cases, the parameter or element in question and its concentration were reviewed to determine potential sources of contamination or error.

3.0 RESULTS

Summary tables of the laboratory analytical results were prepared and are presented in **Table A** of this report. This table includes a comparison of results to CCME FAL guidelines. A summary of the QA/QC sampling results is also attached as **Table B**, including analytical data for duplicates, field blanks, and travel blanks, and RPD values. Copies of original laboratory analytical reports are provided as **Appendix C**.

3.1 GROUNDWATER SAMPLING SUMMARY

Groundwater sampling was completed between June 26 and June 29, 2014. Weather conditions varied throughout the time of sampling with ambient air temperature ranging from 8 to 24°C. Weather conditions were pre-dominantly clear and sunny with periods of overcast conditions. Of the 65 groundwater wells included in the spring sampling event, 60 were located and monitored during the sampling event. Of the five wells listed in the scope of work that were not assessed, two were not located (MP09-01 and MW09-06), one (GSI-PC-01-B) was found destroyed, one (MW09-05) was not accessible (as it was in the tailings pond), and one (MP14-01) had not yet been installed. Of the 60 monitored wells, groundwater samples were collected from 28 for laboratory analysis of select parameters.

There were several reasons for a low sampling rate during the program: eight (8) wells were frozen, five (5) wells were dry, sixteen (16) wells had insufficient groundwater volume to sample (minimal volume and recharge rate, according to criterial provided to Hemmera/ELR by AAM),and four (4) wells were either damaged or had an obstruction in the well, three (3) wells were either inaccessible or not located, and one (1) well listed in the SOW was not installed at the time of sampling. A summary of the condition (status) of groundwater wells is provided in **Table 1-1**, which also indicates where samples were successfully collected. A summary of all well measurements, purge details, and field parameter results is provided in **Table 3-1**.

Table 3-1 Groundwater Field Parameters and Well Measurements for 2014 Spring Sampling Program

Area	Location ID	Sample Date (yyyy-mm-dd)	Stick up Height (m)	Depth To Water (m)[1]	Depth to Bottom (m)	Standing Water Volume (L)	Volume Purged (L)	Purge Start Time	Purge End Time	Elapsed Purge Time	Purge Rate (l/min)	Criteria[1] (3WV/PS)	Draw Down (m)	pH	Temperature (°C)	Specific Conductance (µS/cm)	Conductivity, Uncorrected (µS/cm)	Redox, Uncorrected (mV)	Dissolved Oxygen (mg/L)	Dissolved Sulphide (µg/L)	Methane (%LEL)	Oxygen (%)	Carbon Dioxide (ppm)	Field Turbidity (NTU)	Method Used	Well Diameter (inches)
Dome Creek	GSI-DC-01A	2014-06-26	0.930	0.901	1.447	3.330	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	GSI-DC-01B	2014-06-26	0.950	1.527	1.574	0.290	<0.5	18:15	18:16	0:01		-	-	-	-	-	-	-	-	-	-	-	-	-	Peristaltic	1
	GSI-DC-02A	2014-06-27	0.925	1.596	1.950	-	-	-	-	-		-	-	-	-	-	-	-	-	-	0	20.8	610	-	-	1
	GSI-DC-02B	2014-06-27	0.880	2.487	3.840	0.690	<0.5	7:21	7:26	0:05		-	-	7.54	2.6	320	291.4	-61.1	3.02	-	0	20.6	600	-	Peristaltic	1
	GSI-DC-03A	2014-06-27	0.910	1.208	1.325	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.6	610	-	-	1
	GSI-DC-03B	2014-06-27	0.910	1.533	2.405	0.440	<0.5	9:29	9:33	0:04		-	-	-	-	-	-	-	-	-	0	20.6	610	-	-	1
	GSI-DC-05A	2014-06-27	1.040	1.135	1.937	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.4	690	-	-	1
	GSI-DC-05B	2014-06-27	0.550	1.120	2.805	0.860	<0.5	10:40	10:46	0:06		-	-	-	-	-	-	-	-	-	0	20.4	690	-	-	1
	GSI-DC-06A	2014-06-29	0.870	0.977	1.755	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	GSI-DC-06B	2014-06-27	0.510	0.855	1.394	0.270	1.2	14:35	14:39	0:04	0.30	3WV	-	7.10	8.1	402	250	-78.5	0.66	32	0	21	520	12.81	Peristaltic	1
	GSI-DC-07A	2014-06-29	0.940	1.325	1.985	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.6	0	-	-	1
	GSI-DC-07B	2014-06-29	0.930	1.323	1.925	0.310	3.0	15:45	16:12	0:27	0.11	3WV	-	7.03	2.8	1088	628	-84.4	0.42	1179	0	20.6	0	11.79	Peristaltic	1
	GSI-DC-08-A	2014-06-29	0.910	1.121	1.534	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.6	550	-	-	0.5
	GSI-DC-08-B	2014-06-29	0.270	Frozen	0.759	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.5	640	-	-	0.5
	GSI-DC-09-A	2014-06-29	0.910	1.094	1.359	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	470	-	-	0.5
	GSI-DC-09-B	2014-06-29	-	1.262	3.858	0.625	1.1	12:18	12:27	0:09	0.12	3WV	2.74	6.60	3.9	1940	1151	63.5	0.23	32	0	20.5	530	27.6	Peristaltic	0.5
	GSI-DC-10-A	2014-06-29	1.040	-	1.809	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.6	520	-	-	0.5
	GSI-DC-10-B	2014-06-29	1.030	0.981	3.763	0.900	2.8	14:20	14:35	0:15	0.19	3WV	1.05	6.60	3.2	1212	709	70.5	0.1	40	0	20.5	440	13.9	Peristaltic	0.5
Mill Complex	GSI-HA-01A	2014-06-27	1.220	2.380	3.120	0.380	<0.5	7:41	7:45	0:04		-	-	7.38	3	921	531	-54.2	4.9	-	0	20.9	630	-	-	1
	GSI-HA-02A	2014-06-27	1.490	2.414	2.480	0.034	-	-	-	-		-	-	-	-	-	-	-	-	-	0	20.9	600	-	-	1
	GSI-HA-03A	2014-06-27	0.930	1.512	2.170	0.330	<0.5	8:05	8:11	0:06		3WV	-	6.84	3.5	990	586	-60.6	1.83	-	0	20.9	610	-	Peristaltic	1
	GSI-HA-04A	2014-06-27	0.595	2.050	2.133	0.042	-	-	-	-		-	-	-	-	-	-	-	-	-	0	19.3	3100	-	-	1
	GSI-HA-05A	2014-06-27	0.960	1.375	1.770	0.200	<0.5	8:36	8:37	0:02		-	-	-	-	-	-	-	-	-	0	20.5	620	-	Peristaltic	2
	MW09-16	2014-06-26	1.220	1.686	2.680	2.020	7.5	13:15	13:40	0:25	0.30	3WV	1.69	6.67	4.8	1695	1040	136.6	3.62	3	0	20.6	4.38	3.86	Peristaltic	2
	MW09-17	2014-06-29	0.970	4.778	5.610	1.690	3.0	10:55	11:06	0:11	0.27	3WV	-	6.80	2.6	2788	1594	124	0.08	14	-	-	-	3.47	Peristaltic	2
	MW09-18	2014-06-26	0.900	4.555	7.770	6.530	20.0	15:57	16:56	1:01	0.33	3WV	4.57	7.01	1.5	1434	2590	31.3	0.8	42	0	20.6	2.76	6.49	Peristaltic	2
	MW09-19	2014-06-26	0.990	2.527	5.870	6.793	20.0	14:45	15:33	0:48	0.42	3WV	3.25	6.76	1.6	2327	1285	-86.7	2.19	125	0	20.6	2.92	2.46	Peristaltic	2

Table 3-1 Groundwater Field Parameters and Well Measurements for 2014 Spring Sampling Program

Area	Location ID	Sample Date (yyyy-mm-dd)	Stick up Height (m)	Depth To Water (m)[1]	Depth to Bottom (m)	Standing Water Volume (L)	Volume Purged (L)	Purge Start Time	Purge End Time	Elapsed Purge Time	Purge Rate (l/min)	Criteria[1] (3WV/PS)	Draw Down (m)	pH	Temperature (°C)	Specific Conductance (µS/cm)	Conductivity, Uncorrected (µS/cm)	Redox, Uncorrected (mV)	Dissolved Oxygen (mg/L)	Dissolved Sulphide (µg/L)	Methane (%LEL)	Oxygen (%)	Carbon Dioxide (ppm)	Field Turbidity (NTU)	Method Used	Well Diameter (inches)
Brown-McDade Pit	CH-P-13-01	2014-06-27	0.500	Frozen	2.630	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.5	640	-	-	2
	CH-P-13-03/10	2014-06-27	0.685	Damaged	5.136	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.5	490	-	-	2
	CH-P-13-03/50	2014-06-27	0.606	48.454	50.762	1.150	1.0	16:40	16:50	0:10	0.10	3WV	-	-	-	-	-	-	-	-	0	20.4	1390	70.1	1" bailer	1
	CH-P-13-04/10	2014-06-28	0.638	2.928	2.976	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.5	440	-	-	2
	CH-P-13-04/35	2014-06-28	0.608	Obstruction	6.505	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.5	690	-	-	1
	CH-P-13-05/50	2014-06-27	0.880	25.595	50.470	12.640	60.0	16:25	17:12	0:47	1.28	3WV	26.85	6.27	2.6	2864	1640	122.4	2.53	434	0	20.9	1.42	24.1	Hydrolift	1
	GLL07-01	2014-06-26	0.810	Frozen	12.876	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	1.4	-	-	2
	GLL07-02	2014-06-28	1.370	Dry	7.120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	19.8	3840	-	-	6
	GLL07-03	2014-06-27	1.150	10.031	11.745	3.483	5.0	15:15	15:39	0:24	0.21	3WV	10.89	6.19	4.5	1659	1014	103.7	5.32	95	0	20.9	1.42	22	Manual	2
	MW09-13	2014-06-27	0.760	Frozen	8.995	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.1	2540	-	-	2
	MW09-14	2014-06-27	0.750	Frozen	5.098	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.4	550	-	-	2
	MW09-15	2014-06-26	0.910	Frozen	14.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	1.41	-	-	2
Pony Creek	GSI-PC-01-A	2014-06-27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GSI-PC-01-B	2014-06-27	-	Destroyed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GSI-PC-02-A	2014-06-27	-	0.919	1.297	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.5	460	-	-	0.5
	GSI-PC-02-B	2014-06-27	-	Dry	1.285	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.5	490	-	-	0.5
	GSI-PC-03-A	2014-06-28	0.920	1.095	2.006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	470	-	-	0.5
	GSI-PC-03-B	2014-06-28	0.900	1.398	2.825	0.181	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.4	890	-	-	0.5
	GSI-PC-04-A	2014-06-28	0.890	-	1.262	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.5	490	-	-	0.5
	GSI-PC-04-B	2014-06-28	0.920	1.888	2.586	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.5	560	-	-	0.5
	GSI-PC-05-A	2014-06-28	0.920	-	1.306	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.5	470	-	-	0.5
	GSI-PC-05-B	2014-06-28	0.910	Dry	3.751	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.2	730	-	-	0.5
	MP09-01	2014-06-28	-	Unable to locate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	MP09-02	2014-06-27	1.360	1.228	1.970	0.100	2.5	9:45	10:38	0:53	0.05	3WV	-	7.22	3.3	522	304.9	75.8	5.4	24	0	20.5	450	1.96	Peristaltic	0.5
	MP09-03	2014-06-27	1.300	1.519	1.617	0.012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.6	430	-	-	0.5
	MP09-08	2014-06-27	1.500	0.892	1.975	0.125	2.2	14:10	14:40	0:30	0.07	3WV	-	7.12	2.9	720.3	416.6	-95.5	1.64	124	0	20.6	490	1.02	Peristaltic	0.5
Seepage Dam	W14103083BH01	2014-06-28	0.640	Frozen	6.646	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	521	-	-	2
	W14103083BH02	2014-06-28	0.800	6.897	7.920	2.070	0.5	8:49	8:54	0:05	0.10	-	-	7.46	3.4	2436	1429	-46.2	1.6	-	0	21.3	602	-	Peristaltic	2
	W14103083BH04	2014-06-28	0.800	Frozen	6.730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.6	520	-	-	2

Table 3-1 Groundwater Field Parameters and Well Measurements for 2014 Spring Sampling Program

Area	Location ID	Sample Date (yyyy-mm-dd)	Stick up Height (m)	Depth To Water (m)[1]	Depth to Bottom (m)	Standing Water Volume (L)	Volume Purged (L)	Purge Start Time	Purge End Time	Elapsed Purge Time	Purge Rate (l/min)	Criteria[1] (3WV/PS)	Draw Down (m)	pH	Temperature (°C)	Specific Conductance (µS/cm)	Conductivity, Uncorrected (µS/cm)	Redox, Uncorrected (mV)	Dissolved Oxygen (mg/L)	Dissolved Sulphide (µg/L)	Methane (%LEL)	Oxygen (%)	Carbon Dioxide (ppm)	Field Turbidity (NTU)	Method Used	Well Diameter (inches)
Tailing Facility	MP09-04	2014-06-28	1.200	2.034	3.070	2.110	7.0	11:04	11:39	0:35	0.20	3WV	2.15	7.04	3.6	1610	959	58.2	4.09	12	0	20.5	630	1.87	Peristaltic	2
	MP09-05	2014-06-28	1.200	1.414	1.820	0.450	1.5	16:47	16:59	0:12	0.13	3WV	1.58	6.75	8.5	2380	1723	-41.4	4.1	16	0	21.1	550	5.05	Peristaltic	1.5
	MP09-09	2014-06-29	2.240	2.924	5.630	2.980	3.5	9:15	9:30	0:15	0.23	3WV	5.3	9.66	5.8	275.4	174.3	-23.1	0.25	651	0	20.9	520	61	1" bailer	1.5
	MP09-10	2014-06-29	1.980	2.730	4.540	1.991	4.0	9:02	9:13	0:11	0.36	3WV	-	9.21	8.2	415.4	283	-46.7	7.04	-	0	20.9	520	-	1" bailer	1.5
	MP09-11	2014-06-29	1.740	2.211	4.950	3.010	3.5	8:09	8:29	0:20	0.18	3WV	4.2	7.54	5.1	804.7	498.7	-146.2	0.37	411	31	19.7	830	34	1" bailer	1.5
	MP09-12	2014-06-29	1.700	2.229	4.175	2.140	2.5	7:55	8:05	0:10	0.25	3WV	3.6	7.46	6.5	518	333.9	-91.7	5.93	279	0	20.9	580	82.7	1" bailer	1.5
	MP09-14	2014-06-27	1.070	1.342	1.971	0.080	<0.1	17:36	17:38	0:02		-	-	-	-	-	-	-	-	-	0	20.9	470	-	-	0.5
	MW09-01	2014-06-27	0.820	2.946	8.680	11.650	-	-	-	-		-	-	-	-	-	-	-	-	-	0	20.6	650	-	-	2
	MW09-02	2014-06-27	0.750	2.021	4.705	5.440	17.0	12:55	13:33	0:27	0.63	3WV	3.24	7.13	4.7	2670	1670	-92.1	0.14	23	0	20.6	650	16.9	Peristaltic	2
	MW09-03	2014-06-27	0.560	4.787	9.930	10.450	32.0	15:15	16:07	0:52	0.62	3WV	5.15	7.22	3.5	2526	1492	-24.1	0.76	17	0	20.9	601.3	1.58	Peristaltic	2
	MW09-04	2014-06-27	0.500	2.697	7.670	10.110	30.0	14:06	15:08	1:02	0.48	3WV	5.01	8.64	3.6	2666	154.3	-147.3	0.28	27	0	20.6	602	5.68	Peristaltic	2
	MW09-05	2014-06-28	-	Unable to access	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	MW09-06	2014-06-28	-	Unable to locate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	MW09-07	2014-06-29	1.350	2.461	3.397	1.900	1.5	16:35	16:45	0:10	0.15	3WV	3.222	6.80	5.7	2411	1542	102.4	3.1	294	0	20.9	460	32.2	Peristaltic	2
	MW09-08	2014-06-28	1.080	1.340	3.905	5.210	18.0	11:55	12:40	0:45	0.40	3WV	1.45	6.82	3.3	381.2	216.7	-96.7	1.41	92	0	20.0	520	2.02	Peristaltic	2
	MW09-11	2014-06-29	0.820	Dry	4.909	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.5	440	-	-	2
	MW09-20	2014-06-28	0.910	Dry	3.670	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.4	1100	-	-	2
	MW09-21	2014-06-28	0.720	1.568	3.576	4.080	14.0	17:17	17:55	0:38	0.37	3WV	2.02	6.82	2	2544	1430	-64.8	1.91	63	0	20.6	550	11.1	Peristaltic	2
	MW09-22	2014-06-27	0.880	4.194	5.235	2.120	6.5	16:19	16:44	0:45	0.14	3WV	5.05	5.82	3.7	2073	1684	58.3	2.58	26	4	2.05	950	10.54	Peristaltic	2
	MW09-23	2014-06-27	0.940	11.913	15.805	7.900	30.0	11:49	12:23	0:34	0.88	3WV	12.16	7.12	2.1	2612	1468	-64.7	4.32	90	0	20.6	620	30.1	Waterra	2
	MW09-24	2014-06-28	0.680	9.389	11.170	3.620	12	9:3	10:00	0:25	0.48	3WV	10.04	7.34	2.6	1198	761	3.3	5.77	84	0	20.5	610	11.3	Manual Waterra	2
	W14103083BH03	2014-06-27	0.760	1.842	1.942	0.200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	440	-	-	2
	CH-P-13-02	2014-06-27	-	8.125	8.200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: [1] Depth to Water (DTW) values for frozen or damaged wells indicates depth to ice or blockage.

3.2 ANALYTICAL RESULTS

The following section provides a summary and brief discussion of the program analytical results, including a brief summary of CCME FAL guideline exceedances and a description of factors that may have influenced results. Details regarding well status, including a description of damaged, destroyed, or underperforming wells, are also discussed. In numerous instances, the reported laboratory method detection limits (MDL) for parameters exceeded applicable CCME FAL standards (values *italicized* and shaded light grey in **Table A**). In these cases, samples having high levels of certain materials required laboratory dilution in order to perform the required analyses, and thereby resulting in an elevated MDL. For the purpose of this report, samples where the reported MDL is higher than the applicable guideline have not been reported as CCME FAL exceedances.

3.2.1 Dome Creek

Groundwater along Dome Creek was sampled between June 27 and June 29, 2014. Samples were obtained from four (4) of the nine (9) drive-point piezometers located within this area identified for the sampling program. Sample sites GSI-DC-01B, GSI-DC-02B, GSI-DC-03B, GSI-DC-05B produced insufficient groundwater volume to obtain a sample. The remaining site, drive-point GSI-DC-08-B, was frozen at the time of the sampling program.

Concentrations of dissolved aluminum, arsenic, chromium, and iron exceeded the CCME FAL guidelines at one or more sample location in the Dome Creek area (**Table A**). Concentrations of ammonia also exceeded the CCME FAL guidelines in various sample locations.

The measurement of in-situ headspace vapours was made difficult at the Dome Creek sample sites due to dedicated sampling tubing being present in these small diameter wells. There was no space in the well head to sample vapours until dedicated sampling equipment was removed, after which time well head gases may have dispersed.

The turbidity of all samples collected within the Dome Creek area was less than 50 NTU (**Table 3-1**).

3.2.2 Mill Complex

Groundwater in the Mill Complex Area was sampled between June 26 and June 29, 2014. Samples were obtained from four (4) of the nine (9) wells identified in this area. Drive-points GSI-HA-01A, GSI-HA-02A, GSI-HA-03A, GSI-HA-04A, and GSI-HA-05A produced insufficient groundwater volumes to be sampled.

Concentrations of dissolved arsenic, cadmium, copper, iron and zinc exceeded the CCME FAL guidelines at one or more sample location in Mill Complex area.

Monitoring well MW09-17 was damaged at the surface during the sampling program. This was communicated to AAM, who approved an on-site repair during the program. Accordingly, the well was repaired by attaching a coupling and new well pipe, and installing a new bentonite seal (see photos 15-21, in **Appendix A**). The steel monument was also re-installed and secured with concrete. The well was then re-developed (purged until almost dry) the following morning (~25L purged before parameters or sampling took place). Finally, sampling was completed once the well had time to settle. Well head gases were not measured due to the repair of this well.

Monitoring well MW09-18 had vents installed on the side of the PVC stand pipe, which is likely to have influenced *in-situ* gas concentrations.

The turbidity of all samples collected within this area was less than 50 NTU (**Table 3-1**).

3.2.3 Brown McDade Pit

Groundwater wells in the Brown McDade Pit Area were sampled between June 27 and June 28, 2014. Samples were obtained from three (3) of the 13 sample sites located within this area. Five (5) wells were frozen during the time of sampling (CH-P-13-01, GLL07-01, MW09-13, MW09-14 and MW09-15), one well was damaged (CH-P-13-03/10; broken at the surface), one well had an obstruction affecting the ability to sample (CH-P-13-04/35), one (1) well had insufficient well volume to sample (CH-P-13-04/10), and one (1) well was dry during the time of sampling (GLL07-02). Well MP14-01 was listed as a sample site in the scope of work but had not been installed at the time of sampling.

CH-P-13-03/10 was found to be broken at the top coupler of the PVC pipe. The wells casing material (sand) was missing and presumed to have fallen into the well, as evidenced by the DTB measurement of 5.136 m being less than that previously documented (10 m). CH-P-13-04/35 was found to have a blockage at 6.505 m below the surface. Based on the sound and feel of vibration on the water level meter, it appeared to the crew as though it may be a plastic obstruction like a bailer, but this could not be confirmed.

Concentrations of dissolved cadmium, copper, iron and zinc exceeded the CCME FAL guidelines at one or more sample location in the Brown McDade Pit area.

The crew had some difficulty confirming the location of well CH-P-13-03/50. Based on UTM coordinates and by the marking *CH-P-13-03* on the well cap, the correct well was assumed, although the outer casing of the well was labeled as CH-P-13-02. Field parameters were not measured at site CH-P-13-03/50 due to inability to purge, sample collected with 1" disposable bailer the following day.

Wells CH-P-13-05/50 and GLL07-03 were not properly sealed (no PVC caps or J-plugs were observed during initial inspection). These caps could not be replaced during this sampling event, but the replacement of caps has been included in the recommendations of this report. Also, groundwater turbidity in CH-P-13-03/50 was measured 70.1 NTU at the time of sample collection which is considered to be higher than optimal. The turbidity of CH-P-13-05/50 and GLL07-03 were within an acceptable range during the start of sample collection but became extremely cloudy during the collection of the general chemistry and dissolved metals samples.

3.2.4 Pony Creek

Groundwater wells along Pony Creek were sampled on June 27, 2014. Samples were obtained from two (2) of the nine (9) sample sites in this area during the sampling event. Two (2) wells were dry during the time of sampling (GSI-PC-02-B and GSI-PC-05-B), three (3) drive-points did not produce sufficient volume (GSI-PC-03-B, GSI-PC-04-B, and MP09-03), one (1) well was not located (MP09-01), and one (1) was destroyed by placer mining operations (GSI-PC-01-B).

Concentrations of dissolved arsenic and iron exceeded the CCME FAL guidelines at one or more sample location in this area.

It should be noted that UTM coordinates provided in the scope of work show sample sites MP09-01 and MP09-08 at the same location. Only a single drive-point was found by Hemmera/ELR at this location (MP09-08) and no site marked MP09-01 was identified either upstream or downstream of this site. Sample site GSI-PC-01-A/B was found removed from the stream bed in a location currently being excavated by placer mining operations (as expected based on information provided by AAM).

The turbidity of all samples collected within this area was less than 50 NTU (**Table 3-1**).

3.2.5 Seepage Dam

Groundwater wells in the Seepage Dam area were not sampled during the 2014 spring sampling event. Sample sites W14103083BH01 and W14103083BH04 were frozen at the time of sampling, and site W14103083BH02 did not produce sufficient sample volume.

3.2.6 Tailings Facility

Groundwater wells in the Tailings Facility area were sampled between June 27 and June 29, 2014. Samples were obtained from 15 of the 22 sample sites located in this area.

Two (2) wells were dry during the time of sampling (MW09-11 and MW09-20), two (2) wells produced insufficient sample volume (MP09-14 and W14103083BH03), one (1) well was not located (MW09-06), one (1) well was not accessible as it was within the wetted tailings pond (MW09-05), and one (1) well had

an obstruction that limited the ability to sample (MW09-01). Well MW09-06 had been listed in the SOW as not sampled in the fall of 2013 because it was submerged in the tailings pond, and this was assumed to be the reason that this well could not be located during the June 2013 program. At well MW09-01, an obstruction was noted at approximately 3m below the ground surface, and it was not possible to lower either 3/8" or 3/16" diameter tubing to the level of the water. The tubing lowered into the well had sediment on its end, suggesting that there is sediment/soil built up at this obstruction.

Concentrations of dissolved arsenic, cadmium, chromium, copper, iron, mercury, selenium, silver and zinc exceeded the CCME FAL guidelines at one or more sample location in this area. Groundwater pH in the tailings facility area was also outside of CCME FAL guidelines at sample site MP09-10. Concentrations of Ammonia in groundwater also exceeded the CCME FAL guidelines at several locations.

Wells MP09-09, MP09-10, MP09-12, and MW09-07 had vents installed on the side of the PVC well, which likely influenced in-situ gas measurements. Groundwater turbidity of samples collected from MP09-09 and MP09-12 were greater than the target limit of 50 NTU for sampling (61 and 82.7 NTU), indicating that suspended solids could potentially affect the sample quality. Field turbidity and in-situ sulphide was not measured in samples collected from MP09-10 due extremely high observed turbidity at the time of sampling. The turbidity of all other samples collected within this area was less than 50 NTU (**Table 3-1**).

3.3 QUALITY ASSURANCE AND QUALITY CONTROL RESULTS

A total of four (4) duplicate groundwater samples were collected during the spring sampling event. Two travel blanks were provided by the laboratory and accompanied the samples throughout the sampling program. One field blank was prepared on site for each consecutive day of sampling (4 field blanks in total). Detailed results of QA/QC sampling is provided in **Table B**, including RPD values for all duplicate and sample pairs collected.

Field blank and travel blank analytical results were reported as less than the MDL for all analysed parameters with the exception of a single detection of Molybdenum and Manganese in one sample (FB1). Both reported values were very close to detection limits (< two times MDL) and are not considered to represent sampling or laboratory error.

The RDP value for total cyanide between DUP-3 and MW09-02 was 51.6%, which exceeded the desired limit and suggests a potential error affecting data precision. In the field it was recorded that the PVC cap at site MW09-02 did not fit properly on the well, but no other condition or occurrence that would affect data precision was recorded in the field. The RPD for other parameters including other cyanide analysis was less than 20%; thus there does not seem to be a systemic bias. Sample variation is considered to be the likely cause of the single variable result for cyanide.

All other RDP values were within an acceptable range of variability (less than 20%).

4.0 RECOMMENDATIONS

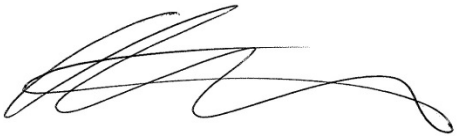
Hemmera/ELR has prepared the following recommendations based on the observations and results of the spring 2014 groundwater sampling program.

1. All groundwater wells should be properly sealed with PVC caps or J-plugs. Wells without caps have risk of becoming contaminated which may affect data precision or quality.
2. Damaged or degraded wells should be repaired. This includes wells where an obstruction is restricting ability to sample the well. Damaged or degraded wells include the following; CH-P-13-03/10, CH-P-13-04/35, and MW09-17. As stated in **Section 3.2.2**, well MW09-17 was found broken at the surface during the time of sampling. The well was repaired and re-developed (purged until almost dry) during the spring 2014 field event, although it should be re-developed the following season to ensure the well screen is free of fine particles.
3. Many of the drive-point piezometers included in the spring sampling event did not produce sufficient volumes necessary for sample collection. Issues with ice build-up were also observed at the drive-point sample locations. These sites should be re-developed and potentially re-installed if purge volumes do not improve. Alternatively, drive-point sites could be sampled later in the season (potentially early July) in order to ensure drive-points are free of ice.
4. Monitoring wells should be fitted for the measurement of in-situ headspace vapour. This would include installing PVC caps or J-plugs on each well, and addressing vents currently installed on the side of some of the PVC wells.
5. To avoid inclusion of acid or alkaline-generating solids that are not representative of an equilibrium condition with groundwater, it is recommended that samples for analysis of acidity, alkalinity, and hardness be field-filtered.
6. To avoid degassing of carbon dioxide, precipitation of calcium carbonate in sample bottles, and exclusion of the representative precipitate component from analysis, it is recommended that samples for analysis of alkalinity be collected in a separate bottle with zero headspace and that the laboratory be instructed to analyze the contents of the entire bottle.

5.0 CLOSURE

We have appreciated the opportunity of working with you on this project and trust that this report is satisfactory to your requirements. Please feel free to contact the undersigned regarding any questions or further information that you may require.

Report prepared by:
ELR



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6.0 REFERENCES

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7.0 STATEMENT OF LIMITATIONS

This report was prepared by Hemmera Envirochem Inc ("Hemmera"), based on fieldwork conducted by Hemmera, for the sole benefit and exclusive use of the Yukon Government. The material in it reflects Hemmera's best judgment in light of the information available to it at the time of preparing this Report. Any use that a third party makes of this Report, or any reliance on or decision made based on it, is the responsibility of such third parties. Hemmera accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this Report.

Hemmera has performed the work as described above and made the findings and conclusions set out in this Report in a manner consistent with the level of care and skill normally exercised by members of the environmental science profession practicing under similar conditions at the time the work was performed.

This Report represents a reasonable review of the information available to Hemmera within the established Scope, work schedule and budgetary constraints. It is possible that the levels of contamination or hazardous materials may vary across the Site, and hence currently unrecognised contamination or potentially hazardous materials may exist at the Site. No warranty, expressed or implied, is given concerning the presence or level of contamination on the Site, except as specifically noted in this Report. The conclusions and recommendations contained in this Report are based upon applicable legislation existing at the time the Report was drafted. Any changes in the legislation may alter the conclusions and/or recommendations contained in the Report. Regulatory implications discussed in this Report were based on the applicable legislation existing at the time this Report was written.

In preparing this Report, Hemmera has relied in good faith on information provided by others as noted in this Report, and has assumed that the information provided by those individuals is both factual and accurate. Hemmera accepts no responsibility for any deficiency, misstatement or inaccuracy in this Report resulting from the information provided by those individuals.

The liability of Hemmera to the Yukon Government shall be limited to injury or loss caused by the negligent acts of Hemmera. The total aggregate liability of Hemmera related to this agreement shall not exceed the lesser of the actual damages incurred, or the total fee of Hemmera for services rendered on this project.

TABLES

Table A
Groundwater Sampling Analytical Results

			Dome Creek								
		Sample ID:	GSI-DC-01B	GSI-DC-02B	GSI-DC-03B	GSI-DC-05B	GSI-DC-06-B	GSI-DC-07-B	GSI-DC-08-B	GSI-DC-09-B	GSI-DC-10-B
		Date Sampled:	-	-	-	-	29/06/2014	29/06/2014	-	29/06/2014	29/06/2014
		Job Number:					L1478849-16	L1478849-15		L1478849-11	L1478849-12
		Well Status:	Insufficient Volume	Insufficient Volume	Insufficient Volume	Insufficient Volume	Sampled	Sampled	Frozen	Sampled	Sampled
Parameter[1,2]	**Units**	**CCME FAL** [3,4]									
Field Tests											
Field Conductance, Specific	µs/cm	-	-	-	-	-	402	1088	-	1940	1212
Field Conductivity	µs/cm	-	-	-	-	-	250	628	-	1151	709
Field Dissolved Oxygen	mg/L	-	-	-	-	-	0.66	0.42	-	0.23	0.1
Field pH (pH Units)	pH Units	-	-	-	-	-	7.1	7.03	-	6.6	6.6
Field Redox, Uncorrected	mV	-	-	-	-	-	-78.5	-84.4	-	63.5	70.5
Field Sulfide	mg/L	-	-	-	-	-	0.032	1.179	-	0.032	0.04
Field Turbidity	NTU	-	-	-	-	-	12.81	11.79	-	27.6	13.9
Field Temperature	ºC	-	-	-	-	-	8.1	2.8	-	3.9	3.2
Physical Tests											
Conductivity	µs/cm	-	-	-	-	-	1260	1020	-	1510	1040
Hardness, Total (CaCO3)	mg/L	-	-	-	-	-	587	554	-	816	513
pH	pH Units	6.5-9 [5]	-	-	-	-	8.2	7.48	-	7.49	6.71
Anions and Nutrients											
Alkalinity, Total (CaCO3)	mg/L	-	-	-	-	-	204	131	-	145	72.1
Ammonia	mg/L	0.029-153 [6]	-	-	-	-	**2.92**	1.81	-	3.03	2.32
Chloride	mg/L	-	-	-	-	-	<5.000	<5.000	-	<5.000	<5.000
Fluoride	mg/L	0.12	-	-	-	-	*<0.200*	*<0.200*	-	*<0.200*	*<0.200*
Nitrate	mg/L	13	-	-	-	-	0.277	<0.050	-	<0.050	<0.050
Nitrite	mg/L	0.06	-	-	-	-	0.02	<0.010	-	<0.010	<0.010
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	-	6.67	2.27	-	4.47	3.63
Sulfate (SO4)	mg/L	-	-	-	-	-	583	466	-	820	519
Sulfide	mg/L	-	-	-	-	-	<0.020	<0.020	-	0.024	<0.020
Anion Sum	mEq/L	-	-	-	-	-	16.2	12.3	-	20	12.2
Cation Sum	mEq/L	-	-	-	-	-	14.2	13.9	-	22.4	16.4
Cation - Anion Balance	%	-	-	-	-	-	-6.8	6.1	-	5.7	14.4
Organic / Inorganic Carbon											
Total Organic Carbon	mg/L	-	-	-	-	-	74.3	13	-	29.5	29.6
Total Inorganic Carbon	mg/L	-	-	-	-	-	19.7	17.2	-	29.9	13.6
Cyanides											
Total Cynanide	mg/L	-	-	-	-	-	<0.005	<0.005	-	0.0099	<0.005
Cyanide, Free	mg/L	0.005	-	-	-	-	<0.005	<0.005	-	<0.005	<0.005
Cyanide, WAD	mg/L	-	-	-	-	-	<0.005	<0.005	-	<0.005	<0.005
Thiocyanate (SCN)	mg/L	-	-	-	-	-	<0.5	<0.5	-	0.52	0.7

Table A
Groundwater Sampling Analytical Results

			Dome Creek								
		Sample ID:	GSI-DC-01B	GSI-DC-02B	GSI-DC-03B	GSI-DC-05B	GSI-DC-06-B	GSI-DC-07-B	GSI-DC-08-B	GSI-DC-09-B	GSI-DC-10-B
		Date Sampled:	-	-	-	-	29/06/2014	29/06/2014	-	29/06/2014	29/06/2014
		Job Number:					L1478849-16	L1478849-15		L1478849-11	L1478849-12
		Well Status:	Insufficient Volume	Insufficient Volume	Insufficient Volume	Insufficient Volume	Sampled	Sampled	Frozen	Sampled	Sampled
Parameter[1,2]	**Units**	**CCME FAL** [3,4]									
Dissolved Metals											
Aluminum	mg/L	0.005-0.1 [7]	-	-	-	-	0.0507	0.0087	-	0.0205	**0.142**
Antimony	mg/L	-	-	-	-	-	0.00034	0.0002	-	0.00033	0.00031
Arsenic	mg/L	0.005	-	-	-	-	**0.303**	**0.167**	-	**0.0361**	**0.0931**
Barium	mg/L	-	-	-	-	-	0.22	0.158	-	0.0702	0.443
Beryllium	mg/L	-	-	-	-	-	<0.0001	<0.0001	-	<0.0001	<0.0001
Bismuth	mg/L	-	-	-	-	-	<0.0005	<0.0005	-	<0.0005	<0.0005
Boron	mg/L	1.5	-	-	-	-	0.014	0.012	-	0.015	<0.01
Cadmium	mg/L	0.00021-0.00037 [8]	-	-	-	-	<0.00001	<0.00001	-	<0.00001	0.000011
Calcium	mg/L	-	-	-	-	-	143	153	-	199	147
Chromium[12]	mg/L	0.001	-	-	-	-	**0.00472**	0.00035	-	0.00049	**0.00207**
Cobalt	mg/L	-	-	-	-	-	0.00282	0.00298	-	0.0034	0.0153
Copper	mg/L	0.00313-0.004 [9]	-	-	-	-	<0.0002	<0.0002	-	0.00024	<0.0002
Iron	mg/L	0.3	-	-	-	-	**20.5**	**31.5**	-	**61.7**	**82.4**
Lead	mg/L	0.00484-0.007 [10]	-	-	-	-	0.000055	<0.00005	-	<0.00005	0.000139
Lithium	mg/L	-	-	-	-	-	<0.0005	0.00167	-	0.00059	0.00054
Magnesium	mg/L	-	-	-	-	-	55.5	41.5	-	77.7	35.5
Manganese	mg/L	-	-	-	-	-	4.87	2.41	-	1.97	11
Mercury	mg/L	0.000026	-	-	-	-	<0.00001	<0.00001	-	<0.00001	<0.00001
Molybdenum	mg/L	0.073	-	-	-	-	0.0096	0.000363	-	0.000346	0.000565
Nickel	mg/L	0.12276-0.180 [11]	-	-	-	-	0.0194	0.00103	-	0.00176	0.00386
Phosphorus	mg/L	-	-	-	-	-	0.159	0.061	-	0.142	<0.050
Potassium	mg/L	-	-	-	-	-	3.53	3.25	-	3.9	2.54
Selenium	mg/L	0.001	-	-	-	-	0.00051	<0.0001	-	0.00027	0.00023
Silicon	mg/L	-	-	-	-	-	10.1	6.95	-	6.51	8.18
Silver	mg/L	0.0001	-	-	-	-	<0.00001	<0.00001	-	<0.00001	<0.00001
Sodium	mg/L	-	-	-	-	-	19.7	20	-	54.4	24.3
Strontium	mg/L	-	-	-	-	-	0.726	0.474	-	0.633	0.555
Sulfur	mg/L	-	-	-	-	-	1.61	148	-	246	162
Thallium	mg/L	0.0008	-	-	-	-	<0.00001	<0.00001	-	<0.00001	0.000016
Tin	mg/L	-	-	-	-	-	<0.0001	<0.0001	-	<0.0001	<0.0001
Titanium	mg/L	-	-	-	-	-	<0.01	<0.01	-	<0.01	<0.01
Uranium	mg/L	0.015	-	-	-	-	0.000084	0.000067	-	0.000157	0.000294
Vanadium	mg/L	-	-	-	-	-	0.0131	0.0013	-	0.0017	0.0107
Zinc	mg/L	0.03	-	-	-	-	0.0063	0.0012	-	0.0024	0.0088

Table A
Groundwater Sampling Analytical Results

			Mill Complex								
		Sample ID:	GSI-HA-01A	GSI-HA-02A	GSI-HA-03A	GSI-HA-04A	GSI-HA-05A	MW09-16	MW09-17	MW09-18	MW09-19
		Date Sampled:	-	-	-	-	-	26/06/2014	29/06/2014	26/06/2014	26/06/2014
		Job Number:						:L1478694-8	L1478849-19	L1478694-10	L1478694-6
		Well Status:	Insufficient Volume	Insufficient Volume	Insufficient Volume	Insufficient Volume	Insufficient Volume	Sampled	Sampled	Sampled	Sampled
Parameter[1,2]	**Units**	**CCME FAL** [3,4]									
Field Tests											
Field Conductance, Specific	µs/cm	-	-	-	-	-	-	1695	2788	1434	2327
Field Conductivity	µs/cm	-	-	-	-	-	-	1040	1594	2590	1285
Field Dissolved Oxygen	mg/L	-	-	-	-	-	-	3.62	0.08	0.8	2.19
Field pH (pH Units)	pH Units	-	-	-	-	-	-	6.67	6.8	7.01	6.76
Field Redox, Uncorrected	mV	-	-	-	-	-	-	136.6	124	31.3	-86.7
Field Sulfide	mg/L	-	-	-	-	-	-	0.003	0.014	0.042	0.125
Field Turbidity	NTU	-	-	-	-	-	-	3.86	3.47	6.49	2.46
Field Temperature	ºC	-	-	-	-	-	-	4.8	2.6	1.5	1.6
Physical Tests											
Conductivity	µs/cm	-	-	-	-	-	-	1710	2800	2580	2290
Hardness, Total (CaCO3)	mg/L	-	-	-	-	-	-	1130	2010	1860	1530
pH	pH Units	6.5-9 [5]	-	-	-	-	-	7.74	7.94	7.81	7.54
Anions and Nutrients											
Alkalinity, Total (CaCO3)	mg/L	-	-	-	-	-	-	312	451	464	443
Ammonia	mg/L	0.029-153 [6]	-	-	-	-	-	<0.005	<0.005	0.0231	2.05
Chloride	mg/L	-	-	-	-	-	-	<5.000	<10.000	<10.000	<10.000
Fluoride	mg/L	0.12	-	-	-	-	-	*<0.200*	*<0.400*	*<0.400*	*<0.400*
Nitrate	mg/L	13	-	-	-	-	-	0.247	0.11	<0.100	<0.100
Nitrite	mg/L	0.06	-	-	-	-	-	<0.010	<0.020	<0.020	<0.020
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	-	-	0.121	0.092	0.137	2.99
Sulfate (SO4)	mg/L	-	-	-	-	-	-	835	1590	1410	1130
Sulfide	mg/L	-	-	-	-	-	-	<0.020	<0.020	<0.020	0.195
Anion Sum	mEq/L	-	-	-	-	-	-	23.6	42	38.7	32.5
Cation Sum	mEq/L	-	-	-	-	-	-	23.1	40.9	37.8	32.8
Cation - Anion Balance	%	-	-	-	-	-	-	-1.1	-1.4	-1.1	0.4
Organic / Inorganic Carbon											
Total Organic Carbon	mg/L	-	-	-	-	-	-	2.96	2.49	2.57	13.1
Total Inorganic Carbon	mg/L	-	-	-	-	-	-	63.9	108	102	98.1
Cyanides											
Total Cynanide	mg/L	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005
Cyanide, Free	mg/L	0.005	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005
Cyanide, WAD	mg/L	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005
Thiocyanate (SCN)	mg/L	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5

Table A
Groundwater Sampling Analytical Results

			Mill Complex								
		Sample ID:	GSI-HA-01A	GSI-HA-02A	GSI-HA-03A	GSI-HA-04A	GSI-HA-05A	MW09-16	MW09-17	MW09-18	MW09-19
		Date Sampled:	-	-	-	-	-	26/06/2014	29/06/2014	26/06/2014	26/06/2014
		Job Number:						:L1478694-8	L1478849-19	L1478694-10	L1478694-6
		Well Status:	Insufficient Volume	Insufficient Volume	Insufficient Volume	Insufficient Volume	Insufficient Volume	Sampled	Sampled	Sampled	Sampled
Parameter[1,2]	**Units**	**CCME FAL** [3,4]									
Dissolved Metals											
Aluminum	mg/L	0.005-0.1 [7]	-	-	-	-	-	0.0023	<0.002	<0.002	0.0109
Antimony	mg/L	-	-	-	-	-	-	0.0634	0.00043	0.00022	<0.0002
Arsenic	mg/L	0.005	-	-	-	-	-	**0.00902**	**0.0207**	**0.0537**	**0.0779**
Barium	mg/L	-	-	-	-	-	-	0.0137	0.00842	0.0083	0.0488
Beryllium	mg/L	-	-	-	-	-	-	<0.0001	<0.0002	<0.0002	<0.0002
Bismuth	mg/L	-	-	-	-	-	-	<0.0005	<0.001	<0.001	<0.001
Boron	mg/L	1.5	-	-	-	-	-	0.131	0.096	<0.02	0.437
Cadmium	mg/L	0.00021-0.00037 [8]	-	-	-	-	-	**0.0249**	*<0.00002*	0.000058	*<0.00002*
Calcium	mg/L	-	-	-	-	-	-	262	367	357	326
Chromium[12]	mg/L	0.001	-	-	-	-	-	<0.0001	<0.0002	<0.0002	<0.0002
Cobalt	mg/L	-	-	-	-	-	-	0.00018	<0.0002	<0.0002	0.00204
Copper	mg/L	0.00313-0.004 [9]	-	-	-	-	-	**0.00558**	0.00056	<0.0004	<0.0004
Iron	mg/L	0.3	-	-	-	-	-	<0.01	<0.01	<0.01	**18.5**
Lead	mg/L	0.00484-0.007 [10]	-	-	-	-	-	0.0069	<0.0001	<0.0001	<0.0001
Lithium	mg/L	-	-	-	-	-	-	0.0086	0.0201	0.0202	0.0108
Magnesium	mg/L	-	-	-	-	-	-	115	266	235	174
Manganese	mg/L	-	-	-	-	-	-	0.0321	0.0369	0.375	4.54
Mercury	mg/L	0.000026	-	-	-	-	-	<0.00001	<0.00001	<0.00001	<0.00001
Molybdenum	mg/L	0.073	-	-	-	-	-	0.000089	<0.0001	<0.0001	0.00012
Nickel	mg/L	0.12276-0.180 [11]	-	-	-	-	-	0.00328	<0.001	<0.001	<0.001
Phosphorus	mg/L	-	-	-	-	-	-	<0.050	<0.050	<0.050	0.234
Potassium	mg/L	-	-	-	-	-	-	5.95	7.58	7.29	7.38
Selenium	mg/L	0.001	-	-	-	-	-	<0.0001	<0.0002	<0.0002	0.00034
Silicon	mg/L	-	-	-	-	-	-	4.78	5	4.85	9.3
Silver	mg/L	0.0001	-	-	-	-	-	<0.00001	<0.00002	<0.00002	<0.00002
Sodium	mg/L	-	-	-	-	-	-	7.08	11.7	10.7	14.7
Strontium	mg/L	-	-	-	-	-	-	0.586	1.1	1.08	1.16
Sulfur	mg/L	-	-	-	-	-	-	258	482	439	353
Thallium	mg/L	0.0008	-	-	-	-	-	0.00025	0.000103	0.00028	<0.00002
Tin	mg/L	-	-	-	-	-	-	<0.0001	<0.0002	<0.0002	<0.0002
Titanium	mg/L	-	-	-	-	-	-	<0.01	<0.02	<0.02	<0.02
Uranium	mg/L	0.015	-	-	-	-	-	0.00304	0.00794	0.00781	0.00056
Vanadium	mg/L	-	-	-	-	-	-	<0.001	<0.002	<0.002	<0.002
Zinc	mg/L	0.03	-	-	-	-	-	**3.84**	<0.002	0.003	<0.002

Table A
Groundwater Sampling Analytical Results

			Brown McDade Pit												
		Sample ID:	CH-P-13-01	CH-P-13-03/10	CH-P-13-03/50	CH-P-13-04/10	CH-P-13-04/35	CH-P-13-05/50	GLL07-01	GLL07-02	GLL07-03	MP14-01	MW09-13	MW09-14	MW09-15
		Date Sampled:	-	-	28/06/2014	-	-	27/06/2014	-	-	27/06/2014	-	-	-	-
		Job Number:			L1478849-3			L1478694-1			L1478694-5				
		Well Status:	Frozen	Damaged	Sampled	Insufficient Volume	Obstruction	Sampled	Frozen	Dry	Sampled	Not Installed	Frozen	Frozen	Frozen
Parameter[1,2]	**Units**	**CCME FAL** [3,4]													
Field Tests															
Field Conductance, Specific	µs/cm	-	-	-	-	-	-	2864	-	-	1659	-	-	-	-
Field Conductivity	µs/cm	-	-	-	-	-	-	1640	-	-	1014	-	-	-	-
Field Dissolved Oxygen	mg/L	-	-	-	-	-	-	2.53	-	-	5.32	-	-	-	-
Field pH (pH Units)	pH Units	-	-	-	-	-	-	6.27	-	-	6.19	-	-	-	-
Field Redox, Uncorrected	mV	-	-	-	-	-	-	122.4	-	-	103.7	-	-	-	-
Field Sulfide	mg/L	-	-	-	-	-	-	0.434	-	-	0.095	-	-	-	-
Field Turbidity	NTU	-	-	-	70.1	-	-	24.1	-	-	22	-	-	-	-
Field Temperature	ºC	-	-	-	-	-	-	2.6	-	-	4.5	-	-	-	-
Physical Tests															
Conductivity	µs/cm	-	-	-	2130	-	-	2690	-	-	1640	-	-	-	-
Hardness, Total (CaCO3)	mg/L	-	-	-	1040	-	-	1810	-	-	974	-	-	-	-
pH	pH Units	6.5-9 [5]	-	-	8.07	-	-	7.05	-	-	7.15	-	-	-	-
Anions and Nutrients															
Alkalinity, Total (CaCO3)	mg/L	-	-	-	338	-	-	116	-	-	74.8	-	-	-	-
Ammonia	mg/L	0.029-153 [6]	-	-	0.153	-	-	0.0349	-	-	0.185	-	-	-	-
Chloride	mg/L	-	-	-	21	-	-	<10.000	-	-	<5.000	-	-	-	-
Fluoride	mg/L	0.12	-	-	*<0.400*	-	-	*<0.400*	-	-	*<0.200*	-	-	-	-
Nitrate	mg/L	13	-	-	<0.100	-	-	0.42	-	-	<0.050	-	-	-	-
Nitrite	mg/L	0.06	-	-	<0.020	-	-	<0.020	-	-	<0.010	-	-	-	-
Total Kjeldahl Nitrogen	mg/L	-	-	-	3.2	-	-	0.121	-	-	0.65	-	-	-	-
Sulfate (SO4)	mg/L	-	-	-	1050	-	-	1850	-	-	991	-	-	-	-
Sulfide	mg/L	-	-	-	0.027	-	-	<0.020	-	-	0.384	-	-	-	-
Anion Sum	mEq/L	-	-	-	29.3	-	-	40.9	-	-	22.1	-	-	-	-
Cation Sum	mEq/L	-	-	-	27.4	-	-	39.1	-	-	21.5	-	-	-	-
Cation - Anion Balance	%	-	-	-	-3.3	-	-	-2.3	-	-	-1.5	-	-	-	-
Organic / Inorganic Carbon															
Total Organic Carbon	mg/L	-	-	-	28.9	-	-	2.05	-	-	3.6	-	-	-	-
Total Inorganic Carbon	mg/L	-	-	-	78.4	-	-	16.5	-	-	9.95	-	-	-	-
Cyanides															
Total Cynanide	mg/L	-	-	-	0.0088	-	-	<0.005	-	-	<0.005	-	-	-	-
Cyanide, Free	mg/L	0.005	-	-	<0.005	-	-	<0.005	-	-	<0.005	-	-	-	-
Cyanide, WAD	mg/L	-	-	-	<0.005	-	-	<0.005	-	-	<0.005	-	-	-	-
Thiocyanate (SCN)	mg/L	-	-	-	<0.5	-	-	<0.5	-	-	<0.5	-	-	-	-

Table A
Groundwater Sampling Analytical Results

			Brown McDade Pit												
		Sample ID:	CH-P-13-01	CH-P-13-03/10	CH-P-13-03/50	CH-P-13-04/10	CH-P-13-04/35	CH-P-13-05/50	GLL07-01	GLL07-02	GLL07-03	MP14-01	MW09-13	MW09-14	MW09-15
		Date Sampled:	-	-	28/06/2014	-	-	27/06/2014	-	-	27/06/2014	-	-	-	-
		Job Number:			L1478849-3			L1478694-1			L1478694-5				
		Well Status:	Frozen	Damaged	Sampled	Insufficient Volume	Obstruction	Sampled	Frozen	Dry	Sampled	Not Installed	Frozen	Frozen	Frozen
Parameter[1,2]	**Units**	**CCME FAL** [3,4]													
Dissolved Metals															
Aluminum	mg/L	0.005-0.1 [7]	-	-	0.0115	-	-	0.0444	-	-	0.0344	-	-	-	-
Antimony	mg/L	-	-	-	0.00105	-	-	<0.0005	-	-	<0.0005	-	-	-	-
Arsenic	mg/L	0.005	-	-	0.00422	-	-	0.00284	-	-	<0.0005	-	-	-	-
Barium	mg/L	-	-	-	0.0447	-	-	0.0111	-	-	0.00967	-	-	-	-
Beryllium	mg/L	-	-	-	<0.0002	-	-	<0.0005	-	-	<0.0005	-	-	-	-
Bismuth	mg/L	-	-	-	<0.001	-	-	<0.0025	-	-	<0.0025	-	-	-	-
Boron	mg/L	1.5	-	-	0.04	-	-	<0.05	-	-	<0.05	-	-	-	-
Cadmium	mg/L	0.00021-0.00037 [8]	-	-	0.000134	-	-	**0.271**	-	-	**0.945**	-	-	-	-
Calcium	mg/L	-	-	-	268	-	-	449	-	-	294	-	-	-	-
Chromium[12]	mg/L	0.001	-	-	<0.0002	-	-	<0.0005	-	-	<0.0005	-	-	-	-
Cobalt	mg/L	-	-	-	0.0212	-	-	0.0322	-	-	0.0238	-	-	-	-
Copper	mg/L	0.00313-0.004 [9]	-	-	0.00095	-	-	**0.131**	-	-	<0.001	-	-	-	-
Iron	mg/L	0.3	-	-	**1.72**	-	-	**7.72**	-	-	**1.75**	-	-	-	-
Lead	mg/L	0.00484-0.007 [10]	-	-	0.00027	-	-	0.00396	-	-	0.00049	-	-	-	-
Lithium	mg/L	-	-	-	0.0035	-	-	0.0319	-	-	0.0245	-	-	-	-
Magnesium	mg/L	-	-	-	90.7	-	-	167	-	-	58.4	-	-	-	-
Manganese	mg/L	-	-	-	16.7	-	-	30.4	-	-	10.4	-	-	-	-
Mercury	mg/L	0.000026	-	-	<0.00001	-	-	<0.00001	-	-	<0.00001	-	-	-	-
Molybdenum	mg/L	0.073	-	-	0.00404	-	-	0.00076	-	-	0.00043	-	-	-	-
Nickel	mg/L	0.12276-0.180 [11]	-	-	0.0339	-	-	0.0136	-	-	0.0499	-	-	-	-
Phosphorus	mg/L	-	-	-	<0.050	-	-	<0.050	-	-	<0.050	-	-	-	-
Potassium	mg/L	-	-	-	8.84	-	-	5.18	-	-	2.45	-	-	-	-
Selenium	mg/L	0.001	-	-	0.00089	-	-	<0.0005	-	-	<0.0005	-	-	-	-
Silicon	mg/L	-	-	-	7.15	-	-	6.6	-	-	3.32	-	-	-	-
Silver	mg/L	0.0001	-	-	<0.00002	-	-	<0.00005	-	-	<0.00005	-	-	-	-
Sodium	mg/L	-	-	-	131	-	-	11	-	-	11	-	-	-	-
Strontium	mg/L	-	-	-	0.777	-	-	0.647	-	-	0.334	-	-	-	-
Sulfur	mg/L	-	-	-	316	-	-	589	-	-	313	-	-	-	-
Thallium	mg/L	0.0008	-	-	0.000029	-	-	0.000458	-	-	0.000391	-	-	-	-
Tin	mg/L	-	-	-	0.00107	-	-	<0.0005	-	-	<0.0005	-	-	-	-
Titanium	mg/L	-	-	-	<0.02	-	-	<0.05	-	-	<0.05	-	-	-	-
Uranium	mg/L	0.015	-	-	0.00809	-	-	0.000931	-	-	0.000117	-	-	-	-
Vanadium	mg/L	-	-	-	<0.002	-	-	<0.005	-	-	<0.005	-	-	-	-
Zinc	mg/L	0.03	-	-	**0.0317**	-	-	**28.2**	-	-	**32**	-	-	-	-

Table A
Groundwater Sampling Analytical Results

			Pony Creek									Seepage Dam		
		Sample ID:	GSI-PC-01-B	GSI-PC-02-B	GSI-PC-03-B	GSI-PC-04-B	GSI-PC-05-B	MP09-01	MP09-02	MP09-03	MP09-08	W14103083BH01	W14103083BH02	W14103083BH04
		Date Sampled:	-	-	-	-	-	-	27/06/2014	-	27/06/2014	-	-	-
		Job Number:							L1478694-4		L1478694-3			
		Well Status:	Destroyed	Dry	Insufficient Volume	Insufficient Volume	Dry	Unable to locate	Sampled	Insufficient Volume	Sampled	Frozen	Insufficient Volume	Frozen
Parameter[1,2]	**Units**	**CCME FAL** [3,4]												
Field Tests														
Field Conductance, Specific	µs/cm	-	-	-	-	-	-	-	522	-	720.3	-	-	-
Field Conductivity	µs/cm	-	-	-	-	-	-	-	304.9	-	416.6	-	-	-
Field Dissolved Oxygen	mg/L	-	-	-	-	-	-	-	5.4	-	1.64	-	-	-
Field pH (pH Units)	pH Units	-	-	-	-	-	-	-	7.22	-	7.12	-	-	-
Field Redox, Uncorrected	mV	-	-	-	-	-	-	-	75.8	-	-95.5	-	-	-
Field Sulfide	mg/L	-	-	-	-	-	-	-	0.024	-	0.124	-	-	-
Field Turbidity	NTU	-	-	-	-	-	-	-	1.96	-	1.02	-	-	-
Field Temperature	ºC	-	-	-	-	-	-	-	3.3	-	2.9	-	-	-
Physical Tests														
Conductivity	µs/cm	-	-	-	-	-	-	-	512	-	705	-	-	-
Hardness, Total (CaCO3)	mg/L	-	-	-	-	-	-	-	276	-	408	-	-	-
pH	pH Units	6.5-9 [5]	-	-	-	-	-	-	7.99	-	8.05	-	-	-
Anions and Nutrients														
Alkalinity, Total (CaCO3)	mg/L	-	-	-	-	-	-	-	121	-	226	-	-	-
Ammonia	mg/L	0.029-153 [6]	-	-	-	-	-	-	0.0055	-	0.0309	-	-	-
Chloride	mg/L	-	-	-	-	-	-	-	<0.500	-	<0.500	-	-	-
Fluoride	mg/L	0.12	-	-	-	-	-	-	0.061	-	0.078	-	-	-
Nitrate	mg/L	13	-	-	-	-	-	-	0.0717	-	<0.005	-	-	-
Nitrite	mg/L	0.06	-	-	-	-	-	-	<0.001	-	<0.001	-	-	-
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	-	-	-	0.251	-	0.247	-	-	-
Sulfate (SO4)	mg/L	-	-	-	-	-	-	-	159	-	180	-	-	-
Sulfide	mg/L	-	-	-	-	-	-	-	<0.020	-	0.108	-	-	-
Anion Sum	mEq/L	-	-	-	-	-	-	-	5.74	-	8.27	-	-	-
Cation Sum	mEq/L	-	-	-	-	-	-	-	5.74	-	8.53	-	-	-
Cation - Anion Balance	%	-	-	-	-	-	-	-	0	-	1.5	-	-	-
Organic / Inorganic Carbon														
Total Organic Carbon	mg/L	-	-	-	-	-	-	-	6.39	-	5.01	-	-	-
Total Inorganic Carbon	mg/L	-	-	-	-	-	-	-	25.3	-	49.5	-	-	-
Cyanides														
Total Cynanide	mg/L	-	-	-	-	-	-	-	<0.005	-	<0.005	-	-	-
Cyanide, Free	mg/L	0.005	-	-	-	-	-	-	<0.005	-	<0.005	-	-	-
Cyanide, WAD	mg/L	-	-	-	-	-	-	-	<0.005	-	<0.005	-	-	-
Thiocyanate (SCN)	mg/L	-	-	-	-	-	-	-	<0.5	-	<0.5	-	-	-

Table A
Groundwater Sampling Analytical Results

			Pony Creek									Seepage Dam		
		Sample ID:	GSI-PC-01-B	GSI-PC-02-B	GSI-PC-03-B	GSI-PC-04-B	GSI-PC-05-B	MP09-01	MP09-02	MP09-03	MP09-08	W14103083BH01	W14103083BH02	W14103083BH04
		Date Sampled:	-	-	-	-	-	-	27/06/2014	-	27/06/2014	-	-	-
		Job Number:							L1478694-4		L1478694-3			
		Well Status:	Destroyed	Dry	Insufficient Volume	Insufficient Volume	Dry	Unable to locate	Sampled	Insufficient Volume	Sampled	Frozen	Insufficient Volume	Frozen
Parameter[1,2]	**Units**	**CCME FAL** [3,4]												
Dissolved Metals														
Aluminum	mg/L	0.005-0.1 [7]	-	-	-	-	-	-	0.0056	-	0.0038	-	-	-
Antimony	mg/L	-	-	-	-	-	-	-	0.00067	-	<0.0001	-	-	-
Arsenic	mg/L	0.005	-	-	-	-	-	-	0.00156	-	**0.0111**	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	0.0553	-	0.043	-	-	-
Beryllium	mg/L	-	-	-	-	-	-	-	<0.0001	-	<0.0001	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	<0.0005	-	<0.0005	-	-	-
Boron	mg/L	1.5	-	-	-	-	-	-	<0.01	-	<0.01	-	-	-
Cadmium	mg/L	0.00021-0.00037 [8]	-	-	-	-	-	-	0.000054	-	<0.00001	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	81.3	-	113	-	-	-
Chromium[12]	mg/L	0.001	-	-	-	-	-	-	<0.0001	-	<0.0001	-	-	-
Cobalt	mg/L	-	-	-	-	-	-	-	0.00015	-	0.00056	-	-	-
Copper	mg/L	0.00313-0.004 [9]	-	-	-	-	-	-	0.0008	-	<0.0002	-	-	-
Iron	mg/L	0.3	-	-	-	-	-	-	0.041	-	**0.795**	-	-	-
Lead	mg/L	0.00484-0.007 [10]	-	-	-	-	-	-	<0.00005	-	<0.00005	-	-	-
Lithium	mg/L	-	-	-	-	-	-	-	0.00091	-	0.00395	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	17.8	-	30.9	-	-	-
Manganese	mg/L	-	-	-	-	-	-	-	0.013	-	0.852	-	-	-
Mercury	mg/L	0.000026	-	-	-	-	-	-	<0.00001	-	<0.00001	-	-	-
Molybdenum	mg/L	0.073	-	-	-	-	-	-	0.000126	-	0.000477	-	-	-
Nickel	mg/L	0.12276-0.180 [11]	-	-	-	-	-	-	<0.0005	-	<0.0005	-	-	-
Phosphorus	mg/L	-	-	-	-	-	-	-	<0.050	-	<0.050	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	0.86	-	1.16	-	-	-
Selenium	mg/L	0.001	-	-	-	-	-	-	<0.0001	-	<0.0001	-	-	-
Silicon	mg/L	-	-	-	-	-	-	-	5.48	-	7	-	-	-
Silver	mg/L	0.0001	-	-	-	-	-	-	<0.00001	-	<0.00001	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	4.55	-	6.16	-	-	-
Strontium	mg/L	-	-	-	-	-	-	-	0.652	-	1.29	-	-	-
Sulfur	mg/L	-	-	-	-	-	-	-	53.2	-	60.9	-	-	-
Thallium	mg/L	0.0008	-	-	-	-	-	-	<0.00001	-	<0.00001	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	<0.0001	-	<0.0001	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	<0.01	-	<0.01	-	-	-
Uranium	mg/L	0.015	-	-	-	-	-	-	0.00134	-	0.00316	-	-	-
Vanadium	mg/L	-	-	-	-	-	-	-	<0.001	-	<0.001	-	-	-
Zinc	mg/L	0.03	-	-	-	-	-	-	0.0033	-	0.0012	-	-	-

Table A
Groundwater Sampling Analytical Results

			Tailings Facility and Seepage Pond											
		Sample ID:	MP09-04	MP09-05	MP09-09	MP09-10	MP09-11	MP09-12	MP09-14	MW09-01	MW09-02	MW09-03	MW09-04	MW09-05
		Date Sampled:	28/06/2014	28/06/2014	29/06/2014	29/06/2014	29/06/2014	29/06/2014	-	-	27/06/2014	27/06/2014	27/06/2014	-
		Job Number:	L1478849-4	L1478849-2	L1478849-17	L1478849-21	L1478849-18	L1478849-14			L1478694-12	L1478694-14	L1478694-11	
		Well Status:	Sampled	Sampled	Sampled	Sampled	Sampled	Sampled	Insufficient Volume	Obstruction	Sampled	Sampled	Sampled	Unable to Access
Parameter[1,2]	**Units**	**CCME FAL** [3,4]												
Field Tests														
Field Conductance, Specific	µs/cm	-	1610	2380	275.4	415.4	804.7	518	-	-	2670	2526	2666	-
Field Conductivity	µs/cm	-	959	1723	174.3	283	498.7	333.9	-	-	1670	1492	154.3	-
Field Dissolved Oxygen	mg/L	-	4.09	4.1	0.25	7.04	0.37	5.93	-	-	0.14	0.76	0.28	-
Field pH (pH Units)	pH Units	-	7.04	6.75	9.66	9.21	7.54	7.46	-	-	7.13	7.22	8.64	-
Field Redox, Uncorrected	mV	-	58.2	-41.4	-23.1	-46.7	-146.2	-91.7	-	-	-92.1	-24.1	-147.3	-
Field Sulfide	mg/L	-	0.012	0.016	0.651	-	0.411	0.279	-	-	0.023	0.017	0.027	-
Field Turbidity	NTU	-	1.87	5.05	61	-	34	82.7	-	-	16.9	1.58	5.68	-
Field Temperature	ºC	-	3.6	8.5	5.8	8.2	5.1	6.5	-	-	4.7	3.5	3.6	-
Physical Tests														
Conductivity	µs/cm	-	1630	2360	489	683	888	746	-	-	2840	2520	2680	-
Hardness, Total (CaCO3)	mg/L	-	1070	1360	197	280	485	444	-	-	1580	1560	1720	-
pH	pH Units	6.5-9 [5]	7.92	7.68	8.74	**9.07**	8.14	8.16	-	-	6.96	7.84	7.96	-
Anions and Nutrients														
Alkalinity, Total (CaCO3)	mg/L	-	243	330	80.2	108	581	429	-	-	34.5	155	97.6	-
Ammonia	mg/L	0.029-153 [6]	0.0056	8.16	**4.12**	**7.74**	**5.03**	**3.91**	-	-	**12.1**	2.37	**6.82**	-
Chloride	mg/L	-	<5.000	<10.000	2.5	2.84	<5.000	<0.500	-	-	<10.000	<10.000	<10.000	-
Fluoride	mg/L	0.12	*<0.200*	*<0.400*	**1.65**	**1.63**	**0.49**	**0.356**	-	-	**0.47**	*<0.400*	*<0.400*	-
Nitrate	mg/L	13	0.478	1.66	0.0191	0.0306	<0.050	0.0218	-	-	<0.100	<0.100	0.31	-
Nitrite	mg/L	0.06	<0.010	0.035	0.0063	0.0023	<0.010	0.0017	-	-	<0.020	<0.020	0.059	-
Total Kjeldahl Nitrogen	mg/L	-	0.199	12.4	5.38	33.7	9	4.6	-	-	16.3	3.19	7.94	-
Sulfate (SO4)	mg/L	-	835	1310	136	253	31.2	48.5	-	-	1860	1640	1750	-
Sulfide	mg/L	-	<0.020	<0.020	<0.100	<0.020	0.03	<0.020	-	-	<0.020	<0.020	<0.020	-
Anion Sum	mEq/L	-	22.3	34	4.59	7.6	12.3	9.6	-	-	39.5	37.3	38.4	-
Cation Sum	mEq/L	-	22	33	5.46	7.66	12	9.75	-	-	40	34.9	37.9	-
Cation - Anion Balance	%	-	-0.7	-1.5	8.7	0.3	-1.4	0.8	-	-	0.7	-3.3	-0.7	-
Organic / Inorganic Carbon														
Total Organic Carbon	mg/L	-	5.48	24.1	28.3	45.6	48.4	13.8	-	-	5.82	6.7	5.88	-
Total Inorganic Carbon	mg/L	-	52.3	70.4	9.2	66.4	89.1	89.8	-	-	8.2	27.9	14.4	-
Cyanides														
Total Cynanide	mg/L	-	0.0078	0.0366	0.292	49.9	0.0323	0.0367	-	-	0.0557	0.0437	<0.005	-
Cyanide, Free	mg/L	0.005	<0.005	<0.005	**0.0176**	**3.22**	<0.005	<0.005	-	-	<0.005	**0.0091**	<0.005	-
Cyanide, WAD	mg/L	-	<0.005	0.0054	0.0319	3.49	<0.005	<0.005	-	-	0.0076	0.0129	<0.005	-
Thiocyanate (SCN)	mg/L	-	<0.5	<2.5	<0.5	0.85	0.62	<0.5	-	-	1.36	<0.5	<0.5	-

Table A
Groundwater Sampling Analytical Results

			Tailings Facility and Seepage Pond											
		Sample ID:	MP09-04	MP09-05	MP09-09	MP09-10	MP09-11	MP09-12	MP09-14	MW09-01	MW09-02	MW09-03	MW09-04	MW09-05
		Date Sampled:	28/06/2014	28/06/2014	29/06/2014	29/06/2014	29/06/2014	29/06/2014	-	-	27/06/2014	27/06/2014	27/06/2014	-
		Job Number:	L1478849-4	L1478849-2	L1478849-17	L1478849-21	L1478849-18	L1478849-14			L1478694-12	L1478694-14	L1478694-11	
		Well Status:	Sampled	Sampled	Sampled	Sampled	Sampled	Sampled	Insufficient Volume	Obstruction	Sampled	Sampled	Sampled	Unable to Access
Parameter[1,2]	**Units**	**CCME FAL** [3,4]												
Dissolved Metals														
Aluminum	mg/L	0.005-0.1 [7]	0.0017	0.0224	0.0048	0.0088	0.005	0.0018	-	-	<0.005	<0.005	<0.002	-
Antimony	mg/L	-	0.00185	0.0004	0.0897	0.0907	0.0195	0.0331	-	-	0.00345	0.503	0.342	-
Arsenic	mg/L	0.005	0.00097	**0.0276**	**18.7**	**9.72**	**11.3**	**5.41**	-	-	**20.3**	**1.28**	**3.83**	-
Barium	mg/L	-	0.0807	0.0811	0.00127	0.00083	0.0884	0.0532	-	-	0.00688	0.0364	0.006	-
Beryllium	mg/L	-	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	-	-	<0.0005	<0.0005	<0.0002	-
Bismuth	mg/L	-	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	-	-	<0.0025	<0.0025	<0.001	-
Boron	mg/L	1.5	0.017	0.122	0.299	0.342	0.037	0.052	-	-	0.058	0.126	0.247	-
Cadmium	mg/L	0.00021-0.00037 [8]	0.00009	**0.000961**	0.000102	**0.000658**	*<0.00002*	0.000313	-	-	**0.000627**	**0.000895**	0.000037	-
Calcium	mg/L	-	260	449	77.6	111	112	103	-	-	473	477	487	-
Chromium[12]	mg/L	0.001	0.00027	0.00079	<0.0002	<0.0002	**0.00152**	0.00029	-	-	<0.0005	<0.0005	<0.0002	-
Cobalt	mg/L	-	0.00022	0.0157	0.0402	0.0468	0.00189	0.00169	-	-	0.0115	0.00422	0.001	-
Copper	mg/L	0.00313-0.004 [9]	0.00267	0.00378	**0.383**	**0.0349**	0.00049	0.00052	-	-	<0.001	<0.001	<0.0004	-
Iron	mg/L	0.3	<0.01	**21.5**	**0.401**	0.229	**11.7**	**3.89**	-	-	**37**	0.218	<0.01	-
Lead	mg/L	0.00484-0.007 [10]	<0.00005	<0.0001	0.00185	0.0028	0.00144	0.00631	-	-	<0.00025	<0.00025	0.00022	-
Lithium	mg/L	-	0.00079	<0.001	<0.001	<0.001	0.0031	0.00208	-	-	0.0192	<0.0025	0.0056	-
Magnesium	mg/L	-	102	57.4	0.81	0.88	49.8	45.6	-	-	96.6	90.5	121	-
Manganese	mg/L	-	0.0034	10.6	0.0591	0.0291	4.15	2.7	-	-	30.7	50.2	4.25	-
Mercury	mg/L	0.000026	<0.00001	<0.00001	**0.000036**	*<0.00005*	<0.00001	<0.00001	-	-	<0.00001	<0.00001	<0.00001	-
Molybdenum	mg/L	0.073	0.000162	0.00053	0.013	0.0142	0.00818	0.00255	-	-	0.00564	0.00371	0.00758	-
Nickel	mg/L	0.12276-0.180 [11]	<0.0005	0.0036	0.0143	0.0146	0.0093	0.00521	-	-	0.0035	<0.0025	<0.001	-
Phosphorus	mg/L	-	<0.050	<0.050	0.179	0.199	0.083	0.097	-	-	<0.050	0.06	0.072	-
Potassium	mg/L	-	2.72	9.57	8.18	10.5	8.22	5.23	-	-	67	20.6	39.5	-
Selenium	mg/L	0.001	0.00012	<0.0002	**0.00183**	**0.0015**	0.00032	<0.0001	-	-	<0.0005	<0.0005	<0.0002	-
Silicon	mg/L	-	6.69	5.68	8.71	6.67	10.8	9.61	-	-	7	15.4	11.8	-
Silver	mg/L	0.0001	<0.00001	<0.00002	**0.00189**	**0.00891**	<0.00002	<0.00001	-	-	<0.00005	<0.00005	<0.00002	-
Sodium	mg/L	-	12.8	80.6	22.7	28.1	21	3.5	-	-	64.1	26.2	43.5	-
Strontium	mg/L	-	0.927	1.13	0.146	0.18	0.596	0.468	-	-	0.915	1.59	1.45	-
Sulfur	mg/L	-	265	398	132	116	11.9	16.3	-	-	589	506	570	-
Thallium	mg/L	0.0008	<0.00001	0.000045	<0.00002	0.000046	<0.00002	0.000084	-	-	0.000254	<0.00005	0.000082	-
Tin	mg/L	-	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	-	-	<0.0005	<0.0005	<0.0002	-
Titanium	mg/L	-	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	-	-	<0.05	<0.05	<0.02	-
Uranium	mg/L	0.015	0.00247	0.00205	0.000542	0.000975	0.000762	0.000713	-	-	0.000678	0.00143	0.000227	-
Vanadium	mg/L	-	<0.001	<0.002	<0.002	<0.002	0.0056	<0.001	-	-	<0.005	<0.005	<0.002	-
Zinc	mg/L	0.03	0.0036	0.013	0.009	0.0082	0.0206	**0.0403**	-	-	**0.312**	0.0065	**0.953**	-

Table A
Groundwater Sampling Analytical Results

			Tailings Facility and Seepage Pond									
		Sample ID:	MW09-06	MW09-07	MW09-08	MW09-11	MW09-20	MW09-21	MW09-22	MW09-23	MW09-24	W14103083BH03
		Date Sampled:	-	29/06/2014	28/06/2014	-	-	28/06/2014	27/06/2014	28/06/2014	28/06/2014	-
		Job Number:		L1478849-13	L1478849-7			L1478849-1	L1478694-15	L1478849-6	L1478849-5	
		Well Status:	Unable to Locate	Sampled	Sampled	Dry	Dry	Sampled	Sampled	Sampled	Sampled	Insufficient Volume
Parameter[1,2]	**Units**	**CCME FAL** [3,4]										
Field Tests												
Field Conductance, Specific	µs/cm	-	-	2411	381.2	-	-	2544	2073	2612	1198	-
Field Conductivity	µs/cm	-	-	1542	216.7	-	-	1430	1684	1468	761	-
Field Dissolved Oxygen	mg/L	-	-	3.1	1.41	-	-	1.91	2.58	4.32	5.77	-
Field pH (pH Units)	pH Units	-	-	6.8	6.82	-	-	6.82	5.82	7.12	7.34	-
Field Redox, Uncorrected	mV	-	-	102.4	-96.7	-	-	-64.8	58.3	-64.7	3.3	-
Field Sulfide	mg/L	-	-	0.294	0.092	-	-	0.063	0.026	0.09	0.084	-
Field Turbidity	NTU	-	-	32.2	2.02	-	-	11.1	10.54	30.1	11.3	-
Field Temperature	ºC	-	-	5.7	3.3	-	-	2	3.7	2.1	2.6	-
Physical Tests												
Conductivity	µs/cm	-	-	2240	277	-	-	2500	3020	2400	1430	-
Hardness, Total (CaCO3)	mg/L	-	-	1300	139	-	-	1600	1700	1350	907	-
pH	pH Units	6.5-9 [5]	-	7.6	7.49	-	-	7.4	6.52	7.83	8.06	-
Anions and Nutrients												
Alkalinity, Total (CaCO3)	mg/L	-	-	225	147	-	-	359	35.7	326	272	-
Ammonia	mg/L	0.029-153 [6]	-	4.6	2.01	-	-	11.6	2.27	**7.77**	<0.005	-
Chloride	mg/L	-	-	<10.000	<0.500	-	-	<10.000	<10.000	<10.000	<5.000	-
Fluoride	mg/L	0.12	-	*<0.400*	0.077	-	-	*<0.400*	*<0.400*	*<0.400*	*<0.200*	-
Nitrate	mg/L	13	-	<0.100	<0.005	-	-	<0.100	11.9	<0.100	1.45	-
Nitrite	mg/L	0.06	-	<0.020	0.0017	-	-	<0.020	**0.326**	<0.020	<0.010	-
Total Kjeldahl Nitrogen	mg/L	-	-	6.55	2.9	-	-	16.8	10.6	11.8	0.331	-
Sulfate (SO4)	mg/L	-	-	1320	12.9	-	-	1410	1990	1300	645	-
Sulfide	mg/L	-	-	0.097	0.069	-	-	<0.020	0.023	<0.020	<0.020	-
Anion Sum	mEq/L	-	-	32	3.2	-	-	36.5	43.1	33.7	19	-
Cation Sum	mEq/L	-	-	32	5.71	-	-	37.2	43.3	32.6	18.5	-
Cation - Anion Balance	%	-	-	0	28.1	-	-	1	0.2	-1.6	-1.1	-
Organic / Inorganic Carbon												
Total Organic Carbon	mg/L	-	-	20.3	18.3	-	-	23.8	10.8	14	6.44	-
Total Inorganic Carbon	mg/L	-	-	46	33.2	-	-	73.3	4.9	67	59.7	-
Cyanides												
Total Cynanide	mg/L	-	-	<0.005	<0.005	-	-	0.0107	0.0225	0.0097	<0.005	-
Cyanide, Free	mg/L	0.005	-	<0.005	<0.005	-	-	**0.0066**	**0.0096**	<0.005	<0.005	-
Cyanide, WAD	mg/L	-	-	<0.005	<0.005	-	-	0.007	0.0132	<0.005	<0.005	-
Thiocyanate (SCN)	mg/L	-	-	<0.5	<0.5	-	-	0.58	<0.5	<0.5	<0.5	-

Table A
Groundwater Sampling Analytical Results

			Tailings Facility and Seepage Pond									
		Sample ID:	MW09-06	MW09-07	MW09-08	MW09-11	MW09-20	MW09-21	MW09-22	MW09-23	MW09-24	W14103083BH03
		Date Sampled:	-	29/06/2014	28/06/2014	-	-	28/06/2014	27/06/2014	28/06/2014	28/06/2014	-
		Job Number:		L1478849-13	L1478849-7			L1478849-1	L1478694-15	L1478849-6	L1478849-5	
		Well Status:	Unable to Locate	Sampled	Sampled	Dry	Dry	Sampled	Sampled	Sampled	Sampled	Insufficient Volume
Parameter[1,2]	**Units**	**CCME FAL** [3,4]										
Dissolved Metals												
Aluminum	mg/L	0.005-0.1 [7]	-	0.0306	0.0686	-	-	0.0588	0.0396	0.0154	0.0033	-
Antimony	mg/L	-	-	0.0085	0.00024	-	-	0.00031	0.00027	0.00034	0.00033	-
Arsenic	mg/L	0.005	-	**0.564**	**0.198**	-	-	**0.0576**	**0.00666**	0.00119	0.00319	-
Barium	mg/L	-	-	0.027	0.128	-	-	0.147	0.0554	0.0649	0.0607	-
Beryllium	mg/L	-	-	<0.0002	<0.0001	-	-	<0.0002	<0.0002	<0.0002	<0.0001	-
Bismuth	mg/L	-	-	<0.001	<0.0005	-	-	<0.001	<0.001	<0.001	<0.0005	-
Boron	mg/L	1.5	-	0.089	<0.01	-	-	0.11	0.024	0.18	0.014	-
Cadmium	mg/L	0.00021-0.00037 [8]	-	0.000049	<0.00001	-	-	0.000029	0.000094	0.000032	0.0001	-
Calcium	mg/L	-	-	396	41.6	-	-	474	587	355	241	-
Chromium[12]	mg/L	0.001	-	0.0004	0.00093	-	-	0.00087	0.00034	0.00026	0.00035	-
Cobalt	mg/L	-	-	0.0243	0.00124	-	-	0.016	0.0153	0.0258	0.00014	-
Copper	mg/L	0.00313-0.004 [9]	-	0.00224	<0.0002	-	-	<0.0004	0.00112	<0.0004	**0.00911**	-
Iron	mg/L	0.3	-	**34.2**	**47.7**	-	-	**45**	**87.4**	**6.21**	0.014	-
Lead	mg/L	0.00484-0.007 [10]	-	0.00024	0.000052	-	-	<0.0001	0.0002	<0.0001	0.000974	-
Lithium	mg/L	-	-	0.0082	<0.0005	-	-	<0.001	<0.001	<0.001	0.00096	-
Magnesium	mg/L	-	-	76.6	8.43	-	-	101	57.5	113	74.1	-
Manganese	mg/L	-	-	15.4	3.52	-	-	14.9	17.9	12.2	0.00292	-
Mercury	mg/L	0.000026	-	<0.00001	<0.00001	-	-	<0.00001	<0.00001	<0.00001	<0.00001	-
Molybdenum	mg/L	0.073	-	0.00343	0.000071	-	-	0.00043	0.00012	0.00611	0.000305	-
Nickel	mg/L	0.12276-0.180 [11]	-	0.0231	<0.0005	-	-	0.0016	0.0031	0.002	<0.0005	-
Phosphorus	mg/L	-	-	<0.050	0.104	-	-	<0.050	<0.050	<0.050	<0.050	-
Potassium	mg/L	-	-	22.1	1.45	-	-	12.9	5.92	15.7	1.85	-
Selenium	mg/L	0.001	-	<0.0002	0.00011	-	-	<0.0002	0.00039	<0.0002	0.0002	-
Silicon	mg/L	-	-	10.1	9.3	-	-	4.91	4.68	5.35	5.48	-
Silver	mg/L	0.0001	-	**0.000113**	<0.00001	-	-	<0.00002	0.000045	<0.00002	<0.00001	-
Sodium	mg/L	-	-	59.5	1.44	-	-	26.3	82	89.7	8.3	-
Strontium	mg/L	-	-	0.915	0.182	-	-	1.29	1.31	0.873	0.632	-
Sulfur	mg/L	-	-	396	3.99	-	-	433	634	405	199	-
Thallium	mg/L	0.0008	-	<0.00002	<0.00001	-	-	<0.00002	<0.00002	<0.00002	<0.00001	-
Tin	mg/L	-	-	<0.0002	<0.0001	-	-	<0.0002	<0.0002	<0.0002	<0.0001	-
Titanium	mg/L	-	-	<0.02	<0.01	-	-	<0.02	<0.02	<0.02	<0.01	-
Uranium	mg/L	0.015	-	0.00315	0.000077	-	-	0.00193	0.000229	0.00311	0.00584	-
Vanadium	mg/L	-	-	<0.002	0.003	-	-	0.0039	<0.002	<0.002	<0.001	-
Zinc	mg/L	0.03	-	**1.61**	0.0017	-	-	0.0025	0.0047	0.0299	0.0021	-

Table B
QA/AC Analytical Data

		Sample ID:	MW09-16	DUP-1 (Field Duplicate of MW09-16)	RPD (%)[13]	CH-P-13-05/50	DUP-2 (Field Duplicate of CH-P-13-05/50)	RPD (%)[13]	MW09-02	DUP-3 (Field Duplicate of MW09-02)	RPD (%)[13]	MW09-08	DUP-5 (Field Duplicate of MW09-08)	RPD (%)[13]	FB-1	FB-2	FB-3	FB-4	TRAVEL BLANK	TRAVEL BLANK
		Date Sampled:	26/06/2014	26/06/2014		27/06/2014	27/06/2014		27/06/2014	27/06/2014		28/06/2014	28/06/2014		26/06/2014	27/06/2014	28/06/2014	29/06/2014	28/06/2014	30/06/2014
		Well Status:	Sampled	Sampled		Sampled	Sampled		Sampled	Sampled		Sampled	Sampled		Sampled	Sampled	Sampled	Sampled	Sampled	Sampled
Parameter[1,2]	**Units**	CCME FAL [3,4]																			
Field Tests																					
Field Conductance, Specific	µs/cm	-	1695	1695	-	2864	2864	-	2670	2670	-	381.2	381.2	-	-	-	-	-	-	-
Field Conductivity	µs/cm	-	1040	1040	-	1640	1640	-	1670	1670	-	216.7	216.7	-	-	-	-	-	-	-
Field Dissolved Oxygen	mg/L	-	3.62	3.62	-	2.53	2.53	-	0.14	0.14	-	1.41	1.41	-	-	-	-	-	-	-
Field pH	pH Units	-	6.67	6.67	-	6.27	6.27	-	7.13	7.13	-	6.82	6.82	-	-	-	-	-	-	-
Field Redox, Uncorrected	mV	-	136.6	136.6	-	122.4	122.4	-	-92.1	-92.1	-	-96.7	-96.7	-	-	-	-	-	-	-
Field Sulfide	mg/L	-	0.003	0.003	-	0.434	0.434	-	0.023	0.023	-	0.092	0.092	-	-	-	-	-	-	-
Field Turbidity	NTU	-	3.86	3.86	-	24.1	24.1	-	16.9	16.9	-	2.02	2.02	-	-	-	-	-	-	-
Field Temperature	ºC	-	4.8	4.8	-	2.6	2.6	-	4.7	4.7	-	3.3	3.3	-	-	-	-	-	-	-
Physical Tests																					
Conductivity	µs/cm	-	1710	1710	*0.0*	2690	2690	*0.0*	2840	2810	*1.1*	277	277	*0.0*	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Hardness, Total (CaCO3)	mg/L	-	1130	1140	*0.9*	1810	1830	*1.1*	1580	1560	*1.3*	139	139	*0.0*	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
pH	pH Units	6.5-9 [5]	7.74	7.84	*1.3*	7.05	7.08	*0.4*	6.96	6.95	*0.1*	7.49	7.3	*2.6*	**5.4**	**5.3**	**5.53**	**5.42**	**5.23**	**5.22**
Anions and Nutrients																					
Alkalinity, Total (CaCO3)	mg/L	-	312	314	*0.6*	116	115	*0.9*	34.5	36	*4.3*	147	147	*0.0*	<2.000	<2.000	<2.000	<2.000	<2.000	<2.000
Ammonia	mg/L	0.0168-231 [6]	<0.005	<0.005	*nc*	0.0349	0.0355	*1.7*	**12.1**	**12.3**	*nc*	2.01	2	*0.5*	<0.005	<0.005	<0.005	<0.005	0.0077	0.0216
Chloride	mg/L	-	<5.000	<5.000	*nc*	<10.000	<10.000	*nc*	<10.000	<10.000	*nc*	<0.500	<0.500	*nc*	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Fluoride	mg/L	0.12	*<0.200*	*<0.200*	*nc*	*<0.400*	*<0.400*	*nc*	**0.47**	**0.46**	*nc*	0.077	0.071	*nc*	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Nitrate	mg/L	13	0.247	0.242	*2.0*	0.42	0.4	*4.9*	<0.100	<0.100	*nc*	<0.005	<0.005	*nc*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrite	mg/L	0.06	<0.010	<0.010	*nc*	<0.020	<0.020	*nc*	<0.020	<0.020	*nc*	0.0017	<0.001	*nc*	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Kjeldahl Nitrogen	mg/L	-	0.121	0.133	*nc*	0.121	0.131	*nc*	16.3	16.5	*1.2*	2.9	2.67	*8.3*	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Sulfate (SO4)	mg/L	-	835	833	*nc*	1850	1850	*0.0*	1860	1830	*nc*	12.9	12.8	*0.8*	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Sulfide	mg/L	-	<0.020	<0.020	*nc*	<0.020	<0.020	*nc*	<0.020	<0.020	*nc*	0.069	0.075	*nc*	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Anion Sum	mEq/L	-	23.6	23.6	-	40.9	40.8	-	39.5	38.8	-	3.2	3.2	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cation Sum	mEq/L	-	23.1	23.2	-	39.1	39.6	-	40	39.7	-	5.71	5.71	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cation - Anion Balance	%	-	-1.1	-0.8	-	-2.3	-1.5	-	0.7	1.1	-	28.1	28.2	-	0	0	0	0	0	0
Organic / Inorganic Carbon																					
Total Organic Carbon	mg/L	-	2.96	2.84	*4.1*	2.05	2.03	*nc*	5.82	5.92	*1.7*	18.3	17.8	*2.8*	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Total Inorganic Carbon	mg/L	-	63.9	65.9	*nc*	16.5	16.4	*nc*	8.2	6.3	*26.2*	33.2	30.9	*7.2*	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500

Table B
QA/AC Analytical Data

		Sample ID:	MW09-16	DUP-1 (Field Duplicate of MW09-16)	RPD (%)[13]	CH-P-13-05/50	DUP-2 (Field Duplicate of CH-P-13-05/50)	RPD (%)[13]	MW09-02	DUP-3 (Field Duplicate of MW09-02)	RPD (%)[13]	MW09-08	DUP-5 (Field Duplicate of MW09-08)	RPD (%)[13]	FB-1	FB-2	FB-3	FB-4	TRAVEL BLANK	TRAVEL BLANK
		Date Sampled:	26/06/2014	26/06/2014		27/06/2014	27/06/2014		27/06/2014	27/06/2014		28/06/2014	28/06/2014		26/06/2014	27/06/2014	28/06/2014	29/06/2014	28/06/2014	30/06/2014
		Well Status:	Sampled	Sampled		Sampled	Sampled		Sampled	Sampled		Sampled	Sampled		Sampled	Sampled	Sampled	Sampled	Sampled	Sampled
Parameter[1,2]	**Units**	**CCME FAL [3,4]**																		
Cyanides																				
Cyanide	mg/L	-	<0.005	<0.005	*nc*	<0.005	<0.005	*nc*	0.0557	0.0944	***51.6***	<0.005	<0.005	*nc*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cyanide, Free	mg/L	0.005	<0.005	<0.005	*nc*	<0.005	<0.005	*nc*	<0.005	<0.005	*nc*	<0.005	<0.005	*nc*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cyanide, WAD	mg/L	-	<0.005	<0.005	*nc*	<0.005	<0.005	*nc*	0.0076	0.0211	*nc*	<0.005	<0.005	*nc*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thiocyanate (SCN)	mg/L	-	<0.5	<0.5	*nc*	<0.5	<0.5	*nc*	1.36	1.35	*0.7*	<0.5	<0.5	*nc*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Metals																				
Aluminum	mg/L	0.005-0.1 [7]	0.0023	0.002	*nc*	0.0444	0.0461	*3.8*	<0.005	<0.005	*nc*	0.0686	0.0693	*1.0*	<0.001	<0.001	<0.001	<0.001	-	-
Antimony	mg/L	-	0.0634	0.069	*8.5*	<0.0005	<0.0005	*nc*	0.00345	0.00343	*0.6*	0.00024	0.00024	*nc*	<0.0001	<0.0001	<0.0001	<0.0001	-	-
Arsenic	mg/L	0.005	**0.00902**	**0.00868**	*3.8*	0.00284	0.00259	*9.2*	**20.3**	**19.7**	*3.0*	**0.198**	**0.197**	*0.5*	<0.0001	<0.0001	<0.0001	<0.0001	-	-
Barium	mg/L	-	0.0137	0.0137	*0.0*	0.0111	0.0115	*3.5*	0.00688	0.00638	*7.5*	0.128	0.127	*0.8*	<0.00005	<0.00005	<0.00005	<0.00005	-	-
Beryllium	mg/L	-	<0.0001	<0.0001	*nc*	<0.0005	<0.0005	*nc*	<0.0005	<0.0005	*nc*	<0.0001	<0.0001	*nc*	<0.0001	<0.0001	<0.0001	<0.0001	-	-
Bismuth	mg/L	-	<0.0005	<0.0005	*nc*	<0.0025	<0.0025	*nc*	<0.0025	<0.0025	*nc*	<0.0005	<0.0005	*nc*	<0.0005	<0.0005	<0.0005	<0.0005	-	-
Boron	mg/L	1.5	0.131	0.143	*8.8*	<0.05	<0.05	*nc*	0.058	0.059	*1.7*	<0.01	<0.01	*nc*	<0.01	<0.01	<0.01	<0.01	-	-
Cadmium	mg/L	0.00021-0.00037 [8]	**0.0249**	**0.0246**	*1.2*	**0.271**	**0.272**	*0.4*	**0.000627**	**0.00063**	*0.5*	<0.00001	<0.00001	*nc*	<0.00001	<0.00001	<0.00001	<0.00001	-	-
Calcium	mg/L	-	262	265	*1.1*	449	457	*1.8*	473	470	*0.6*	41.6	42	*1.0*	<0.05	<0.05	<0.05	<0.05	-	-
Chromium[12]	mg/L	0.001	<0.0001	<0.0001	*nc*	<0.0005	<0.0005	*nc*	<0.0005	<0.0005	*nc*	0.00093	0.00096	*3.2*	<0.0001	<0.0001	<0.0001	<0.0001	-	-
Cobalt	mg/L	-	0.00018	0.00018	*nc*	0.0322	0.0322	*0.0*	0.0115	0.0116	*0.9*	0.00124	0.00117	*5.8*	<0.0001	<0.0001	<0.0001	<0.0001	-	-
Copper	mg/L	0.00313-0.004 [9]	**0.00558**	**0.00552**	*1.1*	**0.131**	**0.13**	*0.8*	<0.001	<0.001	*nc*	<0.0002	<0.0002	*nc*	<0.0002	<0.0002	<0.0002	<0.0002	-	-
Iron	mg/L	0.3	<0.01	<0.01	*nc*	**7.72**	**7.77**	*0.6*	**37**	**36.8**	*0.5*	**47.7**	**47.6**	*0.2*	<0.01	<0.01	<0.01	<0.01	-	-
Lead	mg/L	0.00484-0.007 [10]	0.0069	**0.00784**	*12.8*	0.00396	0.00385	*2.8*	<0.00025	0.00032	*nc*	0.000052	0.000059	*nc*	<0.00005	<0.00005	<0.00005	<0.00005	-	-
Lithium	mg/L	-	0.0086	0.00946	*9.5*	0.0319	0.0316	*0.9*	0.0192	0.02	*4.1*	<0.0005	<0.0005	*nc*	<0.0005	<0.0005	<0.0005	<0.0005	-	-
Magnesium	mg/L	-	115	115	*0.0*	167	167	*0.0*	96.6	95	*1.7*	8.43	8.37	*0.7*	<0.1	<0.1	<0.1	<0.1	-	-
Manganese	mg/L	-	0.0321	0.0328	*2.2*	30.4	30.5	*0.3*	30.7	31	*1.0*	3.52	3.45	*2.0*	0.000093	<0.00005	<0.00005	<0.00005	-	-
Mercury	mg/L	0.000026	<0.00001	<0.00001	*nc*	<0.00001	<0.00001	*nc*	<0.00001	<0.00001	*nc*	<0.00001	<0.00001	*nc*	<0.00001	<0.00001	<0.00001	<0.00001	-	-
Molybdenum	mg/L	0.073	0.000089	0.000105	*nc*	0.00076	0.00075	*nc*	0.00564	0.00569	*0.9*	0.000071	0.000075	*nc*	0.000058	<0.00005	<0.00005	<0.00005	-	-
Nickel	mg/L	0.12276-0.180 [11]	0.00328	0.00336	*2.4*	0.0136	0.0135	*0.7*	0.0035	0.0036	*nc*	<0.0005	<0.0005	*nc*	<0.0005	<0.0005	<0.0005	<0.0005	-	-
Phosphorus	mg/L	-	<0.00005	<0.00005	*nc*	<0.00005	<0.00005	*nc*	<0.00005	<0.00005	*nc*	0.000104	0.000102	*nc*	<0.00005	<0.00005	<0.00005	<0.00005	-	-
Potassium	mg/L	-	5.95	5.83	*2.0*	5.18	5.17	*0.2*	67	66	*1.5*	1.45	1.42	*2.1*	<0.1	<0.1	<0.1	<0.1	-	-
Selenium	mg/L	0.001	<0.0001	<0.0001	*nc*	<0.0005	<0.0005	*nc*	<0.0005	<0.0005	*nc*	0.00011	0.00011	*nc*	<0.0001	<0.0001	<0.0001	<0.0001	-	-
Silicon	mg/L	-	4.78	4.78	*0.0*	6.6	6.69	*1.4*	7	6.95	*0.7*	9.3	9.28	*0.2*	<0.05	<0.05	<0.05	<0.05	-	-
Silver	mg/L	0.0001	<0.00001	0.000017	*nc*	<0.00005	<0.00005	*nc*	<0.00005	<0.00005	*nc*	<0.00001	<0.00001	*nc*	<0.00001	<0.00001	<0.00001	<0.00001	-	-
Sodium	mg/L	-	7.08	7.07	*0.1*	11	10.9	*0.9*	64.1	63.6	*0.8*	1.44	1.41	*2.1*	<0.05	<0.05	<0.05	<0.05	-	-
Strontium	mg/L	-	0.586	0.637	*8.3*	0.647	0.668	*3.2*	0.915	0.935	*2.2*	0.182	0.184	*1.1*	<0.0002	<0.0002	<0.0002	<0.0002	-	-
Sulfur	mg/L	-	0.258	0.261	*1.2*	0.589	0.58	*1.5*	0.589	0.583	*1.0*	0.00399	0.00394	*1.3*	<0.0005	<0.0005	<0.0005	<0.0005	-	-
Thallium	mg/L	0.0008	0.00025	0.000294	*16.2*	0.000458	0.00045	*1.8*	0.000254	0.00026	*2.3*	<0.00001	<0.00001	*nc*	<0.00001	<0.00001	<0.00001	<0.00001	-	-
Tin	mg/L	-	<0.0001	<0.0001	*nc*	<0.0005	<0.0005	*nc*	<0.0005	<0.0005	*nc*	<0.0001	<0.0001	*nc*	<0.0001	<0.0001	<0.0001	<0.0001	-	-
Titanium	mg/L	-	<0.01	<0.01	*nc*	<0.05	<0.05	*nc*	<0.05	<0.05	*nc*	<0.01	<0.01	*nc*	<0.01	<0.01	<0.01	<0.01	-	-
Uranium	mg/L	0.015	0.00304	0.00353	*14.9*	0.000931	0.000917	*1.5*	0.000678	0.000717	*5.6*	0.000077	0.000079	*2.6*	<0.00001	<0.00001	<0.00001	<0.00001	-	-
Vanadium	mg/L	-	<0.001	<0.001	*nc*	<0.005	<0.005	*nc*	<0.005	<0.005	*nc*	0.003	0.003	*nc*	<0.001	<0.001	<0.001	<0.001	-	-
Zinc	mg/L	0.03	**3.84**	**3.78**	*1.6*	**28.2**	**29.1**	*3.1*	**0.312**	**0.309**	*1.0*	0.0017	0.0013	*nc*	<0.001	<0.001	<0.001	<0.001	-	-

Table B
QA/AC Analytical Data

		Sample ID:	MW09-16	DUP-1 (Field Duplicate of MW09-16)	RPD (%)[13]	CH-P-13-05/50	DUP-2 (Field Duplicate of CH-P-13-05/50)	RPD (%)[13]	MW09-02	DUP-3 (Field Duplicate of MW09-02)	RPD (%)[13]	MW09-08	DUP-5 (Field Duplicate of MW09-08)	RPD (%)[13]	FB-1	FB-2	FB-3	FB-4	TRAVEL BLANK	TRAVEL BLANK
		Date Sampled:	26/06/2014	26/06/2014		27/06/2014	27/06/2014		27/06/2014	27/06/2014		28/06/2014	28/06/2014		26/06/2014	27/06/2014	28/06/2014	29/06/2014	28/06/2014	30/06/2014
		Well Status:	Sampled	Sampled		Sampled	Sampled		Sampled	Sampled		Sampled	Sampled		Sampled	Sampled	Sampled	Sampled	Sampled	Sampled
Parameter[1,2]	**Units**	**CCME FAL [3,4]**																		
Total Metals																				
Aluminum	mg/L	0.005-0.1 [7]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001
Arsenic	mg/L	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00005	<0.00005
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005
Boron	mg/L	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01
Cadmium	mg/L	0.00021-0.00037 [8]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00001	<0.00001
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05
Chromium	mg/L	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001
Copper	mg/L	0.00313-0.004 [9]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005
Iron	mg/L	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01
Lead	mg/L	0.00484-0.007 [10]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00005	<0.00005
Lithium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1
Manganese	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00005	<0.00005
Mercury	mg/L	0.000026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00001	<0.00001
Molybdenum	mg/L	0.073	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00005	<0.00005
Nickel	mg/L	0.12276-0.180 [11]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005
Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00005	<0.00005
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001
Selenium	mg/L	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001
Silicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05
Silver	mg/L	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00001	<0.00001
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05
Strontium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002
Sulfur	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005
Thallium	mg/L	0.0008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00001	<0.00001
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01
Uranium	mg/L	0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00001	<0.00001
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
Zinc	mg/L	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003

Notes

(1) CCME guideline exceedences shaded with dark grey. Light grey shading denotes reportable detection limit in exceedence of CCME Guideline.
(2) - = No standard or not analyzed
(3) CCME = Canadian Council of Ministers of the Environment, Canadian Environmental Quality Guidelines, 1999, updated to November, 2014
(4) CCME FAL = Chapter 4, Canadian Water Quality Guidelines for the Protection of Aquatic Life, Freshwater, updated to November, 2014
(5) CCME FAL stipulates pH not < 6.5 and not > 9
(6) Ammonia varies with pH and temperature for CCME FAL; see the CCME ammonia fact sheet for details regarding the applicable criteria, ammonia-NH3 versus total ammonia-N,and other usage guidelines
when field pH values are not available, lab pH is used. When field and lab pH are both not available, the most stringent guideline has been used.
(7) Aluminum varies with pH as follows for CCME FAL:

0.005 mg/L	if	pH<6.5
.01 mg/L	if	pH>=6.5

when field pH values are not available, lab pH is used. When field and lab pH are both not available, the most stringent guideline has been used.
(8) Cadmium varies with Hardness in mg/L as follows for CCME FAL:

0.00004 mg/L	if	H<17
0.00004 - 0.00037 mg/L	if	H>=17 and H<=280 as follows; CWQG (µg/L) = 10{0.83(log[hardness]) – 2.46 }
0.00037mg/L	if	H>280

(9) Copper varies with Hardness in mg/L as follows for CCME FAL:

0.002 mg/L	if	H<82
0.002 - 0.004 mg/L	if	H>=82 and H<=180 as follows; CWQG (µg/L) = 0.2 * e{0.8545[ln(hardness)]-1.465}
0.004 mg/L	if	H>=180

(10) Lead varies with Hardness in mg/L as follows for CCME FAL:

0.001 mg/L	if	H<60
0.001 - 0.007 mg/L	if	H>=60 and H<=180 as follows; CWQG (µg/L)= e{1.273[ln(hardness)]-4.705}
0.007 mg/L	if	H>180

(11) Nickel varies with Hardness in mg/L as follows for CCME FAL:

0.025 mg/L	if	H<60
0.025 - 0.150 mg/L	if	H>=60 and H<=180 as follows; CWQG (µg/L) = e{0.76[ln(hardness)]+1.06}
0.150 mg/L	if	H>180

(12) Chromium CCME FAL 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 exceedences.
(13) RPD = Relative Percent Difference. RPD is calculated as the difference between a sample and its field duplicate over the average of two values.
nc = not calculated. RPD is not calculated if either the sample or the field duplicate concentration is less than five times the detection limit.
Bold Indicates QAQC values exceed expected results (RDP values exceed 20% or QAQC analysis is above reportable detection limits.

APPENDIX A
Site Photos

Photo 1: View of drive point wells GSI-DC-01A and GSI-DC-01B. Photo taken on June 26th, 2014.

Photo 2: View of drive point wells GSI-DC-02A and GSI-DC-02B. Photo taken on June 27th, 2014.

Photo 3: View of drive point wells GSI-DC-03A and GSI-DC-03B. Photo taken on June 27th, 2014.

Photo 4: View of drive point wells GSI-DC-05A and GSI-DC-05B. Photo taken on June 27th, 2014.

Photo 5: View of drive point wells GSI-DC-06A and GSI-DC-06B. Photo taken on June 29th, 2014.

Photo 6: View of drive point wells GSI-DC-07A and GSI-DC-07B. Photo taken on June 29th, 2014.

Photo 7: View of drive point wells GSI-DC-08A and GSI-DC-08B. Photo taken on June 29th, 2014.

Photo 8: View of drive point wells GSI-DC-09A and GSI-DC-09B. Photo taken on June 29th, 2014.

Photo 9: View of drive point wells GSI-DC-10A and GSI-DC-10B. Photo taken on June 29th, 2014.

Photo 10: View of drive point well GSI-HA-01A. Photo taken on June 27th, 2014.

Photo 11: View of drive point well GSI-HA-02A. Photo taken on June 27th, 2014.

Photo 12: View of drive point well GSI-HA-03A. Photo taken on June 27th, 2014.

Photo 13: View of drive point well GSI-HA-04A. Photo taken on June 27th, 2014.

Photo 14: View of well MW09-16. Photo taken on June 26th, 2014.

Photo 15: View of well MW09-17. Stick-up and steel monument broken upon arrival at site. Loose earth up earth above well suggests excavator could have damaged the well. Photo taken on June 26th, 2014.

Photo 16: View of damaged well MW09-17. Existing bailer stuck in well due to large amount of soil that had fallen into well. Photo taken on June 26th, 2014.

Photo 17: View of the first step of well repair for well MW09-17. A hole was excavated around well to the top of where the stick-up was broken. Photo taken on June 28th, 2014.

Photo 18: View of the second step during well repair for well MW09-17. A cup-link and new PVC pipe were attached. Photo taken on June 28th, 2014.

Photo 19: View of the third step during well repair for well MW09-17. Bentonite chips were used to seal the previously dug hole around stick-up. Photo taken on June 28th, 2014.

Photo 20: View of the fourth step during well repair of well MW09-17. The bentonite seal was covered with soil and well redeveloped manually using waterra tubing. Photo taken on June 28th, 2014.

Photo 21: View of the fifth step during well repair of well MW09-17. The steel monument was replaced around the PVC well with concrete. Photo taken on June 29th, 2014.

Photo 22: View of well MW09-18. Photo taken on June 26th, 2014.

Photo 23: View of well MW09-19. Photo taken on June 26th, 2014.

Photo 24: View of well CH-P-13-01. Photo taken on June 27th, 2014.

Photo 25: View of wells CH-P-13-03/10 and CH-P-13-03/50. CH-P-03/10 did not have a label on the well, however provided GPS coordinates show this well to be CH-P-03/10. Photos taken on June 27th, 2014.

Photo 26: View of wells CH-P-13-04/10 and CH-P-13-04/35. Photo taken on June 28th, 2014.

Photo 27: View of well CH-P-13-05/50. Photo taken on June 26th, 2014.

Photo 28: View of GLL07-01. Photo taken on June 26th, 2014.

Photo 29: View of well GLL07-02. This well was found to be dry, but also had no proper stick-up inside steel monument. Photo taken on June 28th, 2014.

Photo 30: View of well GLL07-02 showing the absence of a stick-up. Photo taken on June 28th, 2014.

Photo 31: View of well GLL07-03. Photo taken on June 26th, 2014.

Photo 32: View of wells MW09-13 and MW09-14. Photo taken on June 27, 2014.

Photo 33: View of well MW09-15. Photo taken on June 26th, 2014.

Photo 34: View of well GSI-PC-01A and GSI-PC-01B. Wells have been destroyed by excavator due to area being part of an active Placer Mine. Photo taken on June 27, 2014.

Photo 35: View of drive point wells GSI-PC-02A and GSI-PC-02B. Photo taken on June 27th, 2014.

Photo 36: View of drive point wells GSI-PC-03A and GSI-PC-03B. Photo taken on June 28th, 2014.

Photo 37: View of drive point wells GSI-PC-04A and GSI-PC-04B. Photo taken on June 28th, 2014.

Photo 38: View of drive point wells GSI-PC-05A and GSI-PC-05B. Photo taken on June 28th, 2014.

Photo 39: View of drive point well MP09-02. Photo taken on June 27th, 2014.

Photo 40: View of well MP09-03. Photo taken on June 27th, 2014.

Photo 41: View of well MP09-08. Photo taken on June 27th, 2014.

Photo 42: View of well W14103083BH01. Photo taken on June 28th, 2014.

Photo 43: View of well W14103083BH02. Photo taken on June 28th, 2014.

Photo 44: View of well W14103083BH04. Photo taken on June 28th, 2014.

Photo 45: View of well MP09-04. Photo taken on June 28th, 2014.

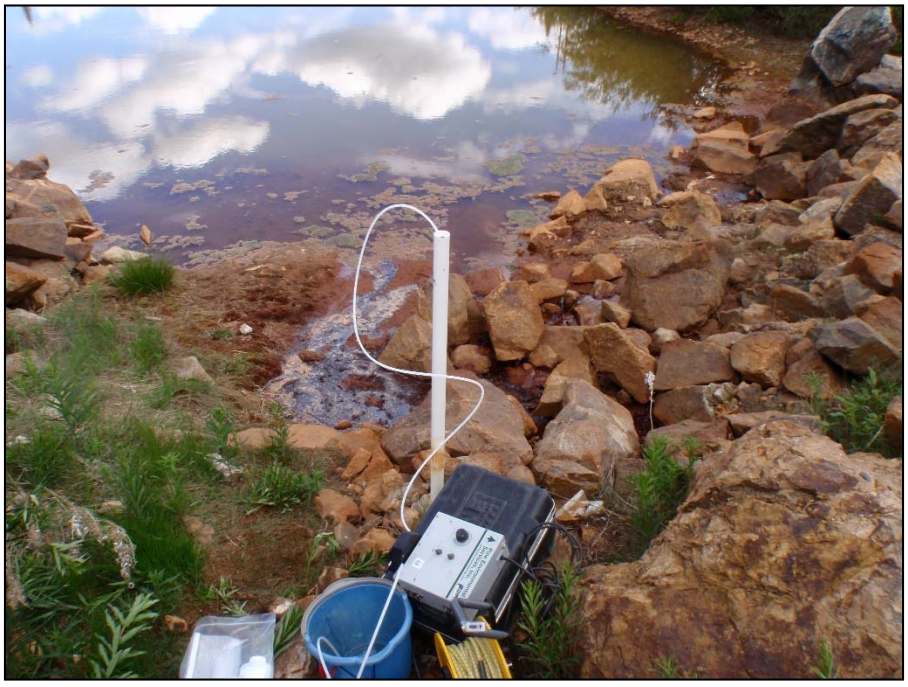

Photo 46: View of well MP09-05. Photo taken on June 28th, 2014.

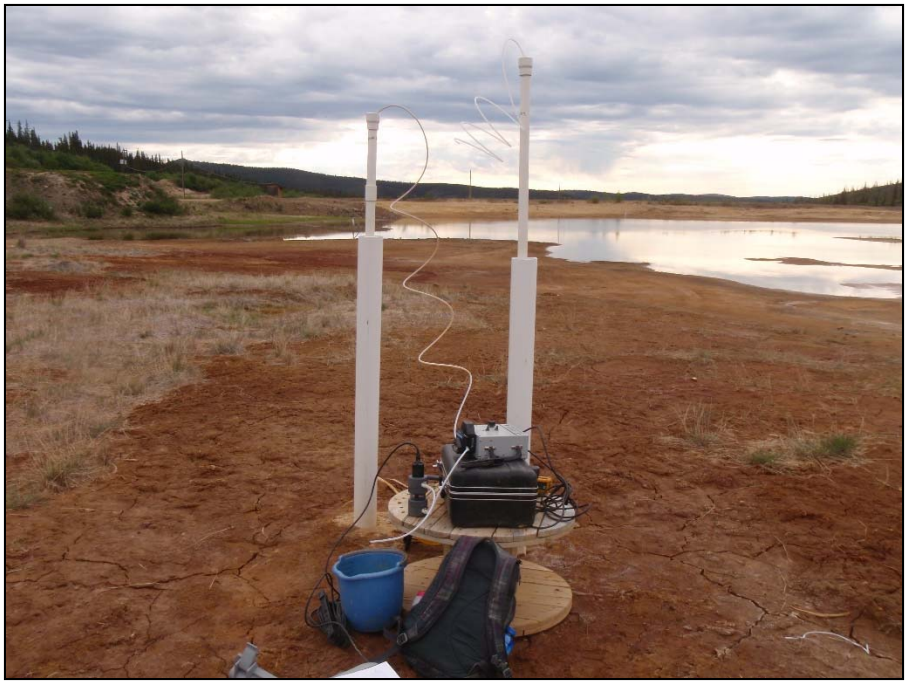

Photo 47: View of well MP09-09 and MP09-10. Photo taken on June 29th, 2014.

Photo 48: View of wells MP09-11 and MP09-12. Photo taken on June 29th, 2014.

Photo 49: View of well MP09-14. Photo taken on June 27th, 2014.

Photo 50: View of wells MW09-01 and MW09-02. Photo taken on June 27th, 2014.

Photo 51: View of well MW09-01. Unable to get any more tubing into well due to large amount of soil found on waterra tubing already existing in well. Photo taken on June 27th, 2014.

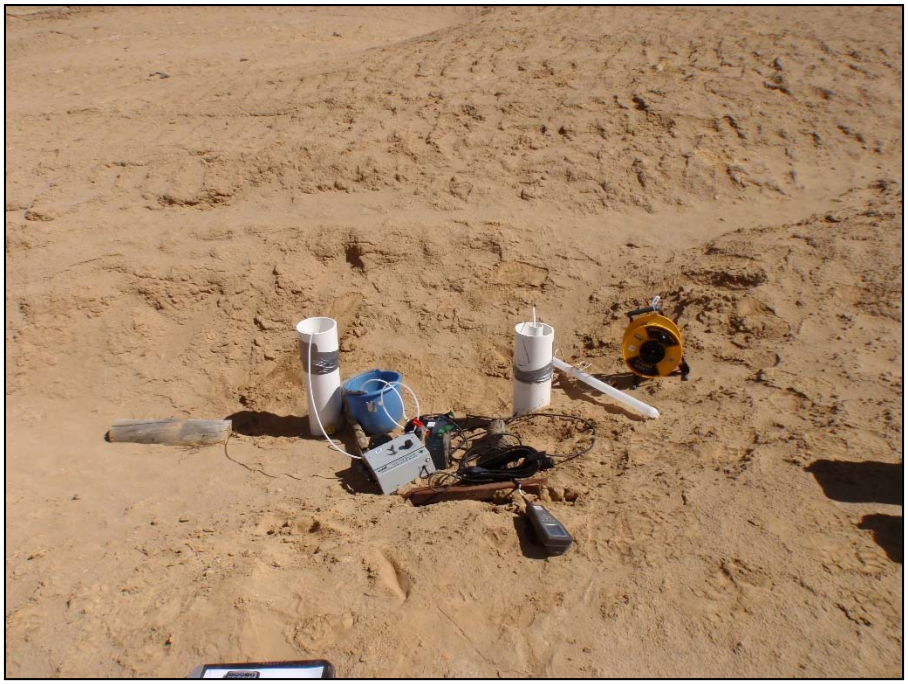

Photo 52: View of wells MW09-03 and MW09-04. Photo taken on June 27th, 2014.

Photo 53: View of well MW09-05. Well located within the water of the tailings pond. Photo taken on June 28th, 2014.

Photo 54: View of well MW09-07. Photo taken on June 28th, 2014.

Photo 55: View of well MW09-08. Photo taken on June 28th, 2014.

Photo 56: View of well MW09-11. Photo taken on June 29th, 2014.

Photo 57: View of well MW09-20. Photo taken on June 28th, 2014.

Photo 58: View of well MW09-21. Photo taken on June 28th, 2014.

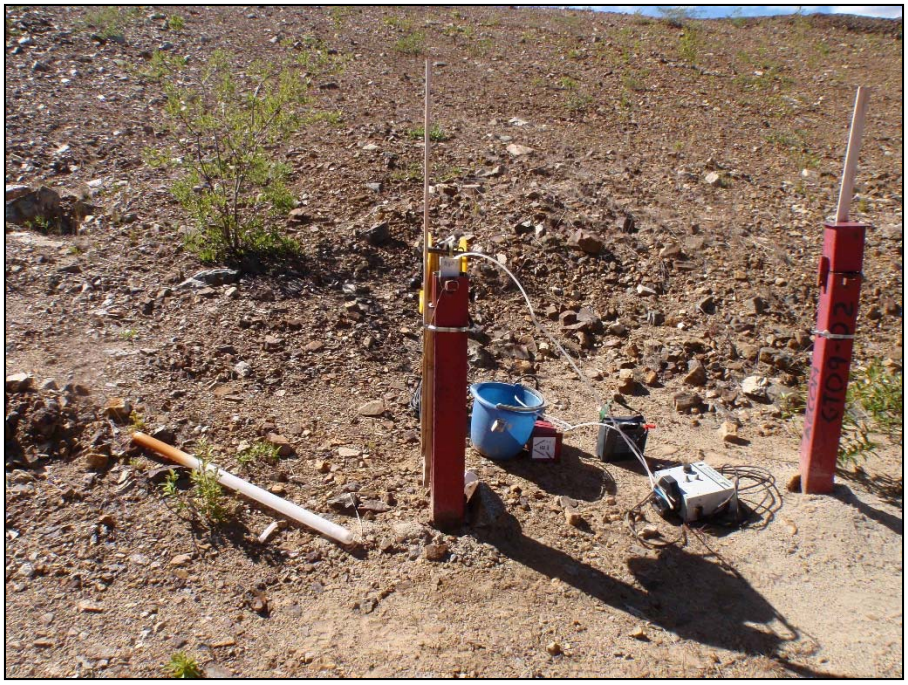

Photo 59: View of well MW09-22. Photo taken on June 27th, 2014.

Photo 60: View of well MW09-23. Photo taken on June 27th, 2014.

Photo 61: View of well MW09-24. Photo taken on June 28th, 2014.

Photo 62: View of well W1403083BH03. Photo taken on June 27th, 2014.

APPENDIX B
Field Forms

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GSI-HA-05A	**Project Number:**	1343-005.03	**Date:**	27-June-14
Approximate Date Drilled:	\	**Client:**	AAM	**Sampler:**	RM/MN
Piezometer Diameter / Screen Length:	1" DP	**Project Name:**	PID GW Sampling	**Weather/Temperature:**	Sunny, partly cloudy
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☐ Good ☑ Bad

Purge Method					
Waterra	**Peristaltic**	**Disp. Bailer**	**Steel Bailer**	**Centrif. Pump**	**Air Lift**
	X				

Initial Depth to Water (m):	1.375	**Calculations:**	**Purge Start Time:**	8:36	**Purge End Time:**				
Depth to Bottom (m):	1.77	0.2006633 = 0.60198	**Time (___) minute interval:**						
Submerged Tubing Depth (m):			**Depth (m)**						
Well Stick-up Height (m):	0.96		**Temperature (°C)**						
Estimated Water Volume (L):	0.20066		**pH**	SEE					
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**						
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**						
			Redox (mV)	BACK					
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**DO (mg/L)**						
			Appearance & Odour (Clear, Silty, HC odours, etc.)						
			Total Purge Volume:						

Sample Method							
	Waterra	**Peristaltic**	**Disp. Bailer**	**Steel Bailer**	**Centrif. Pump**	**Air Lift**	**Other**
Analysis							

Sample ID	**Parameters Analyzed**	**Sample Time**	**Container Types**	**Preservative**	**Turbidity (NTU)**	**Comments**
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): GSI - HA-05

UTM Location: Zn: 08V Easting: 0387898 Northing: 6881125

Photo No.:

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.5	
Carbon Dioxide (C02)	620	

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- purge <5L before going dry @ 8:37
- Insufficient volume of water; unable to sample / purge.

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MP09-10	**Project Number:**	1343-005.03	**Date:**	29-Jun-14
Approximate Date Drilled:	\	**Client:**	AAM	**Sampler:**	RM/MH
Piezometer Diameter / Screen Length:	1.5"	**Project Name:**	MN GW(Spring)	**Weather/Temperature:**	overcast
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☐ Good ☑ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	2.730	**Calculations:**	**Purge Start Time:**	9:02		**Purge End Time:**	9:13				
Depth to Bottom (m):	4.54		**Time (___) minute interval:**	9:13							
Submerged Tubing Depth (m):	~		**Depth (m)**								
Well Stick-up Height (m):	1.98		**Temperature (°C)**	9.2							
Estimated Water Volume (L):	1.991	*KB=5.973*	**pH**	9.21							
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**	283.0							
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**	415.1							
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**	-46.7							
			DO (mg/L)	7.04							
			Appearance & Odour (Clear, Silty, HC odours, etc.)	very turbid no odour							
			Total Purge Volume:	4L							

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis			X				

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MP09-10	diss metals diss mercury sulphide	17:30	as below	☐ Yes ☐ No	61	Highly Turbid (thick, full of soil particles)

SCN
NH3
Gen. chem.
cyanide
cyanate

HEMMERA

Sample Site (Con't): MW09-1D

UTM Location: Zn: 09V Easting: 0389241 Northing: 6880684

Photo No.: Cam2 #00081

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.9	
Carbon Dioxide (C02)	5.20	

CO 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	17:30
Temperature (°C)	8.2
DO (mg/L)	7.04
Specific Cond. (µs/cm)	415.0
Cond. (µs/cm)	283.0
pH	9.21
Redox (mV)	-46.7
Turbidity (NTU)	
Sulphide mg/L (µg/L)	
DO (mg/L)	7.04

General Notes (Condition of well or other features):

- vent on side of casing ∴ no gas seal
- new 3/16" tubing added
- 5/8" waterra used to redevelope due to large amount of soil
  - ↳ attempted to redevelop, large amount of sand in well casing
  - ↳ very turbid water column

reccomendation:

- purge early in the program, return later to sample (use 1" bailer)

- 1" bailer used

0.901 1.447 0.93

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

GS1-DC-01A → SWL = 0.901 (m) Bottom = 1.447 (m) 0.93m = stickup

Well Number:	GS1-DC-01B	**Project Number:**	1343-005.03	**Date:**	5th-June-14
Approximate Date Drilled:		**Client:**	AEM	**Sampler:**	BM/MN
Piezometer Diameter / Screen Length:	1" steel DP Drive Point	**Project Name:**	MN GW Sampling	**Weather/Temperature:**	Sunny, partly cloudy
CHV (ppm / % LEL):		**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☒ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	1.527	**Calculations:**	**Purge Start Time:**	18:15	**Purge End Time:**			
Depth to Bottom (m):	1.574	3 well volumes = 0.095504 x 3 = 0.286512	**Time (___) minute interval:**					
Submerged Tubing Depth (m):	~1.55		**Depth (m)**					
Well Stick-up Height (m):	0.95		**Temperature (°C)**					
Estimated Water Volume (L):	0.095504		**pH**					
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**					
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume		GS1-DC-01A → 1.100472 x 3 = 3.328416	**Specific Cond. (µs/cm)**					
2" casing has 0.16 USgal/ft or 2.032 l/m			**Redox (mV)**					
1" casing has 0.04 USgal/ft or 0.508 l/m			**DO (mg/L)**					
8" sand pack has 0.73 USgal/ft or 9.271 l/m			**Appearance & Odour (Clear, Silty, HC odours, etc.)**					
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Total Purge Volume:**	0.5L				

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		X					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
GS-DC-01B				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): GSI-DC-IB

UTM Location: Zn: 08 ✓ Easting: 0387675 Northing: 6988124

Photo No.: Cam 1 0049

Well Head Space Gases:

	%	ppm
Methane (CH4)		
Oxygen (O2)		
Carbon Dioxide (C02)		

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- 0.5L, well went dry.
- unable to sample TB, not a large enough water column, resampled instead.
- 27-June-14 → poor well recovery, collected less than 50ml of water

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	WI41030838H64	**Project Number:**	B43-005 03	**Date:**	28-June 14
Approximate Date Drilled:	\	**Client:**	APM	**Sampler:**	RM/MM
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MW GW (SD mg)	**Weather/Temperature:**	Sunny
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☒ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):	6.730	**Calculations:**	**Purge Start Time:**		**Purge End Time:**			
Depth to Bottom (m):	LD Frozen		**Time (___) minute interval:**					
Submerged Tubing Depth (m):	\		**Depth (m)**					
Well Stick-up Height (m):	0.9		**Temperature (°C)**					
Estimated Water Volume (L):	\		**pH**					
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**					
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**					
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**					
			DO (mg/L)					
			Appearance & Odour (Clear, Silty, HC odours, etc.)					
			Total Purge Volume:					

CORRECTION (Frozen) SET BACK

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

waypt

~~Sample Site (Con't)~~: WM4BH04

UTM Location: Zn: 08V Easting: 0589544 Northing: 6880666

Photo No.: Cam d #0066

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.6	
Carbon Dioxide (C02)	~~0~~ 520	

3 no well

0 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- ~~Fished~~ out lost bailer
- obstruction (frozen) @6.73m
  - ↳ ice @ top of water level meter
- revisited 20-July-14, still frozen

HEMMERA

p 1/2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MP09-03	**Project Number:**	1343-005.03	**Date:**	2014/06/22
Approximate Date Drilled:	unknown	**Client:**	Yukon AAM	**Sampler:**	AN, AE
Piezometer Diameter / Screen Length:	0.5" / unknown	**Project Name:**	MN GW Sampling Program	**Weather/Temperature:**	clear, sunny ~15°C.
CHV (ppm / % LEL):	not recorded	**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method N/A

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):	1.519
Depth to Bottom (m):	1.617
Submerged Tubing Depth (m):	N/A
Well Stick-up Height (m):	1.30 m
Estimated Water Volume (L):	

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

0.5" casing has 0.127 l/m.
2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations:

- well not sealed.
- stick up measured from creek bank.
- stick up from creek bed = 0.82 m.

12:05 - pumped well dry with peristaltic pump. Yield <100mL

Purge Start Time:		**Purge End Time:**			
Time (___) minute interval:					
Depth (m)					
Temperature (°C)					
pH					
Cond. (µs/cm)					
Specific Cond. (µs/cm)					
Redox (mV)					
DO (mg/L)					
Appearance & Odour (Clear, Silty, HC odours, etc.)					
Total Purge Volume:					

Insufficient volume to Sample

Sample Method N/A

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MP09/03				☐ Yes ☐ No		⊗ Not enough water to sample

Sample Site (Con't): MP09-03

UTM Location: Zn: 08V Easting: 0388956 Northing: 6881739

Photo No.: 0081, 0082, 0083. (Camera 1)

Well Head Space Gases:

	%	ppm
Methane (CH4) LEL%	0.0	—
Oxygen (O2)	20.6 %	—
Carbon Dioxide (C02)	—	430 ppm

→ well not sealed

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- Cannot purge or sample due to insufficient well volume.

HEMMERA

p 1/2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MP09-14	**Project Number:**	1343-005.03	**Date:**	2014/06/27
Approximate Date Drilled:	unknown.	**Client:**	AAM	**Sampler:**	AN, AB.
Piezometer Diameter / Screen Length:	0.5" / unknown.	**Project Name:**	MN GW Sampling Program.	**Weather/Temperature:**	Clear, sunny. ~15°C.
CHV (ppm / % LEL):	not recorded.	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☒ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	low flow.				

Initial Depth to Water (m):	1.342
Depth to Bottom (m):	1.971
Submerged Tubing Depth (m):	~1.5
Well Stick-up Height (m):	1.07
Estimated Water Volume (L):	

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations:

micro waterra was removed from well. installed ¼" tubing for low flow sampling. 3 m. of tubing plus cyclon tubes.

2 min of purging. Well dry yielding <100mL of water.

stick up measured from bottom of pond.
~86 cm stick up from water surface.

Purge Start Time:	17:36	**Purge End Time:**			
Time (___) minute interval:	17:38				
Depth (m)					
Temperature (°C)					
pH					
Cond. (µs/cm)					
Specific Cond. (µs/cm)					
Redox (mV)					
DO (mg/L)					
Appearance & Odour (Clear, Silty, HC odours, etc.)	well dry after purging	doesn't	recharge during very low flow purge		
Total Purge Volume:	100 mL				

insufficient Volume to Sample

Sample Method N/A

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☒ No		Not enough water to Sample

Sample Site (Con't): MP09-14

UTM Location: Zn: 08V **Easting:** 0389138 **Northing:** 6880722

Photo No.: 104 - 106 (Camera 1)

Well Head Space Gases:

	%	ppm
Methane (CH4)	0.0	—
Oxygen (O2)	20.9	—
Carbon Dioxide (C02)	470 ppm.	—

→ well not sealed, no cap

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- 0.5" (approx) drive point well w/ ~ 3/8" PVC tubing inside
- existing micro bailer inside, replaced w/ ~3m of 1/4 PVC + silicon for peri pump by Hemmera
- cannot purge or sample due to insufficient well volume.

HEMMERA

p1/2

GROUNDWATER SAMPLE COLLECTION SHEET

→ see reverse

Well Number:	CH-P-13-03/10 ⊗	**Project Number:**	1343-005.02	**Date:**	27 June 2014
Approximate Date Drilled:	unknown	**Client:**	Yukon AAM	**Sampler:**	AB AN
Piezometer Diameter / Screen Length:	2" PVC -/ cap / unknown	**Project Name:**	Mt Nansen Gw Sample	**Weather/Temperature:**	Clear, sunny ~22°C
CHV (ppm / % LEL):	Not recorded	**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method N/A

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):	N/A (dry)	**Calculations:**	**Purge Start Time:**		**Purge End Time:**			
Depth to Bottom (m):	5.136 →	Well broken @ coupler & ground surface inside stick up protector. All sand in stick up protector fell into well casing (likely causing discrepancy between measured DTB and implied DTB (10m) based on well ID)	**Time (___) minute interval:**					
Submerged Tubing Depth (m):	N/A		**Depth (m)**					
Well Stick-up Height (m):	0.685m		**Temperature (°C)**					
Estimated Water Volume (L):	N/A		**pH**					
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**					
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**					
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**					
			DO (mg/L)					
			Appearance & Odour (Clear, Silty, HC odours, etc.)					
			Total Purge Volume:					

DRY

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): CH-P-13-03/10

UTM Location: Zn: 08 U **Easting:** 0389145 **Northing:** 6881105

Photo No.: 0098, 0099, 0100, 0101 Camera 1

Well Head Space Gases:

	%	ppm
Methane (CH4)	0 % LEL	
Oxygen (O2)	20.5 %	
Carbon Dioxide (C02)	490 ppm	

- casing pulled apart @ coupler when trying to remove threaded PVC, head space questionable

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

Well ID in field marked on stick up as CH-P-13 however our map and GPS coordinates show this should be CH-P-13-03/10

↳ See note on reverse re. coupler (unthreaded) coming apart @ ground surface, causing sand from inside stick up protector to fall inside well casing (see photos)

↳ See inf. in AB field notes as well

- well casing glued back together on 29-June-16

HEMMERA

p 1/2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	W1410308338403	**Project Number:**	1343-005.03	**Date:**	2014/06/27
Approximate Date Drilled:	unknown.	**Client:**	AANDC	**Sampler:**	AN, AS.
Piezometer Diameter / Screen Length:	2" / unknown.	**Project Name:**	MN GW Sampling Program.	**Weather/Temperature:**	clear, sunny. ~15°C.
CHV (ppm / % LEL):	not recorded.	**Duplicate Collected:**	☐ Yes ☒ No N/A	**Recovery:**	☐ Good ☒ Bad

Purge Method N/A

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):	1.842
Depth to Bottom (m):	1.942
Submerged Tubing Depth (m):	N/A
Well Stick-up Height (m):	0.76
Estimated Water Volume (L):	~200 mL

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations:

DTB was reported in the scope of work as 10m. Potential infill of well. ⊗Not enough volume to sample and purge.

Purge Start Time:		**Purge End Time:**			
Time (___) minute interval:					
Depth (m)					
Temperature (°C)					
pH					
Cond. (µs/cm)					
Specific Cond. (µs/cm)					
Redox (mV)					
DO (mg/L)					
Appearance & Odour (Clear, Silty, HC odours, etc.)					
Total Purge Volume:					

Insufficient volume to Sample

Sample Method N/A

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		⊗Not enough water to sample

Sample Site (Con't): W14103083-BH03

UTM Location: Zn: 08V Easting: 0389132 Northing: 6880730

Photo No.: 107 - 110 (Camera 2)

Well Head Space Gases:

	%	ppm
Methane (CH4)	0.0	—
Oxygen (O2)	20.9	—
Carbon Dioxide (C02)	440 ppm.	—

well not sealed

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- existing 1 L plastic bailer in well
- Hemmera did not add any new tubing, not enough water to sample (≈ ≤ 200 mL)

HEMMERA

p 1/2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09 - 14	**Project Number:**	1343-005.003	**Date:**	2014/06/27
Approximate Date Drilled:	unknown	**Client:**	ARM	**Sampler:**	AN, AB.
Piezometer Diameter / Screen Length:	2" / unknown.	**Project Name:**	MN GW sampling Program.	**Weather/Temperature:**	clear, sunny. ~15°C.
CHV (ppm / % LEL):	not recorded.	**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):		**Calculations:**	**Purge Start Time:**		**Purge End Time:**		
Depth to Bottom (m):		Depth to ice: 5.098m	**Time (___) minute interval:**				
Submerged Tubing Depth (m):		Existing 5/8" waterra stuck in well.	**Depth (m)**				
Well Stick-up Height (m):	0.75		**Temperature (°C)**				
Estimated Water Volume (L):			**pH**				
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**				
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**				
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**				
			DO (mg/L)				
			Appearance & Odour (Clear, Silty, HC odours, etc.)				
			Total Purge Volume:				

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

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p2/2

Sample Site (Con't): MW09-14

UTM Location: Zn: 08V Easting: 0389006 Northing: 6081663

Photo No.: 0084, 0085, 0086 (camera 1)

Well Head Space Gases:

	%	ppm
Methane (CH4)	0 % LEL	
Oxygen (O2)	20.4 %	
Carbon Dioxide (C02)	550 ppm	

→ well sealed w/ cap, no slits in riser

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

HEMMERA

p1/2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-13	**Project Number:**	1343-005.003	**Date:**	2014/06/27
Approximate Date Drilled:	unknown	**Client:**	AAM	**Sampler:**	MN, AB
Piezometer Diameter / Screen Length:	2" / unknown	**Project Name:**	MN GW Sampling Program	**Weather/Temperature:**	Sunny, clear. ~15°C.
CHV (ppm / % LEL):	not recorded.	**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):		**Calculations:**	**Purge Start Time:**		**Purge End Time:**		
Depth to Bottom (m):		Depth to blockage 8.995 m	**Time (___) minute interval:**				
Submerged Tubing Depth (m):		No pre-existing tubing in well.	**Depth (m)**				
Well Stick-up Height (m):	0.76	Potentially frozen	**Temperature (°C)**				
Estimated Water Volume (L):			**pH**				
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**				
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**				
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**				
			DO (mg/L)				
			Appearance & Odour (Clear, Silty, HC odours, etc.)				
			Total Purge Volume:				

frozen 2"

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

p2/2

Sample Site (Con't): MW09-13

UTM Location: Zn: 08V Easting: 0389006 Northing: 6881665

Photo No.: 0086, 0085 (camera 1)

Well Head Space Gases:

	%	ppm
Methane (CH4)	0 % LEL	
Oxygen (O2)	20.1 %	
Carbon Dioxide (C02)	2540 ppm	

→ slits in either side of PVC riser well capped

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

HEMMERA

p 1/2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GSI-PC-01-B	**Project Number:**	1343-005.03	**Date:**	2014/06/27
Approximate Date Drilled:	unknown	**Client:**	AAM	**Sampler:**	AN, AB
Piezometer Diameter / Screen Length:	0.5" / unknown	**Project Name:**	MN GW Sampling Programs	**Weather/Temperature:**	Clear, sunny ~15°C
CHV (ppm / % LEL):	—	**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method N / A

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):	
Depth to Bottom (m):	
Submerged Tubing Depth (m):	
Well Stick-up Height (m):	
Estimated Water Volume (L):	

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Notes: **Calculations:**

- Area of well location has become active Placer mining operation. * See photos.
- Well destroyed. Well found beside excavator marked "GSI-PC-01-B". removed from stream bed.

Purge Start Time: **Purge End Time:**

Time (___) minute interval:					
Depth (m)					
Temperature (°C)					
pH					
Cond. (µs/cm)					
Specific Cond. (µs/cm)					
Redox (mV)					
DO (mg/L)					
Appearance & Odour (Clear, Silty, HC odours, etc.)					
Total Purge Volume:					

WELL DESTROYED

Sample Method N / A

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
N/A				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): GSI - PC-01-B

UTM Location: Zn: **Easting:** N/A . **Northing:** N/A .

Photo No.: 0094, 0093, 0092, 0091, 0090, 0089, 0088, 0087. (camera 1).

Well Head Space Gases:

	%	ppm
Methane (CH4)		
Oxygen (O2)		
Carbon Dioxide (C02)		

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

Three drive point wells found pulled out by excavator E side of current excavation, pulled from unknown locations

Flagging (existing) on wells indicate

- GSI-PC-01-B
- unreadable (possibly PC-01-A)
- 09-01 (very faint)

} See photos

HEMMERA

p 1/2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GS1-PC-02-B	**Project Number:**	1343-005.07	**Date:**	2014/06/27
Approximate Date Drilled:	unknown.	**Client:**	Yukon AAM	**Sampler:**	AB AN
Piezometer Diameter / Screen Length:	0.5" / unknown.	**Project Name:**	Mt Nansen GW Sample	**Weather/Temperature:**	clear, sunny ~15°C
CHV (ppm / % LEL):	not recorded	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☒ Bad

Purge Method N/A

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):	1.285
Depth to Bottom (m):	1.285
Submerged Tubing Depth (m):	N/A
Well Stick-up Height (m):	0.89
Estimated Water Volume (L):	N/A

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations:

well dry, probe stops @ bottom of well

※ See reverse for details about GS1-PC-02-A

Purge Start Time: N/A **Purge End Time:**

Time (___) minute interval:					
Depth (m)					
Temperature (°C)					
pH					
Cond. (µs/cm)					
Specific Cond. (µs/cm)					
Redox (mV)					
DO (mg/L)					
Appearance & Odour (Clear, Silty, HC odours, etc.)					
Total Purge Volume:					

DRY

Sample Method N/A

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
N/A				☐ Yes ☐ No		

OVER →

Sample Site (Con't): GSI-PC-02-B

UTM Location: Zn: 08U Easting: 0388707 Northing: 6881786 → and GSI-PC-02-A

Photo No.: 0074 - 77 (General 1)

Well Head Space Gases:

	B	A
Methane (CH4)	0% LEL	0%
Oxygen (O2)	20.5%	20.5%
Carbon Dioxide (C02)	490 ppm	460 ppm

→ both wells sealed
B w/ PVC cap A with ziploc bag + flagging tape

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

GSI-PC-02-A

DTW = 0.919 DTB = 1.297 Stickup = 0.88m

→ water in A but not sampled according to work plan, unknown recovery in A

Both A + B ~ ½ steel casing wells, each have small lip (threads) @ ~0.91 m btoc

15:00 June 28 - revisit A to see if recharge present and well could be sampled, measure DTB = 1.310m and no water, no sample possible at either location

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GSI-HA-01A	**Project Number:**	1343-005.03	**Date:**	27 June-14
Approximate Date Drilled:	\	**Client:**	APM	**Sampler:**	RM/MM
Piezometer Diameter / Screen Length:	1" DP	**Project Name:**	MN GW (spring)	**Weather/Temperature:**	Overcast
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☐ Good ☑ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	2.380	**Calculations:**	**Purge Start Time:**	7:41	**Purge End Time:**			
Depth to Bottom (m):	3.120	1.50368 x3 =4.51104	**Time (___) minute interval:**	7:45				
Submerged Tubing Depth (m):	~3.6		**Depth (m)**					
Well Stick-up Height (m):	1.22	0.37592x3 =1.12776	**Temperature (°C)**	3.0				
Estimated Water Volume (L):	0.35592		**pH**	7.38				
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**	531				
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**	921				
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**	-54.2				
			DO (mg/L)	4.90				
			Appearance & Odour (Clear, Silty, HC odours, etc.)					
			Total Purge Volume:					

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): GSI - HA - 01

UTM Location: Zn: 08V Easting: 0387842 Northing: 6881132

Photo No.: CAW-F-0050

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.9	
Carbon Dioxide (C02)	630	

CO 0

General Notes (Condition of well or other features):

CH-P-B-T2

8.125 (TOW)

8.20 (DTW)

- well was not on sample list provided by client. Depth was taken.

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- purged <0.5L
- Insufficient well volume; unable to purge / sample.
- new 3/16" tubing added to well

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

GS1-DC-05A IDW(m) 1.135 DTB(m) 1.937 Stick-up(m) 1.04

Well Number:	GS1-DC-05B	**Project Number:**	143-005.03	**Date:**	27-June-14
Approximate Date Drilled:	/	**Client:**	APM	**Sampler:**	RM/MH
Piezometer Diameter / Screen Length:	1" DP	**Project Name:**	MD GW (Spring)	**Weather/Temperature:**	Sunny
CHV (ppm / % LEL):	/	**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	1.120	**Calculations:**	**Purge Start Time:**	10:40	**Purge End Time:**			
Depth to Bottom (m):	2.805	0.855798 x 3	**Time (___) minute interval:**	10:46				
Submerged Tubing Depth (m):	~2.3	= 2.56794	**Depth (m)**	Depth not taken, not enough room in casing				
Well Stick-up Height (m):	0.55		**Temperature (°C)**	3.4				
Estimated Water Volume (L):	0.855798		**pH**	7.07				
			Cond. (µs/cm)	1107				
			Specific Cond. (µs/cm)	1823				
			Redox (mV)	-66.1				
			DO (mg/L)	2.79				
			Appearance & Odour (Clear, Silty, HC odours, etc.)					
			Total Purge Volume:					

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

SEE PACK

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): GS1-DC-05

UTM Location: Zn: 08V Easting: 0398735 Northing: 6880836

Photo No.: Cam2 #00058

Well Head Space Gases:

	% (B)	ppm (A)
Methane (CH4)	0	0
Oxygen (O2)	20.4	204
Carbon Dioxide (C02)	690	690

CO O O

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

@ 10:46 well went dry ~~off~~ ~0.5L purged

- Insufficient well volume, cannot sample/purge

- new 3/16" tubing added to well

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

GS1-DC-03B IDW(m) 1.20P DTB(m) 1.395 Stick-up(m) 0.91

CO2 - 6.10% CH4 - 0ppm
O2 - 20.6% CO - 0ppm

Well Number:	GS1-DC-03B	**Project Number:**	B43-005.03	**Date:**	27-June-14
Approximate Date Drilled:	\	**Client:**	FAM	**Sampler:**	RM / MM
Piezometer Diameter / Screen Length:	1" DP	**Project Name:**	MD GW Report	**Weather/Temperature:**	sunny / partly cloudy
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	1.533	**Calculations:**	**Purge Start Time:**	09:29	**Purge End Time:**				
Depth to Bottom (m):	2.405	0.029116 x3 = 0.117348	**Time (___) minute interval:**	9:33					
Submerged Tubing Depth (m):	~1.6	0.442976 x3 = 1.328928	**Depth (m)**	2.30					
Well Stick-up Height (m):	0.91		**Temperature (°C)**	3.0					
Estimated Water Volume (L):	0.442976		**pH**	7.4					
			Cond. (µs/cm)	572					
			Specific Cond. (µs/cm)	936					
			Redox (mV)	-55.5					
			DO (mg/L)	2.34					
			Appearance & Odour (Clear, Silty, HC odours, etc.)						
			Total Purge Volume:						

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

SEE BACK

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): GS1 - DC-03B

UTM Location: Zn: 08V Easting: 0388107 Northing: 6881079

DC-03

Photo No.: Cam2 #0058

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.6	
Carbon Dioxide (C02)	6.0	

0 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

@9:23 purged <0.5L, well went dry
- insufficient well volume, cannot purge / sample
- new 3/16" tubing added to well

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW 09-16	**Project Number:**	1243005.03	**Date:**	26-June-14
Approximate Date Drilled:	\	**Client:**	AANDM	**Sampler:**	RN/MM
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MN GW(Spring)	**Weather/Temperature:**	partly cloudy & sunny
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☑ Yes ☐ No	**Recovery:**	☑ Good ☐ Bad
Purge Method			Dup-1		

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	1.686	**Calculations:**	**Purge Start Time:**	13:15	**Purge End Time:**	13:40		
Depth to Bottom (m):	2.685	Total purge volume @ 3 x 2.01782 = 6.05346	**Time (5) minute interval:**	13:20	13:25	13:30	13:35	13:40
Submerged Tubing Depth (m):	~2.1		**Depth (m)**	1.69	1.69	1.69		
Well Stick-up Height (m):	1.22		**Temperature (°C)**	4.8	4.4	5.0	4.8	4.8
Estimated Water Volume (L):	2.01782		**pH**	6.69	6.63	6.67	6.68	6.67
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**	1035	1039	1045	1041	1040
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**	1693	1694	1695	1695	1695
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**	136.1	147.3	137.9	136.7	136.6
			DO (mg/L)	4.14	3.90	3.73	3.61	3.62
			Appearance & Odour (Clear, Silty, HC odours, etc.)	clear, no odour	clear, no odour	clear, no odour	clear, no odour	"
			Total Purge Volume:	7.5 L				

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		X					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MW09-16	Cyanide (Conical) Gen Chem	13:40	125ml Plastic (Metals) 125ml " (NO3N) 1L "	☐ Yes ☑ No	3.86	See back

Dup-1 Collected ↳ same parameters

Diss metal
Diss mercury
NH_3
TIC
Sulphide
SCN

120ml plastic Y F
120~~40~~ml glass Y F
250ml glass Y
" " Y
40ml glass Y
120ml " Y

Turbidity
Calibration 1.09 calibrated to 1.0
10.06 to 10.0

HEMMERA

Sample Site (Con't): MW09-16
MW09-16
UTM Location: Zn: 08V Easting: 0387992 Northing: 6981094

Photo No.: 0039 Card

Well Head Space Gases:

	%	ppm
Methane (CH4)	0 (LEL)	
Oxygen (O2)	20.6	
Carbon Dioxide (C02)	4.38	

~~C02~~ CO 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	13:40
Temperature (°C)	4.8
DO (mg/L)	8.62
Specific Cond. (µs/cm)	1695
Cond. (µs/cm)	1040
pH	6.67
Redox (mV)	136.6
Turbidity (NTU)	3.86
Sulphide mg/L (µg/L)	3.0
~~DO (mg/L)~~	

General Notes (Condition of well or other features):
- bailer found in well
- new 3/16" tubing added to well

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GS1-DC-08-B	**Project Number:**	1343-005.03	**Date:**	2014/06/29
Approximate Date Drilled:	unknown.	**Client:**	AAM	**Sampler:**	AN, AS
Piezometer Diameter / Screen Length:	0.5"/unknown.	**Project Name:**	MN GW sampling Program.	**Weather/Temperature:**	overcast ~10°C.
CHV (ppm / % LEL):	not recorded.	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):		**Calculations:**	**Purge Start Time:**		**Purge End Time:**			
Depth to Bottom (m):		Well sealed with plastic cap. Existing micro waterra frozen in well. - tubing removed with some effort through ice - unable to re-insert tubing past ice block Depth to blockage: 0.759 m. - ice observed along creek banks.	**Time (___) minute interval:**					
Submerged Tubing Depth (m):			**Depth (m)**					
Well Stick-up Height (m):	0.27 m		**Temperature (°C)**					
Estimated Water Volume (L):			**pH**					
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**					
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**					
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**					
			DO (mg/L)					
			Appearance & Odour (Clear, Silty, HC odours, etc.)	FROZEN				
			→ cont. on back.					
			Total Purge Volume:					

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): 651-DC-08-B

UTM Location: Zn: 08V **Easting:** 0390311 **Northing:** 6880583

Photo No.: 0155 - 0159 (camera #1).

Well Head Space Gases:

	%	ppm
Methane (CH4) LEL	0.0	
Oxygen (O2)	20.5	
Carbon Dioxide (C02)	640 ppm	

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

651-DC-08-A

LEL - 0.0
C02 - 550
02 - 20.6

- sealed with ziplock bag.

DTW - 1.121 m

DTB - 1.534 m.

Stick up - 0.91 m.

- 651-DC-08-A was purged DRY using pre-existing micro waterra.
- yielding ~150mL.
- DTW after purge = 1.488 m
- Waited 10 min. Recharge was 0.10 m, which would be insufficient water to sample even if (A) was in scope

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-11	**Project Number:**	1343-005.03	**Date:**	29 June 2014
Approximate Date Drilled:	unknown	**Client:**	Yukon AAM	**Sampler:**	AB AN
Piezometer Diameter / Screen Length:	2" PVC / unknown	**Project Name:**	Mt Nansen GW Sample	**Weather/Temperature:**	overcast, cool, ~8°C
CHV (ppm / % LEL):	not recorded	**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method N/A

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):	N/A (dry)	**Calculations:**	**Purge Start Time:**		**Purge End Time:**			
Depth to Bottom (m):	4.909	N/A, well dry	**Time (___) minute interval:**					
Submerged Tubing Depth (m):	N/A		**Depth (m)**					
Well Stick-up Height (m):	0.82 m		**Temperature (°C)**	DRY				
Estimated Water Volume (L):	N/A		**pH**					
			Cond. (µs/cm)					
			Specific Cond. (µs/cm)					
			Redox (mV)					
			DO (mg/L)					
			Appearance & Odour (Clear, Silty, HC odours, etc.)					
			Total Purge Volume:					

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Sample Method N/A

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

Existing 1L plastic bailer in well

HEMMERA

Sample Site (Con't): MW09-11

UTM Location: Zn: 08 U **Easting:** 0389037 **Northing:** 6880711

Photo No.: Camera 1. 0151 - 0154

Well Head Space Gases:

	%	ppm
Methane (CH4)	0 % LEL	
Oxygen (O2)	20.5 %	
Carbon Dioxide (C02)	440 ppm	

well sealed w/ plastic cap. but holes cut in top of blank to hold bailer twine (atmospheric intrusion)

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

PVC + stick up protector in good shape (other than slits)

In "sand dune" area

HEMMERA

p 1/2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	CH-P-13-04/10	**Project Number:**	1343-005.02	**Date:**	28 June 2014
Approximate Date Drilled:	unknown	**Client:**	Yukon AAM	**Sampler:**	AB AW
Piezometer Diameter / Screen Length:	2" PVC / unknown	**Project Name:**	Mt Nansen GW Sample	**Weather/Temperature:**	Clear, Sunny ~17°C
CHV (ppm / % LEL):	not recorded	**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method N/A

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	* See reverse				

Initial Depth to Water (m):	2.928 *	**Calculations:**	**Purge Start Time:**	N/A	**Purge End Time:**	N/A				
Depth to Bottom (m):	2.976 *	Well essentially dry, not enough water to purge or sample	**Time (___) minute interval:**							
Submerged Tubing Depth (m):	N/A		**Depth (m)**							
Well Stick-up Height (m):	0.638		**Temperature (°C)**							
Estimated Water Volume (L):	N/A		**pH**	NO PURGE,						
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**							
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**	NO SAMPLE						
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**							
			DO (mg/L)							
			Appearance & Odour (Clear, Silty, HC odours, etc.)							
			Total Purge Volume:							

Sample Method N/A

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

OVER →

Sample Site (Con't): CH-P-13-04/10

UTM Location: Zn: 08 U Easting: 0389138 Northing: 6881472

Photo No.: Camera 1 → 0111 - 0113

Well Head Space Gases:

	%	ppm
Methane (CH4)	0% LEL	
Oxygen (O2)	20.5 %	
Carbon Dioxide (C02)	440 ppm	

well sealed w/ cap

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- No existing tubing or bailers in well, none added
- well in good condition, in middle of road blocked by berm of gravel @ main road, hike in to access
- unknown why measured DTB < 10 m implied by well name and spreadsheet (doesn't feel like blockage or ice (feels like well casing bottom), but could be blockage?

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-20	**Project Number:**	1343-00508	**Date:**	28 June 14
Approximate Date Drilled:		**Client:**	AAM	**Sampler:**	BH/MH
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MD GW (SDM)	**Weather/Temperature:**	Sunny
CHV (ppm / % LEL):		**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☒ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):		**Calculations:**	**Purge Start Time:**		**Purge End Time:**				
Depth to Bottom (m):	3.67		**Time (___) minute interval:**						
Submerged Tubing Depth (m):			**Depth (m)**						
Well Stick-up Height (m):	0.91		**Temperature (°C)**						
Estimated Water Volume (L):			**pH**						
			Cond. (µs/cm)						
			Specific Cond. (µs/cm)						
			Redox (mV)						
			DO (mg/L)						
			Appearance & Odour (Clear, Silty, HC odours, etc.)						
			Total Purge Volume:						

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): MW09-20

UTM Location: Zn: 08V Easting: 0388592 Northing: 6880586

Photo No.: Cam#2 #0071

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.4	
Carbon Dioxide (C02)	17000	0

CO

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- unable to purge or sample, dry well

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GLL07-02	**Project Number:**	1343-005.03	**Date:**	2014/06/28
Approximate Date Drilled:	unknown	**Client:**	AAM	**Sampler:**	AN, AB
Piezometer Diameter / Screen Length:	15.5 cm steel casing / unknown	**Project Name:**	MN GW Sampling Program.	**Weather/Temperature:**	clear, sunny. ~20°C.
CHV (ppm / % LEL):	not recorded.	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):	DRY	**Calculations:**	**Purge Start Time:**		**Purge End Time:**				
Depth to Bottom (m):	7.12	found a 1L plastic bailer and string already in steel casing, no water in casing/ bailer	**Time (___) minute interval:**						
Submerged Tubing Depth (m):	N/A.		**Depth (m)**						
Well Stick-up Height (m):	1.37		**Temperature (°C)**						
Estimated Water Volume (L):			**pH**						
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**						
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**						
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**						
			DO (mg/L)						
			Appearance & Odour (Clear, Silty, HC odours, etc.)						
			Total Purge Volume:						

DRY

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): GLL07-02

UTM Location: Zn: 08V Easting: 0389069 Northing: 6881703

Photo No.: Camera 2 0144 - 0147

Well Head Space Gases:

	%	ppm
Methane (CH4) LEL	0.0 % LEL	
Oxygen (O2)	19.8 %	
Carbon Dioxide (C02)	3840 ppm.	

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- 15.5cm Θ steel casing in ground, no inert PVC/ stainless steel inside

NOT A MONITORING WELL

- Entred GPS coordinates into GPS unit and navigate to this exact location

HEMMERA

pkz

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	CH-P-13-04/35	**Project Number:**	1343-005.03	**Date:**	28 June 2014
Approximate Date Drilled:	unknown	**Client:**	Yukon AAM	**Sampler:**	AS AN
Piezometer Diameter / Screen Length:	1" PVC w/ over size csp/ unknown	**Project Name:**	Mt Nansen GW Sample	**Weather/Temperature:**	clear, sunny, ~17°C
CHV (ppm / % LEL):	not recorded	**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method N/A

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):	6.505	**Calculations:**	**Purge Start Time:**		**Purge End Time:**			
Depth to Bottom (m):	6.505	⊗ Blockage in well @ 6.505m btoc, unknown. Sounds/feels plastic/ hollow, not like ice. Was an existing bailer in well, won't pass blockage. Probe dings @ blockage	**Time (___) minute interval:**					
Submerged Tubing Depth (m):	N/A		**Depth (m)**					
Well Stick-up Height (m):	0.608		**Temperature (°C)**					
Estimated Water Volume (L):	N/A		**pH**	NO PURGE,				
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**					
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**	NO SAMPLE				
2" casing has 0.16 USgal/ft or 2.032 l/m			**Redox (mV)**					
1" casing has 0.04 USgal/ft or 0.508 l/m			**DO (mg/L)**					
8" sand pack has 0.73 USgal/ft or 9.271 l/m			**Appearance & Odour (Clear, Silty, HC odours, etc.)**					
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Total Purge Volume:**					

Sample Method N/A

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

OVER

HEMMERA

Sample Site (Con't): CH-P-13-04/35

UTM Location: Zn: 08 U **Easting:** 0389138 **Northing:** 6881472

Photo No.: Camera 1 → 0111 - 0113

Well Head Space Gases:

	%	ppm
Methane (CH4)	0% LEL	
Oxygen (O2)	20.5%	
Carbon Dioxide (C02)	690 ppm	

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

Well w/ oversized cap for 3" PVC (poor fit/seal) otherwise stick up in good condition

Unknown blockage @ 6.505 m (assume well depth is 35 m based on name + spreadsheet) ?

HEMMERA

p1/2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GS1-PC-03-B	**Project Number:**	1343-005.03	**Date:**	2014/06/28
Approximate Date Drilled:	unknown.	**Client:**	AAM	**Sampler:**	AN, AB
Piezometer Diameter / Screen Length:	0.5" / unknown.	**Project Name:**	MN GW Sampling Program.	**Weather/Temperature:**	clear, sunny ~20°C.
CHV (ppm / % LEL):	not recorded.	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☒ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
micro waterra (manual).					

Initial Depth to Water (m):	1.398
Depth to Bottom (m):	2.825
Submerged Tubing Depth (m):	~2.5
Well Stick-up Height (m):	0.90
Estimated Water Volume (L):	0.181

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

0.5" casing has 0.127 l/m.

2" casing has 0.16 USgal/ft or 2.032 l/m

1" casing has 0.04 USgal/ft or 0.508 l/m

8" sand pack has 0.73 USgal/ft or 9.271 l/m

6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations:

well seated with plastic cap.
Micro waterra found frozen in well.
Tubing dislodged and ice removed.
Well purged, yielding ~150 mL.
DTW post purge = 2.360m
Waited 5 min.
DTW = 2.350 m
Waited another 5 min.
DTW = 2.350 m.
Insufficient water to samp.

Purge Start Time:		**Purge End Time:**			
Time (___) minute interval:					
Depth (m)					
Temperature (°C)					
pH					
Cond. (µs/cm)					
Specific Cond. (µs/cm)					
Redox (mV)					
DO (mg/L)					
Appearance & Odour (Clear, Silty, HC odours, etc.)					
Total Purge Volume:					

Insufficient Water to Sample

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): GS1-PC-03B

UTM Location: Zn: 08V **Easting:** 0389256 **Northing:** 6981706

Photo No.: 0128 - 0131 (camera #1)

Well Head Space Gases:

	%	ppm
Methane (CH4)	0.0	
Oxygen (O2)	20.4	
Carbon Dioxide (C02)	890 ppm.	

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

GS1-PC-03-A

Well head space:

LEL = 0.0

O2 = 20.9

CO2 = 470

well sealed with ziplock bag.

DTW = 1.095 m

DTB = 2.006m.

Stick up = 0.92 m.

HEMMERA

p1/2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GS1-PC-04-B	**Project Number:**	1343-005.03	**Date:**	2014/06/28
Approximate Date Drilled:	unknown.	**Client:**	AAM.	**Sampler:**	AN, AB
Piezometer Diameter / Screen Length:	0.5" / unknown.	**Project Name:**	MN GW sampling Programm.	**Weather/Temperature:**	clear, sunny. ~20°C
CHV (ppm / % LEL):	not recorded.	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☒ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
micro waterra. (manual).					

Initial Depth to Water (m):	1.888	**Calculations:**	**Purge Start Time:**		**Purge End Time:**
Depth to Bottom (m):	2.586	Well sealed with plastic cap. Blockage found in well @ 1.245m (presumed ice). Micro waterra found stuck in well. Tubing dislodged and blockage cleared. Pumped DRY using micro waterra, yielded < 100mL. Waited 10 min. DTW was 2.387. - Insufficient water to sample.	**Time (___) minute interval:**		
Submerged Tubing Depth (m):	~2.3		**Depth (m)**		
Well Stick-up Height (m):	0.92		**Temperature (°C)**		
Estimated Water Volume (L):	0.0886		**pH**		
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**		
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**		
0.5" casing has 0.127 l/m.			**Redox (mV)**		
2" casing has 0.16 USgal/ft or 2.032 l/m			**DO (mg/L)**		
1" casing has 0.04 USgal/ft or 0.508 l/m			**Appearance & Odour (Clear, Silty, HC odours, etc.)**		
8" sand pack has 0.73 USgal/ft or 9.271 l/m					
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Total Purge Volume:**		

Insufficient Water for Sample

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): GSI-PC-04-B

UTM Location: Zn: 08 U Easting: 0389586 Northing: 6881660

Photo No.: 0121 – 0127 (camera #1)

Well Head Space Gases:

	%	ppm
Methane (CH4) LEL	0.0	
Oxygen (O2)	20.5	
Carbon Dioxide (C02)	500 ppm.	

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

GSI-PC-04-A

Well head space:

LEL = 0.0

O2 = 20.5

CO2 = 490

- well sealed with Ziplock bag.
- no pre-existing tubing.

stick up = 0.89 m.

DTB = 1.262 m

DTW = DRY.

HEMMERA

P1/2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GSI-PC-05-B	**Project Number:**	1343-005.03	**Date:**	2014/06/28
Approximate Date Drilled:	unknown	**Client:**	AAM	**Sampler:**	AN, AB
Piezometer Diameter / Screen Length:	0.5"/unknown	**Project Name:**	MN GW Sampling Program	**Weather/Temperature:**	clear, sunny ~20°C
CHV (ppm / % LEL):	not recorded	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):	DRY	**Calculations:**	**Purge Start Time:**		**Purge End Time:**			
Depth to Bottom (m):	3.751	Well found dry @ 12:00. Existing micro waterra and D25 foot valve found in well. Well sealed with PVC cap.	**Time (___) minute interval:**					
Submerged Tubing Depth (m):	N/A		**Depth (m)**					
Well Stick-up Height (m):	0.91		**Temperature (°C)**					
Estimated Water Volume (L):			**pH**					
			Cond. (µs/cm)					
			Specific Cond. (µs/cm)					
			Redox (mV)					
			DO (mg/L)					
			Appearance & Odour (Clear, Silty, HC odours, etc.)					
			Total Purge Volume:					

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

Sample Site (Con't): GS1-PC-05B

UTM Location: Zn: 08 U Easting: 389713 Northing: 6881661

Photo No.: 0114 – 0120 (camera #1).

Well Head Space Gases:

	%	ppm
Methane (CH4)	0.0	
Oxygen (O2)	20.2	
Carbon Dioxide (C02) LEL	730 ppm.	

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

GS1-PC-05-A

- well located @ same UTM as 'GS1-PC-05-B'.

Well Head Space Gases (A)

CO2 = 470
O2 = 20.5
LEL = 0.0

- well sealed with ziplock bag.
- well also found DRY.

DTW: DRY
DTB: 1.306 m
stick up: 0.92 m.

- no pre-existing tubing.

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MP09-01	**Project Number:**	1343-005.03	**Date:**	2014/06/28
Approximate Date Drilled:	—	**Client:**	AAM	**Sampler:**	AN, AB
Piezometer Diameter / Screen Length:	—	**Project Name:**	MN GW Sampling Program.	**Weather/Temperature:**	Clear, sunny ~20°C
CHV (ppm / % LEL):	—	**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):		**Calculations:**	**Purge Start Time:**		**Purge End Time:**			
Depth to Bottom (m):		Well not located. VTM provide in the scope of work is same as well MP09-08'. MP09-08 was located and sampled.	**Time (___) minute interval:**					
Submerged Tubing Depth (m):			**Depth (m)**					
Well Stick-up Height (m):			**Temperature (°C)**					
Estimated Water Volume (L):			**pH**					
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**					
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**					
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**					
			DO (mg/L)					
			Appearance & Odour (Clear, Silty, HC odours, etc.)					
			Total Purge Volume:					

Well not located.

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): MP09-01

UTM Location: Zn: Easting: Northing:

Photo No.:

Well Head Space Gases:

	%	ppm
Methane (CH4)		
Oxygen (O2)		
Carbon Dioxide (C02)		

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

Well not located.
see front for details.

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-05	**Project Number:**	1343-005.05	**Date:**	28-June 14
Approximate Date Drilled:		**Client:**	AAM	**Sampler:**	RM / MM
Piezometer Diameter / Screen Length:		**Project Name:**	MN GW (Spring)	**Weather/Temperature:**	Sunny.
CHV (ppm / % LEL):		**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):		**Calculations:**	**Purge Start Time:**		**Purge End Time:**				
Depth to Bottom (m):		NOT SAMPLED	**Time (___) minute interval:**						
Submerged Tubing Depth (m):			**Depth (m)**						
Well Stick-up Height (m):			**Temperature (°C)**						
Estimated Water Volume (L):			**pH**						
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume		SEE BACK	**Cond. (µs/cm)**						
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**						
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**						
			DO (mg/L)						
			Appearance & Odour (Clear, Silty, HC odours, etc.)						
			Total Purge Volume:						

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): MW09-05

UTM Location: Zn: 08V Easting: 0389413 Northing: 6880656

Photo No.: Cam2 #0064

Well Head Space Gases:

	%	ppm
Methane (CH4)		
Oxygen (O2)		
Carbon Dioxide (C02)		

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- well located within tailings pond, restricted access due to deep pond water therefore could not purge or sample

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-06	**Project Number:**	1343-0005.03	**Date:**	20-June-14
Approximate Date Drilled:		**Client:**	APM	**Sampler:**	RM/MW
Piezometer Diameter / Screen Length:		**Project Name:**	MWGW(SP)09	**Weather/Temperature:**	sunny
CHV (ppm / % LEL):		**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):		**Calculations:**	**Purge Start Time:**		**Purge End Time:**			
Depth to Bottom (m):			**Time ( ) minute interval:**					
Submerged Tubing Depth (m):			**Depth (m)**					
Well Stick-up Height (m):			**Temperature (°C)**					
Estimated Water Volume (L):			**pH**					
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume		NOT SAMPLED SEE BACK	**Cond. (µs/cm)**					
			Specific Cond. (µs/cm)					
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Redox (mV)**					
			DO (mg/L)					
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Appearance & Odour (Clear, Silty, HC odours, etc.)**					
			Total Purge Volume:					

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): MW09-06

UTM Location: Zn: Easting: CANNOT LOCATE Northing:

Photo No.:

Well Head Space Gases:

	%	ppm
Methane (CH4)		
Oxygen (O2)		
Carbon Dioxide (C02)		

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (^{0}C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- unable to locate well using NW GPS + site plan
- no other wells in the area (Damaged, destroyed, removed?)

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	W1410303BH02	**Project Number:**	1343-005.03	**Date:**	28-June-14
Approximate Date Drilled:		**Client:**	DAM	**Sampler:**	RM/MH
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MJ GW Spring	**Weather/Temperature:**	sunny
CHV (ppm / % LEL):	1	**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	6.897	**Calculations:**	**Purge Start Time:**	8:48	**Purge End Time:**				
Depth to Bottom (m):	7.92		**Time (__) minute interval:**	8:54					
Submerged Tubing Depth (m):	~7.4		**Depth (m)**						
Well Stick-up Height (m):	0.8		**Temperature (°C)**	3.4	CANNOT				
Estimated Water Volume (L):	2.078736	*3 = 6.236208	**pH**	7.46	SAMPLE				
			Cond. (µs/cm)	1409					
			Specific Cond. (µs/cm)	2436					
			Redox (mV)	-46.0					
			DO (mg/L)	1.6					
			Appearance & Odour (Clear, Silty, HC odours, etc.)	clear, no odour					
			Total Purge Volume:	0.5L					

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☒ No		

HEMMERA

Sample Site (Con't): W1410508383BH02
W1481102
UTM Location: Zn: 08 v Easting: 0389561 Northing: 6980665

Photo No.: Cam2 #0065

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	21.3	
Carbon Dioxide (C02)	602	

3 no cap

CO O

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- new 3/16" tubing added
- bailer in well found to ice inside
- could not measure water level during purging due to ice build up around well annuals
- dry @ 1L, will return to check recharge rate.
- Insufficient well volume, could not sample or purge

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	WM10308BH01	**Project Number:**	1343-0005.03	**Date:**	23-June-14
Approximate Date Drilled:		**Client:**	ARM	**Sampler:**	RM / MN
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MN GW Sampling	**Weather/Temperature:**	Sunny
CHV (ppm / % LEL):		**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☒ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):	6.646	**Calculations:**	**Purge Start Time:**		**Purge End Time:**				
Depth to Bottom (m):	→ Frozen		**Time (___) minute interval:**						
Submerged Tubing Depth (m):			**Depth (m)**						
Well Stick-up Height (m):	0.64		**Temperature (°C)**						
Estimated Water Volume (L):			**pH**						
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**						
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**						
2" casing has 0.16 USgal/ft or 2.032 l/m			**Redox (mV)**						
1" casing has 0.04 USgal/ft or 0.508 l/m			**DO (mg/L)**						
8" sand pack has 0.73 USgal/ft or 9.271 l/m			**Appearance & Odour (Clear, Silty, HC odours, etc.)**						
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Total Purge Volume:**						

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		See back

HEMMERA

Sample Site (Con't): WH103039.3BH01
W14BH01
UTM Location: Zn: 08V Easting: 6389522 Northing: 6880659

Photo No.: Cam2 #00067

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	21.0	
Carbon Dioxide (C02)	521	0

3 no well cap

CO

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- obstruction (Frozen) @ 6.646m
  - ↳ ice @ the tip of the water level
- revisited 29-July-19, still frozen

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-19	**Project Number:**	1343-005.03	**Date:**	26-June-14
Approximate Date Drilled:	\	**Client:**	AAM	**Sampler:**	RM / MM
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MN Gwspring)	**Weather/Temperature:**	Partly sunny, cloudy.
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	~~☑ Good~~ ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	2.527
Depth to Bottom (m):	5.87
Submerged Tubing Depth (m):	~5.3
Well Stick-up Height (m):	0.09
Estimated Water Volume (L):	6.793

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations:

3 * 6.793 =

20.3789 28

Purge Start Time: 14:45 **Purge End Time:** 15:33

Time (5) minute interval:	14:50	15:04	15:13	15:22	15:33
Depth (m)	2.89	3.25	3.25	3.25	3.25
Temperature (°C)	2.2	1.7	1.6	1.6	1.6
pH	6.59	6.75	6.76	6.76	6.76
Cond. (µs/cm)	2421	1309	1303	1289	1285
Specific Cond. (µs/cm)	1356	2371	2353	2329	2327
Redox (mV)	-66.6	-78.6	-80.2	-86.5	-81.7
DO (mg/L)	0.94	2.66	2.64	2.44	2.19
Appearance & Odour (Clear, Silty, HC odours, etc.)	clear, no odour	clear, no odour	clear, no odour	clear, no odour	clear, no odour
Total Purge Volume:	1	5	10	15	20

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		X					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MW09-19	dis metals (F) dis mercury (F) TIC gen chem cyanide cyanate NH3 sulphide SCN	15:34	120ml P Y " P Y 250ml G N 1L P N 1L P Y 250ml G Y 250ml G Y 120ml P Y " " Y	☐ Yes ☑ No	2.46	2a back

FB-7
taken

HEMMERA

Sample Site (Con't): MW09-19
MW09-19
UTM Location: Zn: 08U Easting: 0388051 Northing: 6883016
Cam 1
Photo No.: 0040 + 0041

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.6	
Carbon Dioxide (C02)	2.90	

CO

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	15:34
Temperature (°C)	1.6
DO (mg/L)	2.19
Specific Cond. (µs/cm)	2327
Cond. (µs/cm)	1265
pH	6.76
Redox (mV)	-86.7
Turbidity (NTU)	246
Sulphide mg/L (µg/L)	125
~~DO (mg/L)~~	

General Notes (Condition of well or other features):
- vents on side of well (see pic #41)
- bailer inside
- new 3/16" tubing added

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09 - 02	**Project Number:**	1348-005.03	**Date:**	27-June-14
Approximate Date Drilled:		**Client:**	ARM	**Sampler:**	RM/MM.
Piezometer Diameter / Screen Length:	8"	**Project Name:**	MW GW (spring)	**Weather/Temperature:**	Sunny
CHV (ppm / % LEL):		**Duplicate Collected:**	☑ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	2.021
Depth to Bottom (m):	4.705
Submerged Tubing Depth (m):	~4
Well Stick-up Height (m):	0.75
Estimated Water Volume (L):	5.438888

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations:

3x vol.
16.3169 purge vol
2

Purge Start Time: 12:55 **Purge End Time:**

Time (___) minute interval:	13:00	13:07	13:16	13:23
Depth (m)	2.565	3.06	3.21	3.24
Temperature (°C)	4.5	4.2	4.8	4.7
pH	7.17	7.15	7.12	7.18
Cond. (µs/cm)	2614	1589	1651	1670
Specific Cond. (µs/cm)	1586	2621	2694	2670
Redox (mV)	-89.8	-76.1	-91.4	-92.1
DO (mg/L)	0.38	0.22	0.15	0.14
Appearance & Odour (Clear, Silty, HC odours, etc.)	Clear no odour	Clear no odour	→	→
Total Purge Volume:	1	5	11	17

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		X					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MW09-02	gen Chem NH_3 TIC	13:23	1L P M 250g " " Y " " N	☐ Yes ☐ No	16.9	Sediment.
+Dup-3	Cyanide Chromium diss metal (5) SCN Sulphide diss mercury (A)		140ml P 140ml P 120ml P " " " " 40ml g	Y Y Y Y Y Y		

HEMMERA

Sample Site (Con't): MW09-02

UTM Location: Zn: 08V Easting: 0389393 Northing: 6880557

Photo No.: 0059 -> 0062

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.6	
Carbon Dioxide (C02)	650	

00 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	13:23
Temperature (°C)	4.7
DO (mg/L)	0.14
Specific Cond. (µs/cm)	2670
Cond. (µs/cm)	1670
pH	7.13
Redox (mV)	-92.1
Turbidity (NTU)	10.2
Sulphide mg/L (µg/L)	23
DO (mg/L)	0.14

General Notes (Condition of well or other features):

- loose cap
- new 3/16" tubing added to well

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-03	**Project Number:**	1434-005.03	**Date:**	27-June-14
Approximate Date Drilled:	\	**Client:**	APM	**Sampler:**	RM/MM
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MW GW Sampling	**Weather/Temperature:**	sunny 24°C
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☑ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	4.737	**Calculations:**	**Purge Start Time:**	15:15	**Purge End Time:**			
Depth to Bottom (m):	9.03		**Time (__) minute interval:**	15:15	15:25	15:40	15:55	16:07
Submerged Tubing Depth (m):	~9		**Depth (m)**	5.06	5.15	5.15	5.15	5.15
Well Stick-up Height (m):	0.56		**Temperature (°C)**	3.9	3.8	3.9	3.6	3.5
Estimated Water Volume (L):	10.450576	x3 = 31.351728	**pH**	7.82	7.41	7.21	7.22	7.22
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**	1526	1513	1503	1489	1492
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**	2648	2538	2505	2523	2526
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**	-93.7	-42.4	-28.1	-25.4	-24.1
			DO (mg/L)	0.53	0.41	0.7	0.77	0.76
			Appearance & Odour (Clear, Silty, HC odours, etc.)	clear, no odour	→	→	→	→
			Total Purge Volume:	2L	9L	16L	23L	32L

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		X					

Sample ID	Parameters Analyzed	Sample Time	Container Types		Preservative	Turbidity (NTU)	Comments
MW09-03	gen chem NH_3 TIC diss. metals SCN sulphide cyanide cyanate diss. mercury	16:08	1L P 250ml G " " 120ml P " " " 140ml P " 40ml G	N Y N N Y Y Y Y Y Y Y	☐ Yes ☑ No	1.58	See back

HEMMERA

Sample Site (Con't): MW09-03

UTM Location: Zn: 08 U Easting: 0389421 Northing: 6980555

Photo No.: Cam2 #0061

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.9	
Carbon Dioxide (C02)	601.3	

CO 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	16:08
Temperature (°C)	3.5
DO (mg/L)	0.76
Specific Cond. (µs/cm)	2526
Cond. (µs/cm)	1492
pH	7.22
Redox (mV)	-24.1
Turbidity (NTU)	1.58
Sulphide mg/L (µg/L)	17
DO (mg/L)	0.76

General Notes (Condition of well or other features):

- transducer present.
- new 3/16" tubing added to well

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-22	**Project Number:**	1343-005.03	**Date:**	27-June-14
Approximate Date Drilled:	\	**Client:**	DPM	**Sampler:**	PM/MH
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MW GW Spring	**Weather/Temperature:**	Sunny
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☐ Good ☑ Bad → Slow

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	4.194
Depth to Bottom (m):	5.285
Submerged Tubing Depth (m):	~4.8
Well Stick-up Height (m):	0.88
Estimated Water Volume (L):	2.115312

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations:

3x volume (purge)
x3 = 6.345936

Purge Start Time: 16:19 **Purge End Time:**

Time (___) minute interval:	16:22	16:27	16:37	16:44
Depth (m)	4.41	4.60	4.90	5.05
Temperature (°C)	4.4	3.8	3.6	3.7
pH	5.67	5.71	5.83	5.82
Cond. (µs/cm)	1677	1627	1696	1684
Specific Cond. (µs/cm)	2763	2727	2071	2073
Redox (mV)	32.5	53.0	58.1	58.3
DO (mg/L)	0.64	1.49	2.57	2.58
Appearance & Odour (Clear, Silty, HC odours, etc.)	Slightly turbid no odours		clear no odour	clear no odour
Total Purge Volume:	1L	2L	4L	6.5L

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		X					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MW09-22	gen Chem NH3 TKN	16:50	1L P 250ml G	☐ Yes ☑ No	10.54	see back
	cyanide chloride diss. metals (F) SCN sulphide diss mercury (F)		60ml P " " 125ml P " " " " 40ml P			

FB 2

HEMMERA

Sample Site (Con't): MW09-22
MW09-22
UTM Location: Zn: 08U Easting: 0389495 Northing: 6886549

Photo No.: Cam2 #0062.

Well Head Space Gases:

	%	ppm
Methane (CH4)		4
Oxygen (O2)	2.05	
Carbon Dioxide (C02)	9.50	

CO O

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	16:50
Temperature (°C)	3.7
DO (mg/L)	2.58
Specific Cond. (µs/cm)	2073
Cond. (µs/cm)	1684
pH	5.82
Redox (mV)	58.3
Turbidity (NTU)	10.54
Sulphide mg/L µg/L	26
DO (mg/L)	2.58

General Notes (Condition of well or other features):

-new 3/16" tubing added to well

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-18	**Project Number:**	1348-005.03	**Date:**	26-June-14
Approximate Date Drilled:	/	**Client:**	AAM	**Sampler:**	RM/MH
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MN GW(Spring)	**Weather/Temperature:**	Sunny, cloudy
CHV (ppm / % LEL):	/	**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☑ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	4.555	**Calculations:**	**Purge Start Time:**	15:57	**Purge End Time:**			
Depth to Bottom (m):	7.77	6.532886 x3	**Time (___) minute interval:**	16:03	16:14	16:27	16:46	16:56
Submerged Tubing Depth (m):	~7.27	= 19.59864	**Depth (m)**	4.57	4.57	4.57	4.57	4.57
Well Stick-up Height (m):	0.90		**Temperature (°C)**	2.3	1.8	1.6	1.5	1.5
Estimated Water Volume (L):	6.532886		**pH**	6.84	6.75	6.97	7.03	7.01
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**	1460	1447	1438	1430	1434
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**	2575	2591	2594	2593	2590
2" casing has 0.16 USgal/ft or 2.032 l/m			**Redox (mV)**	33.3	26.8	280	29.9	31.3
1" casing has 0.04 USgal/ft or 0.508 l/m			**DO (mg/L)**	0.49	0.44	0.48	0.64	0.80
8" sand pack has 0.73 USgal/ft or 9.271 l/m			**Appearance & Odour (Clear, Silty, HC odours, etc.)**	Slightly turbid no odour	Clear, no odour	Clear, no odour	Clear, no odour	Clear, no odour
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Total Purge Volume:**	1	5	10	15	20

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		X					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MW09-18	NH_3 TIC OGM Diss. metal (F) " mercury (F) Cyanide Cyanate SCN Sulphide	16:57	250ml G Y N " P Y N 1L P Y N 120ml P Y " 140ml P Y " 120ml P Y "	☐ Yes ☑ No	6.49	See back

HEMMERA

Sample Site (Con't): MW09-18

MW09-18
UTM Location: Zn: 08V Easting: 0388054 Northing: 6980986

Photo No.: Cam#1 >0042

Well Head Space Gases:

	%	ppm
Methane (CH4)	0	0
Oxygen (O2)	20.6	\
Carbon Dioxide (C02)	2.76	\

CO O

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	16:57
Temperature (°C)	1.5
DO (mg/L)	0.80
Specific Cond. (µs/cm)	1434
Cond. (µs/cm)	2590
pH	7.01
Redox (mV)	31.3
Turbidity (NTU)	6.49
Sulphide mg/L (µg/L)	42
DO (mg/L)	0.80

General Notes (Condition of well or other features):

- vents on side of PVC, could influence gas reading
- new 3/16" tubing added to well
- bailer inside well

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GS1-DC-09-B	**Project Number:**	1343-005.03	**Date:**	2014/06/29
Approximate Date Drilled:	unknown.	**Client:**	AAM	**Sampler:**	AN, AB.
Piezometer Diameter / Screen Length:	0.5" / unknown.	**Project Name:**	MN GW Sampling Program.	**Weather/Temperature:**	overcast. ~10°C
CHV (ppm / % LEL):	not recorded.	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☒ Bad

Purge Method (managed at very low flow per pump)

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	e low flow				

Initial Depth to Water (m):	1.262
Depth to Bottom (m):	3.858
Submerged Tubing Depth (m):	~3.0m
Well Stick-up Height (m):	
Estimated Water Volume (L):	2.6 x .125 ~

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

½" x .125 approx

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations:

@ 12:15, post purge test earlier this morning

.275
.275
.275
.825 ÷3
~1.9L = 3 well volume?

- added 5m of ¼" waterra.

Purge Start Time:	12:18	**Purge End Time:**	12:27		
Time (3) minute interval:	12:21	12:24	12:27		
Depth (m)	2.96	2.67	2.74		
Temperature (°C)	3.4	3.8	3.9		
pH	6.42	6.53	6.60		
Cond. (µs/cm)	1217	1194	1151		
Specific Cond. (µs/cm)	2075	1995	1946		
Redox (mV)	68.9	72.1	63.5		
DO (mg/L)	0.75	0.49	0.23		
Appearance & Odour (Clear, Silty, HC odours, etc.)	light brown, silty	mostly clear	clear		
Total Purge Volume: (L) (cumulative)	0.5	6.8	1.1		

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		low flow.					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
GS1-DC-09-B	full suite	12:35 – 12:52	full suite	☒ Yes ☒ No	27.6 NTU from last sample collected (gen dem)	

Stopped purge @ 12:27 because of drawdown. water clear 2 sets stable parameters, almost 3 well volumes, purge rate of ~ 100 mL/min has water level stable. Recharge to 2.17m @ 12:32 and 1.45m @ 12:35

HEMMERA

Sample Site (Con't): GSI-DC-09-B

UTM Location: Zn: 08V Easting: 0390614 Northing: 6880494

Photo No.: 0158-0164 (Camera #1).

Well Head Space Gases:

	%	ppm
Methane (CH4)	0.0	
Oxygen (O2)	20.5	
Carbon Dioxide (C02)	530 ppm	

- well sealed with plastic cap.
- waterra tubing jammed in well making it difficult to measure gases.

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide S^{2-} mg/L (µg/L)	32
DO (mg/L)	

General Notes (Condition of well or other features):

GSI-DC-09-A

Well head space gases.

LEL · 0.0 %
C02 · 470 ppm
02 · 20.9%

Well sealed with ziplock bag.

DTW · 1.094 m
DTB · 1.359 m
stick up · 0.91 m.

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GSI-DC-10-B	**Project Number:**	1343-005.03	**Date:**	29 June 2014
Approximate Date Drilled:	unknown.	**Client:**	AAM	**Sampler:**	AB AN
Piezometer Diameter / Screen Length:	0.5" / unknown.	**Project Name:**	MN GW Sampling Program.	**Weather/Temperature:**	Overcast ~10°C.
CHV (ppm / % LEL):	not recorded.	**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☒ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	@ low flow				

Initial Depth to Water (m):	0.981
Depth to Bottom (m):	3.763
Submerged Tubing Depth (m):	~3.0m
Well Stick-up Height (m):	1.03
Estimated Water Volume (L):	~900ml

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

½" - .125

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations:

→ post purge test earlier this morning (water came up clear cleared?)

→ ~2.8m x .125

~900ml

-added 5m of ¼" waterra.

Purge Start Time: 14:20 **Purge End Time:**

Time (3rd minute interval:	14:23	14:26	14:29	14:32	14:33	14:35
Depth (m)	.986	.986	1.05	1.15	0.99	1.05
Temperature (°C)	4.3	4.2	3.2	3.1	3.3	3.2
pH	6.54	6.54	6.54	6.57	6.58	6.60
Cond. (µs/cm)	726	725	695	768	712	709
Specific Cond. (µs/cm)	1189	1201	1216	1215	1210	1212
Redox (mV)	57.3	59.5	64.9	68.8	69.4	70.5
DO (mg/L)	6.30	0.15	0.14	0.12	0.10	0.10
Appearance & Odour (Clear, Silty, HC odours, etc.)	brown, very silty	partially clear, light brown silty	mostly clear, faint light brown	clear	clear	clear
Total Purge Volume: (L) (cumulative)	0.4	0.8	1.3	1.8	2.3	2.8

→ switched flow interval, pump speed up slightly, water clear, minimal drawdown

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		low flow.					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
GSI-DC-10-B	full suite	14:38 - start 14:46 - End.	full suite →	☐ Yes ☐ No	13.9 NTU from last sample bottle collected (grn chm)	

HEMMERA

Sample Site (Con't): GS1-DC-10-B

UTM Location: Zn: 08V Easting: 0390859 Northing: 6880452

Photo No.: 0164 - 0166. (Camera #1).

Well Head Space Gases:

	%	ppm
Methane (CH4) LEL	0.0	
Oxygen (O2)	20.5	
Carbon Dioxide (C02)	440 ppm.	

- sealed with plastic cap.
- tubing stuck in well (jammed in tight). making measuring gas difficult.

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L (µg/L)	40
DO (mg/L)	

General Notes (Condition of well or other features):

GS1-DC-10-A

LEL · 0.0%
C02 · 520 ppm
02 · 20.6

DTW · DRY
DTB - 1.809 m.

Stick up. 1.04 m.

-Sealed with a ziplock bag.

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-07	**Project Number:**	1343-005.03	**Date:**	2014/06/28 + 2014/06/29
Approximate Date Drilled:	unknown.	**Client:**	AAM	**Sampler:**	AN, AB
Piezometer Diameter / Screen Length:	2" / unknown.	**Project Name:**	MN GW Sampling Program.	**Weather/Temperature:**	cloudy / sunny ~15°C.
CHV (ppm / % LEL):	not recorded	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☒ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	low flow.				

Initial Depth to Water (m):	2.461
Depth to Bottom (m):	3.397
Submerged Tubing Depth (m):	~3.10
Well Stick-up Height (m):	1.35
Estimated Water Volume (L):	~1.9

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations:

Well covered with PVC cap. Slits cut into PVC pipe for bailer. Purged 1.5 L. Well not recharging. Stopped purging, will return following day for sample. 2014/06/29 re-visited well to sample. (07:25). DTW prior to sample 2.626 m

Purge Start Time:	16:35	**Purge End Time:**			
Time (5) minute interval:	16:40	16:45			
Depth (m)	2.880	3.222			
Temperature (°C)		5.7			
pH		6.80			
Cond. (µs/cm)		1542			
Specific Cond. (µs/cm)		2411			
Redox (mV)		102.4			
DO (mg/L)		3.10			
Appearance & Odour (Clear, Silty, HC odours, etc.) cum.	Purge rate reduced	Purge stop. Due to draw down.			
~~Total~~ Purge Volume:	1	1.5			

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		e low flow					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MW09-07	full suite	7:40-7:56 @ 29 JUNE	full suite →	☐ Yes ☐ No	Post sample 32.2, slightly more clear e Sample start	

↳ DTW post sample = 3.085

↳ stopped here w/gen chemistry; no more water for pump ~ 250 mL only (filled last)

Used 1/4" 1/4" + silicon

HEMMERA

Sample Site (Con't): MW09-07

UTM Location: Zn: 08V Easting: 0389322 Northing: 6880699

Photo No.: 0148 - 0150 (camera #1).

Well Head Space Gases:

	%	ppm
Methane (CH4) LEL	0.0 % LEL	
Oxygen (O2)	20.9 %	
Carbon Dioxide (C02)	460 ppm	

well capped w/ plastic cap,
bot holes/slits cut in PVC blank for
holding bailer twine
1 2L plastic bailer already in place in well

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	32.2 NTU post sample
Sulphide S^{2-} mg/L (µg/L)	294
DO (mg/L)	

General Notes (Condition of well or other features):

2" PVC MW casing in larger 6" PVC casing
(pond protector?)
- see photos

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MP09-12	**Project Number:**	1343-005.03	**Date:**	29-Jun-14
Approximate Date Drilled:	\	**Client:**	AAM	**Sampler:**	RM/MD
Piezometer Diameter / Screen Length:	1.5"	**Project Name:**	MN GW (Spring)	**Weather/Temperature:**	overcast.
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☐ Good ☑ Bad Very slow recharge

Purge Method					
Waterra	**Peristaltic**	**Disp. Bailer**	**Steel Bailer**	**Centrif. Pump**	**Air Lift**
	X				

Initial Depth to Water (m):	2.229	**Calculations:**	**Purge Start Time:**	7:55			**Purge End Time:**	8:05			
Depth to Bottom (m):	4.175		**Time (___) minute interval:**	8:05							
Submerged Tubing Depth (m):	~3.8		**Depth (m)**	3.6							
Well Stick-up Height (m):	1.70		**Temperature (°C)**	6.5							
Estimated Water Volume (L):	2.1406	*3 = 6.4218	**pH**	7.46							
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**	3339							
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**	518.0							
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**	-91.7							
			DO (mg/L)	5.93							
			Appearance & Odour (Clear, Silty, HC odours, etc.)	turbid no odour							
			Total Purge Volume:	2L							

Sample Method							
	Waterra	**Peristaltic**	**Disp. Bailer**	**Steel Bailer**	**Centrif. Pump**	**Air Lift**	**Other**
Analysis			X (1")				

Sample ID	**Parameters Analyzed**	**Sample Time**	**Container Types**	**Preservative**	**Turbidity (NTU)**	**Comments**
MP09-12	gen chem TIC NH3 dissolved (F) diss metals (F) SCN sulphide cyanide chloride	13:18	1L P 250mL " " 40mL 120mL " " " 140mL "	N N Y Y Y Y Y Y Y Y Y	☐ Yes ☑ No 82.7	Set back

HEMMERA

Sample Site (Con't): MPG9_12

UTM Location: Zn: 08V Easting: 0389286 Northing: 6880814

Photo No.: Cam 2 #00080

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.9	
Carbon Dioxide (C02)	580	

CO

0

3 readings

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	13:19
Temperature (°C)	6.5
DO (mg/L)	5.93
Specific Cond. (µs/cm)	518.0
Cond. (µs/cm)	333.9
pH	7.46
Redox (mV)	-91.7
Turbidity (NTU)	82.7
Sulphide mg/L (µg/L)	270
DO (mg/L)	5.98

General Notes (Condition of well or other features):

- cut in PVC ∴ no gas seal

8:06 drawdown @ too fast, purged 2.5L, wait for recharge.

- new 3/16" tubing added
- 1" bailer used.
- Recommendation
  - purge @ the beginning of the program, + return to sample (1" bailer)

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

GS1-DC-07A IDW(m): 1.325 DTB(m): 1.985 Stick-up(m): 0.94

Well Number:	GS1-DC-07B	**Project Number:**	343-005.03	**Date:**	29-Jun-14
Approximate Date Drilled:		**Client:**	[illegible]	**Sampler:**	[illegible]
Piezometer Diameter / Screen Length:	1" (metal)	**Project Name:**	[illegible]	**Weather/Temperature:**	Sunny
CHV (ppm / % LEL):		**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☒ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	1.392	**Calculations:**	**Purge Start Time:**	15:45	**Purge End Time:**	16:12	
Depth to Bottom (m):	1.925		**Time (___) minute interval:**	15:46	15:54	16:02	16:12
Submerged Tubing Depth (m):	~1.70		**Depth (m)**				
Well Stick-up Height (m):	0.03		**Temperature (°C)**	4.8	2.9	2.7	2.8
Estimated Water Volume (L):			**pH**	6.98	7.08	7.03	7.03
			Cond. (µs/cm)	667	632	627	628
			Specific Cond. (µs/cm)	1092	1094	1086	1088
			Redox (mV)	-96.0	-86.7	-84.5	-84.4
			DO (mg/L)	0.01	1.64	0.46	0.42
			Appearance & Odour (Clear, Silty, HC odours, etc.)	Turbid, no odour	———	———	———
			Total Purge Volume:	0.5L	1.5	3L	

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		X					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
GS1-DC-07B	Diss. Metals Diss. Hg WAD Cyanide Sulphide Gen. Chem TIC NH3 Cyanate Cyanide	16:15	as before	☐ Yes ☑ No	11.79	

FB-4 taken

HEMMERA

Sample Site (Con't): GSI-DC-07B
DC07

UTM Location: Zn: 08U Easting: 0 391025 Northing: 6880641

Photo No.: Cam 2 #0086

Well Head Space Gases:

	%	ppm
Methane (CH4)	0	0
Oxygen (O2)	20.6	20.6
Carbon Dioxide (C02)	0	0

CO 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	16:15
Temperature (°C)	2.8
DO (mg/L)	0.42
Specific Cond. (µs/cm)	1088
Cond. (µs/cm)	608
pH	7.03
Redox (mV)	-84.4
Turbidity (NTU)	
Sulphide mg/L (µg/L)	11179
DO (mg/L)	0.42

General Notes (Condition of well or other features):

- new 3/16" tubing added

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

GS1-DC-06A IDW(m): 0.977 IDB(m): 1.755 Stick-up(m): 0.87

Well Number:	GS1-DC-06B	**Project Number:**	1343-005.03	**Date:**	29-Jan-14
Approximate Date Drilled:	/	**Client:**	PAM	**Sampler:**	KM/MH
Piezometer Diameter / Screen Length:	1" (metal)	**Project Name:**	MW GW Sampling	**Weather/Temperature:**	sunny, partly
CHV (ppm / % LEL):	/	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☒ Bad slow recharge

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	0.855
Depth to Bottom (m):	1.394
Submerged Tubing Depth (m):	~1.2
Well Stick-up Height (m):	0.51
Estimated Water Volume (L):	0.27382

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations:

purge volum
×3 = 0.82

Purge Start Time: 14:35 **Purge End Time:** 14:39

Time (___) minute interval:	14:36	14:38	14:39		
Depth (m)					
Temperature (°C)	8.2	8.1	8.1		
pH	7.13	7.10	7.10		
Cond. (µs/cm)	264	248	250		
Specific Cond. (µs/cm)	390	399	402		
Redox (mV)	-92.4	-82.3	-78.5		
DO (mg/L)	2.01	0.75	0.66		
Appearance & Odour (Clear, Silty, HC odours, etc.)	clear no odour	clear no odour	clear no odour		
Total Purge Volume:	0.1	0.8	1.2		

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
GS1-DC-06B	diss metals (F)	14:40	120ml	☐ Yes ☐ No	12-81	See back
	SO4					
	sulphide					
	diss. mercury (F)		40ml g			
	gen chem		1L p			
	TIC		250ml g			
	NH3		1L p			
	cyanide		40ml p			
	Cyanide		40ml p			

HEMMERA

Sample Site (Con't): GSI-DC-06

DC06

UTM Location: Zn: 08U Easting: 0389708 Northing: 6883567

Photo No.: Cam2 #0084

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	21.0	
Carbon Dioxide (C02)	5.20	

0 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	14:40
Temperature (°C)	8.1
DO (mg/L)	0.66
Specific Cond. (µs/cm)	402
Cond. (µs/cm)	250
pH	7.10
Redox (mV)	-78.5
Turbidity (NTU)	12.81
Sulphide mg/L µg/L	32
DO (mg/L)	0.66

General Notes (Condition of well or other features):

- new 3/16" tubing added

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MP09-09	**Project Number:**	1343-005.03	**Date:**	29-Jun-14
Approximate Date Drilled:	\	**Client:**	ADM	**Sampler:**	RM/MB
Piezometer Diameter / Screen Length:	1.5"	**Project Name:**	MJ GW Sampling	**Weather/Temperature:**	overcast
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☒ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	2.924	**Calculations:**	**Purge Start Time:**	9:15	**Purge End Time:**	9:30	
Depth to Bottom (m):	5.63		**Time (___) minute interval:**	9:20	9:25	9:28	9:30
Submerged Tubing Depth (m):	~5.1		**Depth (m)**	3.	4.2	4.91	5.30
Well Stick-up Height (m):	2.24		**Temperature (°C)**	5.9	5.2	5.8	5.8
Estimated Water Volume (L):	2.9766	x3=8.9298	**pH**	9.67	9.65	9.68	9.66
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**	184.2	169.1	173.1	174.3
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**	285.6	271.4	273.1	275.4
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**	-36.9	-31.3	-27.5	-23.1
			DO (mg/L)	0.84	0.43	0.34	0.25
			Appearance & Odour (Clear, Silty, HC odours, etc.)	very turbid no odour	very turbid no odour	→	→
			Total Purge Volume:	1L	2L	3L	

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis			X				

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MP09-09	Diss. Metals (F) Diss. Mercury (F) Sulphide	12:25	120ml P 40ml G 120 ml P " " " 250ml G 250ml G 1L P 240ml P " "	☒ Yes ☐ No	61	See back

SCN
TIC
NH_3
Diss Comm
Cyanide
Cyanate

HEMMERA

Sample Site (Con't): MP09-09

MP09-09

UTM Location: Zn: 08V Easting: 0589340 Northing: 6893068

Photo No.: Cam3 #00081

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.9	
Carbon Dioxide (C02)	520	

CO 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	12:25
Temperature (°C)	5.8
DO (mg/L)	0.25
Specific Cond. (µs/cm)	275.4
Cond. (µs/cm)	174.3
pH	9.66
Redox (mV)	-23.1
Turbidity (NTU)	61
Sulphide mg/L (µg/L)	651
DO (mg/L)	0.25

General Notes (Condition of well or other features):

- vent in side of casing: no gas 2m!
- new 3/16" tubing added
- slow recovery, purging stopped @ 3.5L recommendation
- purge early in the program + return later to some (1" bailers)
- 1" bailers used

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MP09-11	**Project Number:**	343-0057.03	**Date:**	29-Jun-14
Approximate Date Drilled:		**Client:**	DAM	**Sampler:**	RU/MS
Piezometer Diameter / Screen Length:	1.5"	**Project Name:**	MD GW (Spring)	**Weather/Temperature:**	overcast
CHV (ppm / % LEL):		**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☐ Good ☑ Bad slow recharge

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	2.211
Depth to Bottom (m):	4.95
Submerged Tubing Depth (m):	~4.7
Well Stick-up Height (m):	1.74
Estimated Water Volume (L):	3.6129

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations: *3 = 9.0387

Purge Start Time: 8:09 **Purge End Time:** 8:29

Time (___) minute interval:	8:12	8:22	8:29		
Depth (m)	2.75	3.19	4.20		
Temperature (°C)	7.4	5.1	5.1		
pH	7.5	7.61	7.54		
Cond. (µs/cm)	3763	511	498.7		
Specific Cond. (µs/cm)	561.0	803	884.7		
Redox (mV)	-92.9	-141.2	-146.2		
DO (mg/L)	0.78	0.72	0.37		
Appearance & Odour (Clear, Silty, HC odours, etc.)	clear no odour	turbid no odour	turbid no odour		
Total Purge Volume:	1L	2L	3.5L		

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis			X				

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MP09-11	gen chem NH3 TIC organic organic sulphide DOC diss metals (F) diss mercury (F)	13:39	1LP 250mL 250mL 140mL " 120mL " " 40mL	☐ Yes / ☐ No	34	subsan

HEMMERA

Sample Site (Con't): MP09-11

UTM Location: Zn: 08v Easting: 0388620 Northing: 6889614

Photo No.: Cam 2 #0080

Well Head Space Gases:

	%	ppm
Methane (CH4)		31
Oxygen (O2)	19.7	
Carbon Dioxide (C02)	8330	

CO O

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	~~13:39~~
Temperature (°C)	5.1
DO (mg/L)	0.37
Specific Cond. (µs/cm)	804.7
Cond. (µs/cm)	498.7
pH	7.54
Redox (mV)	-146.2
Turbidity (NTU)	34
Sulphide mg/L (µg/L)	~~.65~~ 411
DO (mg/L)	0.37

General Notes (Condition of well or other features):

- 8:30 – purging stopped @ 3.5L due to fast draw down. waiting for recharge
- new 3/16" tubing added
- ~~bladder~~ bailer used
- recommendation
  - purge early in the program, + return later to sample

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-21	Project Number:	1343-005.03	Date:	28-June-14
Approximate Date Drilled:	\	Client:	AAH	Sampler:	ZH, MM
Piezometer Diameter / Screen Length:	2"	Project Name:	MN GW (Spring)	Weather/Temperature:	Partly cloudy sunny
CHV (ppm / % LEL):	\	Duplicate Collected:	☐ Yes ☑ No	Recovery:	☒ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	1.568	**Calculations:**
Depth to Bottom (m):	3.576	
Submerged Tubing Depth (m):	~3	
Well Stick-up Height (m):	0.72	Purge volume ·
Estimated Water Volume (L):	4.08	x3 = 12.24

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Purge Start Time:	17:17		Purge End Time:	17:55	
Time (___) minute interval:	17:21	17:27	17:35	17:47	17:55
Depth (m)	1.79	1.91	1.93	2.01	2.02
Temperature (°C)	3.2	2.4	2.0	2.1	2.0
pH	6.78	6.82	6.82	6.82	6.82
Cond. (µs/cm)	1453	1426	1424	1424	1430
Specific Cond. (µs/cm)	2509	2514	2543	2542	2544
Redox (mV)	-60.9	-62.1	-64.6	-64.9	-64.8
DO (mg/L)	0.38	0.49	1.92	1.93	1.91
Appearance & Odour (Clear, Silty, HC odours, etc.)	clear no odour	clear no odour	clear no odour	→	→
Total Purge Volume:	1L	5L	8.5L	12L	14L

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		X					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MW09-21	gen chem NH_3 TP diss mercury (F) diss metals (F) Fcn Sulphide Chloride Cyanide	18:00	1L P N 250ml G Y " " N 40ml G Y 250ml G Y " " Y " " Y 40ml P Y " " Y	☐ Yes ☐ No	11.1	See back.

HEMMERA

Sample Site (Con't): MW09-21

UTM Location: Zn: 08V Easting: 0339536 Northing: 6[illegible]5577

Photo No.: Camd #0079

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.6	
Carbon Dioxide (C02)	550	

CO 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	18:00
Temperature (°C)	2.0
DO (mg/L)	1.91
Specific Cond. (µs/cm)	2544
Cond. (µs/cm)	1430
pH	6.82
Redox (mV)	-64.8
Turbidity (NTU)	11.1
Sulphide mg/L (µg/L)	-63
DO (mg/L)	1.91

General Notes (Condition of well or other features):
- new 3/16" tube added

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MD09-05	**Project Number:**	1348-005.03	**Date:**	28-June 14
Approximate Date Drilled:	\	**Client:**	AAM	**Sampler:**	RM/MM
Piezometer Diameter / Screen Length:	1.5"	**Project Name:**	MD GW (Spring)	**Weather/Temperature:**	Partly cloudy, sunny
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	1.414	**Calculations:**	**Purge Start Time:**	16:47		**Purge End Time:**	16:59	
Depth to Bottom (m):	1.82		**Time (__) minute interval:**	16:50	16:55	16:59		
Submerged Tubing Depth (m):	~1.8		**Depth (m)**	1.48	1.55	1.58		
Well Stick-up Height (m):	1.2	Purge vol	**Temperature (°C)**	10.1	8.9	8.5		
Estimated Water Volume (L):	0.4466	x3 = 1.3398	**pH**	6.71	6.74	6.75		
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**	1666	1640	1723		
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**	2350	2370	2390		
			Redox (mV)	-460	-43.6	-41.4		
			DO (mg/L)	4.9	4.09	4.10		
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Appearance & Odour (Clear, Silty, HC odours, etc.)**	Clear no odour	Clear no odour	Clear no odour		
			Total Purge Volume:	0.5	1L	1.5L		

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		X					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MD09-05	gen chem NH3 TIC	17:00	1L P 250ml g 250ml g	☐ Yes ☒ No	5.05	See back.
	Cyanide Chloride Diss. mercury Diss Metals SO4 Sulphide		40ml g 40ml g 40ml g 125ml P 125ml P 125ml P			

HEMMERA

Sample Site (Con't): MP09-05

UTM Location: Zn: 08V Easting: 0389548 Northing: 6890590

Photo No.: Camp #00078

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	21.1	
Carbon Dioxide (C02)	550	

CO O

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	16:59
Temperature (°C)	8.5
DO (mg/L)	4.10
Specific Cond. (µs/cm)	2390
Cond. (µs/cm)	1703
pH	6.75
Redox (mV)	-414
Turbidity (NTU)	5.05
Sulphide mg/L (µg/L)	16
DO (mg/L)	4.10

General Notes (Condition of well or other features):

- new 3/16" tubing added

HEMMERA

P1/2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	CH-P-13-03/50	**Project Number:**	B43-005.03	**Date:**	27 June 2014 + 28 Jun. 2014
Approximate Date Drilled:	Unknown	**Client:**	Yukon AAM	**Sampler:**	AB/AN
Piezometer Diameter / Screen Length:	2" PVC w/ cap/ unknown	**Project Name:**	Mt Nansen GW Sample	**Weather/Temperature:**	Clear/sunny ~ 20°C
CHV (ppm / % LEL):	not recorded	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☒ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
manual				→ 27 June 2014	

		Calculations:	Purge Start Time:	16:40	Purge End Time:				
Initial Depth to Water (m):	48.454	2.3m = 50% ~ 1.15L (approx 2m below DTW) 16:40 - attempt to purge well w/ 5/8" Waterra + D16 footvalve (no 2" bailer), limited water won't even reach surface (just fills tubing) DTW after 5/8" removed = 49.55m. Need 1" bailer	**Time (___) minute interval:**	16:50					
Depth to Bottom (m):	50.762		**Depth (m)**						
Submerged Tubing Depth (m):	bailer		**Temperature (°C)**						
Well Stick-up Height (m):	0.606m		**pH**						
Estimated Water Volume (L):	~1.15		**Cond. (µs/cm)**						
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Specific Cond. (µs/cm)**						
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Redox (mV)**						
2" casing has 0.16 USgal/ft or 2.032 l/m			**DO (mg/L)**	✓					
1" casing has 0.04 USgal/ft or 0.508 l/m			**Appearance & Odour (Clear, Silty, HC odours, etc.)**	unable to purge any further. No parameters measured. All water purged into waterra tubing. Not enough volume.					
8" sand pack has 0.73 USgal/ft or 9.271 l/m			**Total Purge Volume:**	~1 L					
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m									

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis			1" bailer.				

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
CH-P-13-03/50	full suite	Start 07:30 End 09:30 2014/06/28.	full suite	☒ Yes ☒ No	@ time of sample 70.1 NTU (Avg)	

Used 5/8" Waterra + D16 footvalve to attempt to purge w/ no success (not enough water) → ~52m

Returned to sample on 2014/06/28. DTW @ time of sample = 48.45 m (fully recharged to previous depth).

Sample very slow given small bailer

HEMMERA

p 2/2

Sample Site (Con't): CH-P-13-03/50 0389143

UTM Location: Zn: 08 U Easting: ~~08~~ Northing: 6881105 1183 m

Photo No.: 0098, 102, 103 Camera 2

Well Head Space Gases: → right side, beside 03/10

	%	ppm
Methane (CH4)	0 % LEL	
Oxygen (O2)	20.4 %	
Carbon Dioxide (C02)	1390 ppm	

well sealed w/ cap and intact

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

~~Sheen / Odour~~	
Time	09:30
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	256
DO (mg/L)	

General Notes (Condition of well or other features):

- ASSUME this is CH-P-13-03/50, despite stick up protector labelled as CH-P-13-02
- well cap faintly says ~~CH~~-P-13-03 though?
- Can't purge w/ 5/8" waterra, water column too low to reach ground (Fills tubing almost to surface only)

→ See AB field notes for more info

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MP09-04	**Project Number:**	1843-005.03	**Date:**	29-June-2014
Approximate Date Drilled:	/	**Client:**	AAM	**Sampler:**	RM/MM
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MJ GW (Spring)	**Weather/Temperature:**	Sunny
CHV (ppm / % LEL):	/	**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☑ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	2.024	**Calculations:**	**Purge Start Time:**	11:04		**Purge End Time:**	11:39
Depth to Bottom (m):	3.07		**Time ( ) minute interval:**	11:07	11:19	11:29	11:39
Submerged Tubing Depth (m):	~2.5	Purge volume =	**Depth (m)**	2.11	2.12	2.13	2.15
Well Stick-up Height (m):	1.2	*3 = 6.315456	**Temperature (°C)**	4.3	3.5	3.8	3.6
Estimated Water Volume (L):	2.105152		**pH**	6.99	6.94	7.04	7.04
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**	1016	947	955	959
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**	1677	1604	1607	1610
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**	76.0	72.3	60.9	58.2
			DO (mg/L)	3.8	4.16	4.08	4.09
			Appearance & Odour (Clear, Silty, HC odours, etc.)	Clear no odour	→	→	→
			Total Purge Volume:	1L	3L	5L	7L

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		X					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MP09-04	gen chem cyanide cyanate NH3 TIC diss mercury (F) diss metals (F) sen sulphide	11:40	1LP N 1L P Y 250ml P N 40ml G Y 120ml P Y	☐ Yes ☐ No	1.87	See back.

FB-3

HEMMERA

Sample Site (Con't): MP09-04

UTM Location: Zn: 08V Easting: 0389575 Northing: 6880609

Photo No.: Com 2#6069

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.5	
Carbon Dioxide (C02)	0.0	

0.0 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	11:39
Temperature (°C)	@ 3.1
DO (mg/L)	4.09
Specific Cond. (µs/cm)	1610
Cond. (µs/cm)	059
pH	7.04
Redox (mV)	58.2
Turbidity (NTU)	1.87
Sulphide mg/L (µg/L)	12
DO (mg/L)	4.09

General Notes (Condition of well or other features):

- new 3/16" tubing added.

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-24	**Project Number:**	1343-005.03	**Date:**	08-June-14
Approximate Date Drilled:		**Client:**	AAM	**Sampler:**	RM / MH
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MW GW(Spring)	**Weather/Temperature:**	sunny
CHV (ppm / % LEL):		**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☑ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
X					

Initial Depth to Water (m):	9.389	**Calculations:**	**Purge Start Time:**	9:35	**Purge End Time:**	10:00	
Depth to Bottom (m):	11.17		**Time (___) minute interval:**	9.35	9:45	9.55	10:00
Submerged Tubing Depth (m):	10.80		**Depth (m)**	9.5	9.92	10.02	10.04
Well Stick-up Height (m):	0.68		**Temperature (°C)**	2.9	2.6	2.6	2.6
Estimated Water Volume (L):	3.6189922	* 3 = 10.8569766	**pH**	7.51	7.43	7.34	7.34
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**	790	763	762	761
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**	1340	1325	1199	1198
			Redox (mV)	-40.2	-51.1	3.4	3.3
			DO (mg/L)	10.1	7.22	5.81	5.77
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Appearance & Odour (Clear, Silty, HC odours, etc.)**	Turbid + no odour		→	
			Total Purge Volume:	3	6	9	12

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis			X				

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MW09-24	10:20 →	→	see below	☐ Yes ☐ No	11.3	see back.

Gen chem 1L P (Nat)
Nitrate 60mL P (Preserved)
TIC " " (Nat)
Cyanide 140mL P (pre)
Cyanides " " "

Sulphur 140mL P (pre)
diss metals " (pre, F)
diss mercury 40mL G (" ")
SCN 60mL P (pre)

HEMMERA

Sample Site (Con't): MW09-24

UTM Location: Zn: 08V Easting: 389561 Northing: 6880624

Photo No.: Cam2 #00068

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.5	
Carbon Dioxide (C02)	0.0	

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	10:00
Temperature (°C)	2.6
DO (mg/L)	5.77
Specific Cond. (µs/cm)	1198
Cond. (µs/cm)	761
pH	7.34
Redox (mV)	3.3
Turbidity (NTU)	11.3
Sulphide mg/L µg/L	84
DO (mg/L)	5.77

General Notes (Condition of well or other features):

- New [illegible] waterra tubing added 3 foot valve

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

+28 June

Well Number:	MW09-23	**Project Number:**	1343-005.03	**Date:**	27-June-14
Approximate Date Drilled:	\	**Client:**	AAM	**Sampler:**	RM / MM
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MN GW(spring)	**Weather/Temperature:**	Partly cloudy, sunny.
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☒ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
X					

Initial Depth to Water (m):	11.913	**Calculations:**	**Purge Start Time:**	11:49	**Purge End Time:**	12:23		
Depth to Bottom (m):	15.805	3 well volums	**Time (✓) minute interval:**	11:54	12:03	12:07	12:13	12:18	12:23
Submerged Tubing Depth (m):	~15	×3	**Depth (m)**	12.07	12.16	12.16	12.16	12.16	12.16
Well Stick-up Height (m):	0.94	23.726.	**Temperature (°C)**	7.5	3.7	2.5	2.4	2.0	2.1
Estimated Water Volume (L):	7.908544	every 5L	**pH**	6.98	7.09	7.12	7.12	7.12	7.13
			Cond. (µs/cm)	73	4927	1515	1498	1475	1468
			Specific Cond. (µs/cm)	121	8403	2655	2640	2626	2618
			Redox (mV)	-130.5	-67.8	-86.5	-65.3	-65.5	-64.7
			DO (mg/L)	12.68	4.5	6.42	6.82	4.14	4.32
			Appearance & Odour (Clear, Silty, HC odours, etc.)	turbid no odour	turbid no odour	turbid no odour	turbid no odour	turbid, no odour	turbid. no odour.
			Total Purge Volume:	2	10	15	20	25	30

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis			X				

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MW09-23	-gen chem -TIC -NH_3	7:40	-1L P 250mL P	N N	☐ Yes ☒ No 30.1	See Dock.
	-cyanide -cyanate -diss. metals (F) -sulphide -DOC -diss. mercury (F)	June 28/14	140mL P 140mL P 125mL P " " " " 40mL G	Y Y Y Y Y Y		

HEMMERA

Sample Site (Con't): MW09-23

UTM Location: Zn: 08V Easting: 0389459 Northing: 6980053

Photo No.: Can 2 #0063

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.6	
Carbon Dioxide (C02)	620	

0 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	7:40
Temperature (°C)	2.1
DO (mg/L)	4.32
Specific Cond. (µs/cm)	260
Cond. (µs/cm)	1468
pH	7.12
Redox (mV)	-64.7
Turbidity (NTU)	30.1
Sulphide mg/L (µg/L)	90.0
DO (mg/L)	4.30

General Notes (Condition of well or other features):

- new 5/8" tubing added.
- Sample taken July 28 @ bailer, water too turbid to sample directly after purge.

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-08	**Project Number:**	1343-005.00	**Date:**	28-June-14
Approximate Date Drilled:	2009	**Client:**	AAM	**Sampler:**	RM / MBD
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MN GW (spring)	**Weather/Temperature:**	Sunny
CHV (ppm / % LEL):	—	**Duplicate Collected:**	☑ Yes ☐ No	**Recovery:**	☑ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	1.310	
Depth to Bottom (m):	3.905	
Submerged Tubing Depth (m):	3.45	
Well Stick-up Height (m):	1.08	
Estimated Water Volume (L):	5.21L	

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations:

5.21L x 3 =
15.64

Purge Start Time: 11:55 **Purge End Time:**

Time (10 minute interval):	11:55	12:05	12:15	12:25	12:35	12:40
Depth (m)	—	1.45	1.45	1.45	1.45	1.45
Temperature (°C)	—	4.3	4.0	3.2	3.3	3.3
pH	—	6.88	6.89	6.84	6.81	6.82
Cond. (µs/cm)	—	163.1	154.1	215.7	217.3	216.7
Specific Cond. (µs/cm)	—	274.2	259.3	377.8	380.1	381.2
Redox (mV)	—	-91.3	-94.2	-95.3	-96.1	-96.7
DO (mg/L)	—	0.48	1.05	1.36	1.38	1.41
Appearance & Odour (Clear, Silty, HC odours, etc.)	Clear no odour	Clear no odour	Slightly yellow sulphur like odour	Yellow tinge sulphur like odour	→	"
Total Purge Volume:	—	4L	8L	12L	16L	18L

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		X					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MW09-08	gen Chem PAHs TIC	12:41	1L P N 250 g " " N	☐ Yes ☑ No	2.02	See back

Dup-5 duplicate of MW09-08

Cyanide	1L P	
Cyanate	" "	
Sulphide	120ml P	
SCN	" "	
diss metals (F)	" "	
diss mercury (F)	40ml G	Y

DUP-5 same

HEMMERA

Sample Site (Con't): MD09-08

UTM Location: Zn: 08V Easting: 0389620 Northing: 6880576

Photo No.: Cam2 0070

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.04	
Carbon Dioxide (C02)	<20	

CO 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	10:41
Temperature (°C)	3.3
DO (mg/L)	1.41
Specific Cond. (µs/cm)	381.2
Cond. (µs/cm)	216.7
pH	6.82
Redox (mV)	-96.7
Turbidity (NTU)	2.02
Sulphide mg/L µg/L	92.0
DO (mg/L)	1.41

General Notes (Condition of well or other features):

Bailer in the well.

~~tbl~~ new tubing added.
3/16"

HEMMERA

P 1/2

GROUNDWATER SAMPLE COLLECTION SHEET

*see reverse

Well Number:	MP09-08*	**Project Number:**	1343-005.03	**Date:**	27 June 2014
Approximate Date Drilled:	unknown	**Client:**	Yukon AAM	**Sampler:**	AS AN
Piezometer Diameter / Screen Length:	~1/2" steel drive point/ unknown	**Project Name:**	Mt Nansen GW Sample	**Weather/Temperature:**	clear, sunny ~20°C
CHV (ppm / % LEL):	not recorded	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☒ Good ☐ Bad c low flow

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
micro (initial)	final c low flow			→ start peri pump	

Initial Depth to Water (m):	0.892	**Calculations:**	**Purge Start Time:**	14:10	**Purge End Time:**	14:40	
Depth to Bottom (m):	1.975	1m x .125 l/m = .125l	**Time (___) minute interval:**	14:25	14:32	14:35	14:37	14:40
Submerged Tubing Depth (m):	Stick-up bottom: 0.79 bottom: 1.09	Notes	**Depth (m)**	0.892	0.892	not recorded →		
Well Stick-up Height (m):	~1.5	14:10 - 14:25 purged 2L w/ micro bailer	**Temperature (°C)**		3.3	2.7	2.8	2.9
Estimated Water Volume (L):	~ .125	↓ foot valve in place, very brown/dark grey, silty, sulphur odour	**pH**		7.24	7.15	7.13	7.12
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume		14:32 - start peri pump purge	**Cond. (µs/cm)**		422.4	416.2	415.2	416.6
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**		723.1	726.3	721.0	720.3
0.125 for 1/2"			**Redox (mV)**		-101.8	-99.1	-97.3	-95.5
2" casing has 0.16 USgal/ft or 2.032 l/m			**DO (mg/L)**		2.34	2.09	1.92	1.64
1" casing has 0.04 USgal/ft or 0.508 l/m			**Appearance & Odour (Clear, Silty, HC odours, etc.)**	↓ see notes	Clear, Sulphur odour →			
8" sand pack has 0.73 USgal/ft or 9.271 l/m			**Total Purge Volume: (L)** (cumulative)	1	1.3	1.6	1.9	2.2
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m								

AS

DTW post sample = 0.910 m btoc

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		c low flow					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MP09-08	full suite	14:42 - 14:55	full suite →	☒ Yes ☒ No	1.92 NTU	

Hemmera added 3m 1/4 + silicon

OVER →

HEMMERA

Sample Site (Con't): MP09-08

UTM Location: Zn: 08 U Easting: 0389160 Northing: 6881718

Photo No.: 0095 - 0097 Camera 1

Well Head Space Gases:

	%	ppm
Methane (CH4) %LEL	0 % LEL	
Oxygen (O2) %	20.6 %	
Carbon Dioxide (C02) ppm	490	

well not sealed yet no cap

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

SET RESOURCE	
Time	14:40
Temperature (°C)	2.9
DO (mg/L)	1.64
Specific Cond. (µs/cm)	7203
Cond. (µs/cm)	416.6
pH	7.12
Redox (mV)	-95.5
Turbidity (NTU)	1.02
Sulphide S^{2-} mg/L (µg/L)	124
DO (mg/L)	1.64

General Notes (Condition of well or other features):

⊗ Have a figure and spreadsheet w/ UTM co-ords showing MP09-01 & 09-08 in same place. In field, no flagging tape markings @ this location so ASSUME this is MP09-08 because older of MP09 wells named as more down creek and saw flagging for a "09-01" drive point well ripped out by excavator near ESI-PC-01-A+B

HEMMERA

p 1/2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MP09-02	**Project Number:**	1343-005.03	**Date:**	2014/06/27
Approximate Date Drilled:	unknown.	**Client:**	AAM	**Sampler:**	AN, RS
Piezometer Diameter / Screen Length:	~0.5" / unknown.	**Project Name:**	MN GW Sampling Program.	**Weather/Temperature:**	clear, sunny ~12°C.
CHV (ppm / % LEL):	not recorded.	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☒ Good ☐ Bad (low flow)

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
initial micro purge	low flow.			→ start peri pump	

Initial Depth to Water (m):	1.228
Depth to Bottom (m):	1.970
Submerged Tubing Depth (m):	~1.5m
Well Stick-up Height (m):	above bmk = 1.09 above ground bottom = 1.36
Estimated Water Volume (L):	~100mL

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

0.5" casing has 0.127 l/m.
2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations:

Based on ½" casing and 0.127 l/m for well volume

Notes

Start purge w/ existing micro tubing (~½" + micro foot valve), good recovery but sample very turbid. Switch to peri pump and sample immediately clear

DTW post sample = 1.228m

Purge Start Time:	9:45		**Purge End Time:**	10:38	
Time (___) minute interval:	10:25	10:30	10:33	10:34	10:36
Depth (m)	↓	1.25	N/R →		
Temperature (°C)	pumped	3.5	3.4	3.4	3.3
pH	1.5L	7.38	7.28	7.23	7.22
Cond. (µs/cm)	w/ micro	308.6	305.7	305.5	304.9
Specific Cond. (µs/cm)	tubing,	522.8	524.1	520.5	522.0
Redox (mV)	See	70.1	71.9	75.3	75.8
DO (mg/L)	notes	5.78	5.80	5.54	5.49
Appearance & Odour (Clear, Silty, HC odours, etc.)	brown, silty + fine organic particles	clear →			
Total Purge Volume: (L) (cumulative)	1.5	1.75	2	2.25	2.5

N/R - not recorded

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		low flow.					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MP09-02	full suite	10:42 start 10:53 end	full suite →	☒ Yes ☒ No →	@ time of sample 1.96 NTU start + end	

↓ see first sample of project

OVER →

HEMMERA

Sample Site (Con't): MP09-02

UTM Location: Zn: 08U **Easting:** 0388867 **Northing:** 6581816

Photo No.: 0071-0073 Camera 1

Well Head Space Gases:

	%	ppm
Methane (CH4) %LEL	0 %LEL	Well (drive point)
Oxygen (O2) %	20.5 %	not capped/sealed
Carbon Dioxide (C02) ppm	450 ppm	

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Sample Previous Purge	
Time	10:36
Temperature (°C)	3.3
DO (mg/L)	5.49
Specific Cond. (µs/cm)	502.0
Cond. (µs/cm)	304.9
pH	7.22
Redox (mV)	75.8
Turbidity (NTU)	1.96
Sulphide S^{2-} mg/L (µg/L)	24 mgL
DO (mg/L)	5.49

General Notes (Condition of well or other features):

Drive point w/ ~ 5/8" metal casing + ~ 1/2" PVC tubing inside

Existing micro mattern + tubing in well; purge/sample too turbid

Hemmera added 3m 1/4 PVC + silicon for peri pump

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GROUNDWATER SAMPLE COLLECTION SHEET

pg. 1-2

Well Number:	CH-P-13-05/50	**Project Number:**	1343-005.03	**Date:**	2014/06/26 + 27
Approximate Date Drilled:	unknown.	**Client:**	AAM.	**Sampler:**	AN, AB.
Piezometer Diameter / Screen Length:	1"/unknown.	**Project Name:**	MN GW sampling Programme.	**Weather/Temperature:**	overcast. ~12°C.
CHV (ppm / % LEL):	not recorded.	**Duplicate Collected:**	☒ Yes ☐ No → DUP-2	**Recovery:**	☒ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
Hydrolift.					

Initial Depth to Water (m):	25.595
Depth to Bottom (m):	50.470
Submerged Tubing Depth (m):	~47.0
Well Stick-up Height (m):	0.88
Estimated Water Volume (L):	72.6365

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Notes ~~Calculations~~:
- Installed 52 m of 5/8" waterra, including D16 footvalve.

Purge Start Time:	16:25	**Purge End Time:**	17:12		
~~Time~~ (25) ~~minute~~ interval:	16:46	17:03	17:12		
Depth (m)	26.650	27.29	26.85		
Temperature (°C)	2.5	2.2	2.6		
pH	6.26	6.31	6.27		
Cond. (µs/cm)	1634	1626	1640		
Specific Cond. (µs/cm)	2862	2877	2864		
Redox (mV)	104.9	117.0	122.4		
DO (mg/L)	2.54	2.54	2.53		
Appearance & Odour (Clear, Silty, HC odours, etc.)	grey. brown. silty	light grey brown mostly clear.	faint light brown grey mostly clear		
Total Purge Volume: (L) (cumulative)	25L	50	60		

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis	~~Manual~~ → Manual (avoid agitation)						

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
CH-P-13-05/50	G.chem, Dis. Metals, SCN, Sulphide, Cyanate, Cyanide, TIC, NH3, Dis. Mercury.	08:18		☐ Yes ☐ No	@ time of sample = 24.1 NTV	DTW @ time of sample: 25.642 m

* Full suite package (refer to back).

2014/06/27

Post sample = 103 NTV

and → DUP-2

See reverse full suite for sample + duplicate

Sample Site (Con't): CH-P-13-05/50

UTM Location: Zn: 08 V Easting: 0388954 Northing: 6881466.

Photo No.: 0070, 0069, 0068 Camera 2

Well Head Space Gases:

	%	ppm
Methane (CH4) %LEL	0.0	—
Oxygen (O2) %	20.9	—
Carbon Dioxide (C02) %	1.42	—

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	17:12
Temperature (°C)	2.6
DO (mg/L)	2.53
Specific Cond. (µs/cm)	2864
Cond. (µs/cm)	1640
pH	6.27
Redox (mV)	122.4
Turbidity (NTU)	24.1
Sulphide mg/L (µg/L)	S^{2-} 434
~~DO (mg/L)~~	

* Full suite package
- General Chem. (RAW). 1000 mL plastic.
- Dis. Metals (field filter, nitric acid) - 125 mL plastic
- NH3 (H_2SO_4). 250 mL glass amber.
- Dis. Mercury (field filter, HCL) 40 mL glass.
- TIC (RAW) - 250 mL glass amber.
- Sulphide (Zinc Acetate, + NAOH) - 125 mL plastic
- SCN (HNO_3) - 125 mL plastic
- Cyanate (NaOH) - 145 mL plastic
- Cyanate (NaOH) - 145 mL plastic

General Notes (Condition of well or other features):

1" PVC W/no cap (not sealed). Small bailer inside
- will be tight fit for 47m of 5/8" tubing + foot valve DZ5 so used foot valve D16. Caused some initial turbidity + aggitation, but water became clear by end of purge
- Recorded turbidity @ 17:30, reading 84 NTU.
- did not sample 2014/06/26. Will return 2014/06/27 to sample.

- filled G.Chem. last (most turbid sample), aggitation from bottom + filtered metals

HEMMERA

pg 1-2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GLL07-03	**Project Number:**	1343-005.03	**Date:**	2014/06/26 & 2014/06/27.
Approximate Date Drilled:	unknown.	**Client:**	AAM	**Sampler:**	AN/MB
Piezometer Diameter / Screen Length:	2" / unknown.	**Project Name:**	MN GW Sampling Program.	**Weather/Temperature:**	overcast. ~10°C.
CHV (ppm / % LEL):	not recorded.	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☒ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
manual					

Initial Depth to Water (m):	10.031
Depth to Bottom (m):	11.745
Submerged Tubing Depth (m):	~11.0
Well Stick-up Height (m):	1.15
Estimated Water Volume (L):	3.4828

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Notes. Calculations:

Drawn down can not exceed 10.888 m depth. ½ of H_2O column.
Purge stopped from 15:18 to 15:30.
Resumed @ 15:30.
15:30 DTW: 10.420 m.
Purging stopped @ 15:39. ½ of H_2O column drawn down.
- 16:33 DTW 10.854
- 17:38 DTW 10.826

See next pg →

Purge Start Time: 15:15 **Purge End Time:** 15:39.

Time (5) minute interval:	15:18	15:34	15:39		
Depth (m)	10.450	10.660	10.885		
Temperature (°C)		3.8	4.5		
pH		6.18	6.19		
Cond. (µs/cm)		994	1014		
Specific Cond. (µs/cm)		1663	1659		
Redox (mV)		103.4	103.7		
DO (mg/L)		3.37	5.32		
Appearance & Odour (Clear, Silty, HC odours, etc.)	no readings YSI shutting off. Purge Paused.	YSI fixed. Some light, brown. grey. turbid.	Same. stopped purge.		
~~Total~~ Purge Volume:	1	2	5		

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis	manual						

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
GLL07-03	full suite	07:10 start	full suite	☒ Yes ☒ No	Turbidity @ start of sample = 22.0 NTU	DTW post sample 11.028 m

07:40 finish.
2014/06/27

Turbidity @ end of sample.
= 826 NU

Grab Clean + filtered metals collected last as manual Waterra causes increased agitation

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Sample Site (Con't): 6LL07-03

UTM Location: Zn: 08 V Easting: 0388959 Northing: 6881477

Photo No.: 0067, 0066. (taken on camera #1).

Well Head Space Gases:

	%	ppm
Methane (CH4) % LEL	0.0	—
Oxygen (O2) %	20.9	—
Carbon Dioxide (C02) %	1.42	—

→ well not sealed

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge): See previous page.

Time	15:39
Temperature (°C)	4.5
DO (mg/L)	5.32
Specific Cond. (µs/cm)	1659
Cond. (µs/cm)	1614
pH	6.19
Redox (mV)	103.7
Turbidity (NTU)	22.0
Sulphide mg/L (µg/L)	95.0 S^{2-}
DO (mg/L)	5.32

General Notes (Condition of well or other features):

Removed transducer @ 15:03. 2014/06/26.
No PVC cap on well.
Transducer re-installed @ 15:42 2014/06/26.
Installed 13 m of 5/8" waterra tubing, including D25 foot valve.
Re-visited well on 2014/6/27.
- removed transducer @ 07:04.
DTW @ time of sample: 10.735 m
Filled 6. Chem. last (most turbid sample).

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-04	**Project Number:**	1343-005.03	**Date:**	2-June-14
Approximate Date Drilled:		**Client:**	APM	**Sampler:**	RM/MM
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MV GW (Baseline)	**Weather/Temperature:**	Sunny 24°C
CHV (ppm / % LEL):		**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☑ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	2.607
Depth to Bottom (m):	7.67
Submerged Tubing Depth (m):	~7
Well Stick-up Height (m):	0.50
Estimated Water Volume (L):	10.105 [illegible] → ×3 = 30.315408

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Calculations:

Purge Start Time: 14:08 **Purge End Time:** 15:08

Time (✓) minute interval:	14:11	14:24	14:31	14:39	14:49	14:58	15:08
Depth (m)	3.129	3.55	4.02	4.59	4.91	4.98	5.01
Temperature (°C)	4.8	4.8	4.0	3.9	3.8	3.8	3.6
pH	8.58	8.68	8.67	8.65	8.60	8.61	8.64
Cond. (µs/cm)	590	543	925	1597	1572	1568	1543
Specific Cond. (µs/cm)	957	893	876	2667	2635	2647	2666
Redox (mV)	-200.6	-181.7	8.88	-170.1	-156.4	-154.0	-147.3
DO (mg/L)	0.38	0.00	0.19	2.3	0.04	0.31	0.28
Appearance & Odour (Clear, Silty, HC odours, etc.)	clear no odour	→	→	→	→	→	→
Total Purge Volume:	1	6	10	15	20	25	30

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		X					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MW09-04	Chromium NH3 TIC diss. metal (F) sulphide Sen diss. mercury (F) Cyanide Chloride	15:09	1L P N 250ml P Y " " N 120ml P N " " Y " " Y " " Y 40ml G Y 140ml P Y " " Y	☐ Yes ☒ No	5.08	see back

HEMMERA

Sample Site (Con't): MW09-04

UTM Location: Zn: 08v Easting: 638946120 Northing: 6880557

Photo No.: 0061 (cam 2)

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.6	
Carbon Dioxide (C02)	602.0	

CO O

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	15:10
Temperature (°C)	3.6
~~DO (mg/L)~~	—
Specific Cond. (µs/cm)	2666
Cond. (µs/cm)	154.3
pH	8.64
Redox (mV)	-147.3
Turbidity (NTU)	5.68
Sulphide mg/L (µg/L)	27.0
DO (mg/L)	0.28

General Notes (Condition of well or other features):

- Transducer present.
- new 3/16" tubing added to well

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	CH-D-13-01	**Project Number:**	1343-005 03	**Date:**	27-June-14
Approximate Date Drilled:	\	**Client:**	AAM	**Sampler:**	RM/MH
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MW GW(Spring)	**Weather/Temperature:**	Sunny
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):	1.9	**Calculations:**	**Purge Start Time:**		**Purge End Time:**			
Depth to Bottom (m):	2.63		**Time (___) minute interval:**					
Submerged Tubing Depth (m):	\		**Depth (m)**					
Well Stick-up Height (m):	0.5		**Temperature (°C)**					
Estimated Water Volume (L):	\		**pH**	DRY				
			Cond. (µs/cm)					
			Specific Cond. (µs/cm)					
			Redox (mV)					
			DO (mg/L)					
			Appearance & Odour (Clear, Silty, HC odours, etc.)	FROZEN				
			Total Purge Volume:					

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): CH-D-13-01
P-13-01

UTM Location: Zn: 08V Easting: 0388657 Northing: 6891116.

Photo No.: Cam#2 #0057

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.5	
Carbon Dioxide (C02)	640	

0 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- well is dry (frozen?) cannot sample or purge

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GSI-HA-04A	**Project Number:**	1343-005 03	**Date:**	27-June-11
Approximate Date Drilled:		**Client:**	APM	**Sampler:**	RW/MM
Piezometer Diameter / Screen Length:	1" DP	**Project Name:**	MN GW(SPring)	**Weather/Temperature:**	Sunny to cloudy
CHV (ppm / % LEL):		**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☐ Good ☑ Bad

Purge Method					
Waterra	**Peristaltic**	**Disp. Bailer**	**Steel Bailer**	**Centrif. Pump**	**Air Lift**

Initial Depth to Water (m):	2.050	**Calculations:**	**Purge Start Time:**		**Purge End Time:**			
Depth to Bottom (m):	2.133	0.042164 x3 = 0.126492	**Time (___) minute interval:**					
Submerged Tubing Depth (m):			**Depth (m)**					
Well Stick-up Height (m):	0.595		**Temperature (°C)**	CANNOT				
Estimated Water Volume (L):	0.042164		**pH**					
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**	SAMPLE				
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**					
			Redox (mV)					
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**DO (mg/L)**					
			Appearance & Odour (Clear, Silty, HC odours, etc.)	SEE BACK				
			Total Purge Volume:					

Sample Method							
	Waterra	**Peristaltic**	**Disp. Bailer**	**Steel Bailer**	**Centrif. Pump**	**Air Lift**	**Other**
Analysis							

Sample ID	**Parameters Analyzed**	**Sample Time**	**Container Types**	**Preservative**	**Turbidity (NTU)**	**Comments**
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): GSI-HA-04

UTM Location: Zn: 08 Easting: 0387916 Northing: 6881130

Photo No.: Cam2 6055

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	19.3	
Carbon Dioxide (C02)	3100	

0 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- Cannot sample or purge, insufficient well volume, < 0.5L

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GS1-HA-02A	**Project Number:**	1343-005 03	**Date:**	27-June-14
Approximate Date Drilled:		**Client:**	PPM	**Sampler:**	RM/MM
Piezometer Diameter / Screen Length:	1" DP	**Project Name:**	MN GW Spring	**Weather/Temperature:**	overcast
CHV (ppm / % LEL):		**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):	2.414	**Calculations:**	**Purge Start Time:**		**Purge End Time:**			
Depth to Bottom (m):	2.48	0.13412 x 3 = 0.402336	**Time (___) minute interval:**					
Submerged Tubing Depth (m):			**Depth (m)**					
Well Stick-up Height (m):	1.49		**Temperature (°C)**					
Estimated Water Volume (L):	0.033528	could not purge or sample, insufficient well volume. 0.033528 x 3 = 0.100584	**pH**	NOT				
			Cond. (µs/cm)					
			Specific Cond. (µs/cm)	SAMPLED				
			Redox (mV)					
			DO (mg/L)	SEE NOTES				
			Appearance & Odour (Clear, Silty, HC odours, etc.)					
			Total Purge Volume:					

(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume

(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume

2" casing has 0.16 USgal/ft or 2.032 l/m
1" casing has 0.04 USgal/ft or 0.508 l/m
8" sand pack has 0.73 USgal/ft or 9.271 l/m
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): GS1-BH-08

HP02

UTM Location: Zn: 08V Easting: 0387861 Northing: 6881129

Photo No.: Cam2 0053

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.9	
Carbon Dioxide (C02)	600	

00 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- Insufficient well volume, cannot sample or purge.
  < 0.5L

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW01 - 01	**Project Number:**	1343-005.03	**Date:**	27-June-14
Approximate Date Drilled:		**Client:**	AAM	**Sampler:**	RM/MM
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MW Gwsamp	**Weather/Temperature:**	Sunny
CHV (ppm / % LEL):		**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	2.946	**Calculations:**	**Purge Start Time:**		**Purge End Time:**				
Depth to Bottom (m):	8.680		**Time (___) minute interval:**						
Submerged Tubing Depth (m):	~8		**Depth (m)**						
Well Stick-up Height (m):	0.82		**Temperature (°C)**	CANNOT PURGE OR SAMPLE. SEE BACK					
Estimated Water Volume (L):	11.651488	7 x3 = 34.954464	**pH**						
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**						
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**						
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**						
			DO (mg/L)						
			Appearance & Odour (Clear, Silty, HC odours, etc.)						
			Total Purge Volume:						

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): MW09-01

UTM Location: Zn: 08V Easting: 0389391 Northing: 6938055

Photo No.: Com2-70059, 0060

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.6	
Carbon Dioxide (C02)	650	

CO 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- could not purge or sample due to an obstruction inside the well casing @ ~3m from TOC.
- could not fit 3/8" or 3/16" tubing past the obstruction
- soil build up @ the obstruction see photo #0060

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GSI-AA-03A	**Project Number:**	1343-005.03	**Date:**	27 June -14
Approximate Date Drilled:	\	**Client:**	AAM	**Sampler:**	RM/MM
Piezometer Diameter / Screen Length:	1" DP	**Project Name:**	MNGW (spring)	**Weather/Temperature:**	overcast.
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	1.512	**Calculations:**		**Purge Start Time:**	8:05		**Purge End Time:**	8:11			
Depth to Bottom (m):	2.17			**Time (___) minute interval:**	8:11						
Submerged Tubing Depth (m):	~1.8			**Depth (m)**							
Well Stick-up Height (m):	0.930			**Temperature (°C)**	2.5						
Estimated Water Volume (L):	0.334264	0.334264 x 3 = 1.002792		**pH**	6.84	SEE					
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume				**Cond. (µs/cm)**	586						
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume				**Specific Cond. (µs/cm)**	990						
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m				**Redox (mV)**	-60.6	BACK					
				DO (mg/L)	1.83						
				Appearance & Odour (Clear, Silty, HC odours, etc.)							
				Total Purge Volume:	0.5						

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): GSI-MW-03

UTM Location: Zn: 08V Easting: 0387878 Northing: 6981131

Photo No.: Cam2#0054

Well Head Space Gases:

	%	ppm
Methane (CH4)		0
Oxygen (O2)	20.9	
Carbon Dioxide (C02)	610	

CO 0

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

- new 3/16" tubing added to well
- well dry @ ~0.5L
- insufficient well volume, sample/purge not possible

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

GS1-DC-02A IDW(m) 1.596 DTB(m) 1.95 Stick-up(m) 0.95

Well Number:	GS1-DC-02B	**Project Number:**	1848 0005.03	**Date:**	27-June-14
Approximate Date Drilled:	\	**Client:**	AAM	**Sampler:**	RM / MM
Piezometer Diameter / Screen Length:	1" DP	**Project Name:**	MW GW(Spring)	**Weather/Temperature:**	overcast.
CHV (ppm / % LEL):	\	**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☐ Good ☑ ~~Bad~~

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
	X				

Initial Depth to Water (m):	2.487	**Calculations:**	**Purge Start Time:**	7:21		**Purge End Time:**					
Depth to Bottom (m):	3.84	~~3x2 7.40394~~	**Time (\) minute interval:**	7:26							
Submerged Tubing Depth (m):	~3.3	~~=3.247088~~	**Depth (m)**	3.70							
Well Stick-up Height (m):	0.88	0.687324 x3	**Temperature (°C)**	2.6							
Estimated Water Volume (L):	0.687324	= 2.06/972	**pH**	7.54	CANNOT						
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**	291.4	SAMPLE						
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**	320.0							
			Redox (mV)	-61.1							
2" casing has 0.16 USgal/ft or 2.032 l/m			**DO (mg/L)**	3.08							
1" casing has 0.04 USgal/ft or 0.508 l/m			**Appearance & Odour (Clear, Silty, HC odours, etc.)**		SITE						
8" sand pack has 0.73 USgal/ft or 9.271 l/m			**Total Purge Volume:**								
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m											

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		X					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
GS1-DC-02B				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): GSI-DC-02B
DC02
UTM Location: Zn: 08V Easting: 038 7839 Northing: 6881129

Photo No.: Cam2 # 0053a

Well Head Space Gases:

	%	ppm
Methane (CH4)	0	0
Oxygen (O2)	20.6	20.8
Carbon Dioxide (C02)	600	610

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):
- well dry @ less than 0.5L (27-June-14)
- full purge / sampling not possible due to insufficient well volume

HEMMERA

p1/2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	GL07-01	**Project Number:**	1343-005.03	**Date:**	2014/06/26
Approximate Date Drilled:	unknown.	**Client:**	AAM	**Sampler:**	AN/AB
Piezometer Diameter / Screen Length:	2" / unknown.	**Project Name:**	MN GW Sampling Program.	**Weather/Temperature:**	cloudy / sunny. ~12°C.
CHV (ppm / % LEL):	not recorded.	**Duplicate Collected:**	☐ Yes ☒ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):		**Calculations:**	**Purge Start Time:**		**Purge End Time:**			
Depth to Bottom (m):		Depth to blockage/ice = 12.876 m.	**Time (___) minute interval:**					
Submerged Tubing Depth (m):			**Depth (m)**					
Well Stick-up Height (m):	0.81		**Temperature (°C)**					
Estimated Water Volume (L):			**pH**					
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**					
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**					
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**					
			DO (mg/L)					
			Appearance & Odour (Clear, Silty, HC odours, etc.)					
			Total Purge Volume:					

FROZEN

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

Sample Site (Con't): GLL07-01

UTM Location: Zn: 08 V Easting: 0388851 Northing: 6888177

Photo No.: 0065, 0064, 0063.

Well Head Space Gases:

	[redacted]	ppm
Methane (CH4) % LEL	0.0	
Oxygen (O2) %	20.9	
Carbon Dioxide (C02) %	1.40	

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (^{0}C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

Well was sealed with PVC cap.

5/8" waterra tubing frozen in well.

HEMMERA

p1/2

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-15	**Project Number:**	1343-005.03	**Date:**	2014/06/26
Approximate Date Drilled:	unknown.	**Client:**	AAM	**Sampler:**	AN/AB
Piezometer Diameter / Screen Length:	2" / unknown.	**Project Name:**	MN GW Sampling Program.	**Weather/Temperature:**	cloudy/sunny. ~12°C.
CHV (ppm / % LEL):		**Duplicate Collected:**	☐ Yes ☐ No	**Recovery:**	☐ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift

Initial Depth to Water (m):	13.947	**Calculations:**	**Purge Start Time:**		**Purge End Time:**			
Depth to Bottom (m):	14.004		**Time (___) minute interval:**					
Submerged Tubing Depth (m):			**Depth (m)**					
Well Stick-up Height (m):	0.91		**Temperature (°C)**					
Estimated Water Volume (L):			**pH**					
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**					
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**					
2" casing has 0.16 USgal/ft or 2.032 l/m 1" casing has 0.04 USgal/ft or 0.508 l/m 8" sand pack has 0.73 USgal/ft or 9.271 l/m 6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Redox (mV)**					
			DO (mg/L)					
			Appearance & Odour (Clear, Silty, HC odours, etc.)					
			Total Purge Volume:					

FROZEN

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis							

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
				☐ Yes ☐ No		

HEMMERA

P2/2

Sample Site (Con't): MW09-15

UTM Location: Zn: 08V Easting: 0388915 Northing: 6881723.

Photo No.: 0062, 0061

Well Head Space Gases:

	%	ppm
Methane (CH4) %LEL	0.0	
Oxygen (O2) %	20.9	
Carbon Dioxide (C02) %	1.41	

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L µg/L	
DO (mg/L)	

General Notes (Condition of well or other features):

No PVC cap on well.
Removed transduser @ 13:35 (1m depth).
2nd Transduser in well @ greater depth, 2nd transduser stuck in well. potentially frozen in.
Well depth recorded from previous sampling event >35m.
Well depth recorded @ 2014/06/26 14 m.
Potential blockage or Frozen well.
NOT SAMPLED.
Transduser placed back in well @ 13:44.

Photos: Taken on Camera #1.
#0062, #0061

HEMMERA

GROUNDWATER SAMPLE COLLECTION SHEET

Well Number:	MW09-17	**Project Number:**	343-005 03	**Date:**	26 & 28-June-14, & 29 June
Approximate Date Drilled:	/	**Client:**	RDM	**Sampler:**	RM/MM
Piezometer Diameter / Screen Length:	2"	**Project Name:**	MW GW (Spring)	**Weather/Temperature:**	Sunny
CHV (ppm / % LEL):	/	**Duplicate Collected:**	☐ Yes ☑ No	**Recovery:**	☑ Good ☐ Bad

Purge Method

Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift
X	X				

manual to redevelop, separately to peri pump

Initial Depth to Water (m):	4.778	**Calculations:**	**Purge Start Time:**	10:55		**Purge End Time:**	11:06	
Depth to Bottom (m):	5.61		**Time (___) minute interval:**	10:56	11:01	11:06		
Submerged Tubing Depth (m):	~~5.1~~		**Depth (m)**	/	/	/		
Well Stick-up Height (m):	0.97		**Temperature (°C)**	4.3	2.9	2.6		
Estimated Water Volume (L):	1.69	x 3 = 5.07	**pH**	6.95	6.80	6.80		
(DTB – DTW) x 2 (for 2" well diameter) = 1 well volume			**Cond. (µs/cm)**	1685	1600	1594		
(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume			**Specific Cond. (µs/cm)**	2776	2773	2788		
2" casing has 0.16 USgal/ft or 2.032 l/m			**Redox (mV)**	119.3	123.2	124.0		
1" casing has 0.04 USgal/ft or 0.508 l/m			**DO (mg/L)**	0.13	0.09	0.08		
8" sand pack has 0.73 USgal/ft or 9.271 l/m			**Appearance & Odour (Clear, Silty, HC odours, etc.)**	clear no odour	→	→		
6 5/8" sand pack has 0.50 USgal/ft or 6.35 l/m			**Total Purge Volume:**	28L				

Sample Method

	Waterra	Peristaltic	Disp. Bailer	Steel Bailer	Centrif. Pump	Air Lift	Other
Analysis		X					

Sample ID	Parameters Analyzed	Sample Time	Container Types	Preservative	Turbidity (NTU)	Comments
MW09-17	Gen. Chem NH3 TIC	11:07	as before	☐ Yes ☐ No	3.47	See back

Diss. Metals
Diss. Hg
SCN
Sulphide
Cyanide
Cyanate

HEMMERA

Sample Site (Con't): MW00-17

UTM Location: Zn: 08V Easting: 0380075 Northing: 6980970

Photo No.: Com2 #0043, 0044, 0045, 0046, 0047, 0048, 0072, 0073, 0074, 0075, 0076, 0077

Well Head Space Gases:

	%	ppm
Methane (CH4)		
Oxygen (O2)		
Carbon Dioxide (C02)		

3 not taken due to repair of well

General Notes (Condition of well or other features):

Final Groundwater Field Parameters (Following Purge):

Time	
Temperature (°C)	
DO (mg/L)	
Specific Cond. (µs/cm)	
Cond. (µs/cm)	
pH	
Redox (mV)	
Turbidity (NTU)	
Sulphide mg/L (µg/L)	14
DO (mg/L)	

General Notes (Condition of well or other features):

- case broken @ surface, unable to pull bailer out of well

Fixing of well:

1) Dig hole around well down to top of where the well was broken (photo # 0072, 0073, 0074
2) Attach coupling + new pipe (photo # 0075)
3) Cover w Bentonite Chip (photo # 0076)
4) Completed well # 0077
5) Place steel monument + add cement

- developed well twice before sampling or taking parameters

~25 L purged before sample or parameters

APPENDIX C
Laboratory Reports

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

Date Received: 28-JUN-14
Report Date: 10-JUL-14 17:11 (MT)
Version: FINAL

Client Phone: 867-456-4865

Certificate of Analysis

Lab Work Order #: L1478694

Project P.O. #: NOT SUBMITTED
Job Reference: 1343-005.03
C of C Numbers: 1, 2
Legal Site Desc:

Brent Mack
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1478694-1	L1478694-2	L1478694-3	L1478694-4	L1478694-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	27-JUN-14	27-JUN-14	27-JUN-14	27-JUN-14	27-JUN-14
	Sampled Time	08:18	08:18	14:42	10:52	07:10
	Client ID	CH-P-13-05/50	DUP-2	MP09-08	MP09-02	GLL07-03
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	2690	2690	705	512	1640
	Hardness (as CaCO3) (mg/L)	1810	1830	408	276	974
	pH (pH)	7.05	7.08	8.05	7.99	7.15
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	116	115	226	121	74.8
	Ammonia, Total (as N) (mg/L)	0.0349	0.0355	0.0309	0.0055	0.185
	Chloride (Cl) (mg/L)	<10 DLA	<10 DLA	<0.50	<0.50	<5.0 DLA
	Fluoride (F) (mg/L)	<0.40 DLA	<0.40 DLA	0.078	0.061	<0.20 DLA
	Nitrate (as N) (mg/L)	0.42	0.40	<0.0050	0.0717	<0.050 DLA
	Nitrite (as N) (mg/L)	<0.020 DLA	<0.020 DLA	<0.0010	<0.0010	<0.010 DLA
	Total Kjeldahl Nitrogen (mg/L)	0.121	0.131	0.247	0.251	0.650
	Sulfate (SO4) (mg/L)	1850	1850	180	159	991
	Sulphide as S (mg/L)	<0.020	<0.020	0.108	<0.020	0.384
	Anion Sum (meq/L)	40.9	40.8	8.27	5.74	22.1
	Cation Sum (meq/L)	39.1	39.6	8.53	5.74	21.5
	Cation - Anion Balance (%)	-2.3	-1.5	1.5	0.0	-1.5
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	16.5	16.4	49.5	25.3	9.95
	Total Organic Carbon (mg/L)	2.05	2.03	5.01	6.39	3.6
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1478694-6 Water 26-JUN-14 15:34 MW09-19	L1478694-7 Water 26-JUN-14 15:34 FB-1	L1478694-8 Water 26-JUN-14 13:40 MW09-16	L1478694-9 Water 26-JUN-14 13:40 DUP-1	L1478694-10 Water 26-JUN-14 16:57 MW09-18
WATER						
Physical Tests	Conductivity (uS/cm)	2290	<2.0	1710	1710	2580
	Hardness (as CaCO3) (mg/L)	1530	<0.50	1130	1140	1860
	pH (pH)	7.54	5.40	7.74	7.84	7.81
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	443	<2.0	312	314	464
	Ammonia, Total (as N) (mg/L)	2.05	<0.0050	<0.0050	<0.0050	0.0231
	Chloride (Cl) (mg/L)	<10 DLA	<0.50	<5.0 DLA	<5.0 DLA	<10 DLA
	Fluoride (F) (mg/L)	<0.40 DLA	<0.020	<0.20 DLA	<0.20 DLA	<0.40 DLA
	Nitrate (as N) (mg/L)	<0.10 DLA	<0.0050	0.247	0.242	<0.10 DLA
	Nitrite (as N) (mg/L)	<0.020 DLA	<0.0010	<0.010 DLA	<0.010 DLA	<0.020 DLA
	Total Kjeldahl Nitrogen (mg/L)	2.99	<0.050	0.121	0.133	0.137
	Sulfate (SO4) (mg/L)	1130	<0.50	835	833	1410
	Sulphide as S (mg/L)	0.195	<0.020	<0.020	<0.020	<0.020
	Anion Sum (meq/L)	32.5	<0.10	23.6	23.6	38.7
	Cation Sum (meq/L)	32.8	<0.10	23.1	23.2	37.8
	Cation - Anion Balance (%)	0.4	0.0	-1.1	-0.8	-1.1
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	98.1	<0.50	63.9	65.9	102
	Total Organic Carbon (mg/L)	13.1	<0.50	2.96	2.84	2.57
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1478694-11 Water 27-JUN-14 15:09 MW09-04	L1478694-12 Water 27-JUN-14 13:23 MW09-02	L1478694-13 Water 27-JUN-14 13:23 DUP-3	L1478694-14 Water 27-JUN-14 16:08 MW09-03	L1478694-15 Water 27-JUN-14 16:50 MW09-22
WATER						
Physical Tests	Conductivity (uS/cm)	2680	2840	2810	2520	3020
	Hardness (as CaCO3) (mg/L)	1720	1580	1560	1560	1700
	pH (pH)	7.96	6.96	6.95	7.84	6.52
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	97.6	34.5	36.0	155	35.7
	Ammonia, Total (as N) (mg/L)	6.82	12.1	12.3	2.37	2.27
	Chloride (Cl) (mg/L)	<10 DLA	<10 DLA	<10 DLA	<10 DLA	<10 DLA
	Fluoride (F) (mg/L)	<0.40 DLA	0.47	0.46	<0.40 DLA	<0.40 DLA
	Nitrate (as N) (mg/L)	0.31	<0.10 DLA	<0.10 DLA	<0.10 DLA	11.9
	Nitrite (as N) (mg/L)	0.059	<0.020 DLA	<0.020 DLA	<0.020 DLA	0.326
	Total Kjeldahl Nitrogen (mg/L)	7.94	16.3	16.5	3.19	10.6
	Sulfate (SO4) (mg/L)	1750	1860	1830	1640	1990
	Sulphide as S (mg/L)	<0.020	<0.020	<0.020	<0.020	0.023
	Anion Sum (meq/L)	38.4	39.5	38.8	37.3	43.1
	Cation Sum (meq/L)	37.9	40.0	39.7	34.9	43.3
	Cation - Anion Balance (%)	-0.7	0.7	1.1	-3.3	0.2
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	0.0076	0.0211	0.0129	0.0132
	Cyanide, Total (mg/L)	<0.0050	0.0557	0.0944	0.0437	0.0225
	Thiocyanate (SCN) (mg/L)	<0.50	1.36	1.35	<0.50	<0.50
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	0.0091	0.0096
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	14.4	8.2	6.3	27.9	4.9 RRA
	Total Organic Carbon (mg/L)	5.88	5.82	5.92	6.7	10.8
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1478694-16	L1478694-17			
	Description	Water	Water			
	Sampled Date	27-JUN-14	28-JUN-14			
	Sampled Time	16:50				
	Client ID	FB-2	TRAVEL BLANK			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	<2.0	<2.0			
	Hardness (as CaCO3) (mg/L)	<0.50	<0.50			
	pH (pH)	5.30	5.23			
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	<2.0	<2.0			
	Ammonia, Total (as N) (mg/L)	<0.0050	0.0077 RRV			
	Chloride (Cl) (mg/L)	<0.50	<0.50			
	Fluoride (F) (mg/L)	<0.020	<0.020			
	Nitrate (as N) (mg/L)	<0.0050	<0.0050			
	Nitrite (as N) (mg/L)	<0.0010	<0.0010			
	Total Kjeldahl Nitrogen (mg/L)	<0.050	<0.050			
	Sulfate (SO4) (mg/L)	<0.50	<0.50			
	Sulphide as S (mg/L)	<0.020	<0.020			
	Anion Sum (meq/L)	<0.10	<0.10			
	Cation Sum (meq/L)	<0.10	<0.10			
	Cation - Anion Balance (%)	0.0	0.0			
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050			
	Cyanide, Total (mg/L)	<0.0050	<0.0050			
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50			
	Cyanide, Free (mg/L)	<0.0050	<0.0050			
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	<0.50	<0.50			
	Total Organic Carbon (mg/L)	<0.50	<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			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1478694-1	L1478694-2	L1478694-3	L1478694-4	L1478694-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	27-JUN-14	27-JUN-14	27-JUN-14	27-JUN-14	27-JUN-14
	Sampled Time	08:18	08:18	14:42	10:52	07:10
	Client ID	CH-P-13-05/50	DUP-2	MP09-08	MP09-02	GLL07-03
Grouping	**Analyte**					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Sulfur (S)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0444	0.0461	0.0038	0.0056	0.0344
	Antimony (Sb)-Dissolved (mg/L)	<0.00050 DLA	<0.00050 DLA	<0.00010	0.00067	<0.00050 DLA
	Arsenic (As)-Dissolved (mg/L)	0.00284	0.00259	0.0111	0.00156	<0.00050 DLA
	Barium (Ba)-Dissolved (mg/L)	0.0111	0.0115	0.0430	0.0553	0.00967
	Beryllium (Be)-Dissolved (mg/L)	<0.00050 DLA	<0.00050 DLA	<0.00010	<0.00010	<0.00050 DLA
	Bismuth (Bi)-Dissolved (mg/L)	<0.0025 DLA	<0.0025 DLA	<0.00050	<0.00050	<0.0025 DLA
	Boron (B)-Dissolved (mg/L)	<0.050 DLA	<0.050 DLA	<0.010	<0.010	<0.050 DLA
	Cadmium (Cd)-Dissolved (mg/L)	0.271	0.272	<0.000010	0.000054	0.945
	Calcium (Ca)-Dissolved (mg/L)	449	457	113	81.3	294
	Chromium (Cr)-Dissolved (mg/L)	<0.00050 DLA	<0.00050 DLA	<0.00010	<0.00010	<0.00050 DLA
	Cobalt (Co)-Dissolved (mg/L)	0.0322	0.0322	0.00056	0.00015	0.0238
	Copper (Cu)-Dissolved (mg/L)	0.131	0.130	<0.00020	0.00080	<0.0010 DLA
	Iron (Fe)-Dissolved (mg/L)	7.72	7.77	0.795	0.041	1.75
	Lead (Pb)-Dissolved (mg/L)	0.00396	0.00385	<0.000050	<0.000050	0.00049
	Lithium (Li)-Dissolved (mg/L)	0.0319	0.0316	0.00395	0.00091	0.0245
	Magnesium (Mg)-Dissolved (mg/L)	167	167	30.9	17.8	58.4

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1478694-6	L1478694-7	L1478694-8	L1478694-9	L1478694-10
	Description	Water	Water	Water	Water	Water
	Sampled Date	26-JUN-14	26-JUN-14	26-JUN-14	26-JUN-14	26-JUN-14
	Sampled Time	15:34	15:34	13:40	13:40	16:57
	Client ID	MW09-19	FB-1	MW09-16	DUP-1	MW09-18
Grouping	**Analyte**					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Sulfur (S)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0109	<0.0010	0.0023	0.0020	<0.0020 DLA
	Antimony (Sb)-Dissolved (mg/L)	<0.00020 DLA	<0.00010	0.0634	0.0690	0.00022
	Arsenic (As)-Dissolved (mg/L)	0.0779	<0.00010	0.00902	0.00868	0.0537
	Barium (Ba)-Dissolved (mg/L)	0.0488	<0.000050	0.0137	0.0137	0.00830
	Beryllium (Be)-Dissolved (mg/L)	<0.00020 DLA	<0.00010	<0.00010	<0.00010	<0.00020 DLA
	Bismuth (Bi)-Dissolved (mg/L)	<0.0010 DLA	<0.00050	<0.00050	<0.00050	<0.0010 DLA
	Boron (B)-Dissolved (mg/L)	0.437	<0.010	0.131	0.143	<0.020 DLA
	Cadmium (Cd)-Dissolved (mg/L)	<0.000020 DLA	<0.000010	0.0249	0.0246	0.000058
	Calcium (Ca)-Dissolved (mg/L)	326	<0.050	262	265	357
	Chromium (Cr)-Dissolved (mg/L)	<0.00020 DLA	<0.00010	<0.00010	<0.00010	<0.00020 DLA
	Cobalt (Co)-Dissolved (mg/L)	0.00204	<0.00010	0.00018	0.00018	<0.00020 DLA
	Copper (Cu)-Dissolved (mg/L)	<0.00040 DLA	<0.00020	0.00558	0.00552	<0.00040 DLA
	Iron (Fe)-Dissolved (mg/L)	18.5	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.00010 DLA	<0.000050	0.00690	0.00784	<0.00010 DLA
	Lithium (Li)-Dissolved (mg/L)	0.0108	<0.00050	0.00860	0.00946	0.0202
	Magnesium (Mg)-Dissolved (mg/L)	174	<0.10	115	115	235

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1478694-11	L1478694-12	L1478694-13	L1478694-14	L1478694-15
	Description	Water	Water	Water	Water	Water
	Sampled Date	27-JUN-14	27-JUN-14	27-JUN-14	27-JUN-14	27-JUN-14
	Sampled Time	15:09	13:23	13:23	16:08	16:50
	Client ID	MW09-04	MW09-02	DUP-3	MW09-03	MW09-22
Grouping	**Analyte**					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Sulfur (S)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.0020 DLA	<0.0050 DLA	<0.0050 DLA	<0.0050 DLA	0.0396
	Antimony (Sb)-Dissolved (mg/L)	0.342	0.00345	0.00343	0.503	0.00027
	Arsenic (As)-Dissolved (mg/L)	3.83	20.3	19.7	1.28	0.00666
	Barium (Ba)-Dissolved (mg/L)	0.00600	0.00688	0.00638	0.0364	0.0554
	Beryllium (Be)-Dissolved (mg/L)	<0.00020 DLA	<0.00050 DLA	<0.00050 DLA	<0.00050 DLA	<0.00020 DLA
	Bismuth (Bi)-Dissolved (mg/L)	<0.0010 DLA	<0.0025 DLA	<0.0025 DLA	<0.0025 DLA	<0.0010 DLA
	Boron (B)-Dissolved (mg/L)	0.247	0.058	0.059	0.126	0.024
	Cadmium (Cd)-Dissolved (mg/L)	0.000037	0.000627	0.000630	0.000895	0.000094
	Calcium (Ca)-Dissolved (mg/L)	487	473	470	477	587
	Chromium (Cr)-Dissolved (mg/L)	<0.00020 DLA	<0.00050 DLA	<0.00050 DLA	<0.00050 DLA	0.00034
	Cobalt (Co)-Dissolved (mg/L)	0.00100	0.0115	0.0116	0.00422	0.0153
	Copper (Cu)-Dissolved (mg/L)	<0.00040 DLA	<0.0010 DLA	<0.0010 DLA	<0.0010 DLA	0.00112
	Iron (Fe)-Dissolved (mg/L)	<0.010	37.0	36.8	0.218	87.4
	Lead (Pb)-Dissolved (mg/L)	0.00022	<0.00025 DLA	0.00032	<0.00025 DLA	0.00020
	Lithium (Li)-Dissolved (mg/L)	0.0056	0.0192	0.0200	<0.0025 DLA	<0.0010 DLA
	Magnesium (Mg)-Dissolved (mg/L)	121	96.6	95.0	90.5	57.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1478694-16	L1478694-17			
	Description	Water	Water			
	Sampled Date	27-JUN-14	28-JUN-14			
	Sampled Time	16:50				
	Client ID	FB-2	TRAVEL BLANK			
Grouping	**Analyte**					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)		<0.10			
	Manganese (Mn)-Total (mg/L)		<0.000050			
	Mercury (Hg)-Total (mg/L)		<0.000010			
	Molybdenum (Mo)-Total (mg/L)		<0.000050			
	Nickel (Ni)-Total (mg/L)		<0.00050			
	Phosphorus (P)-Total (mg/L)		<0.050			
	Potassium (K)-Total (mg/L)		<0.10			
	Selenium (Se)-Total (mg/L)		<0.00010			
	Silicon (Si)-Total (mg/L)		<0.050			
	Silver (Ag)-Total (mg/L)		<0.000010			
	Sodium (Na)-Total (mg/L)		<0.050			
	Strontium (Sr)-Total (mg/L)		<0.00020			
	Sulfur (S)-Total (mg/L)		<0.50			
	Thallium (Tl)-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	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	<0.0010				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	<0.00010				
	Barium (Ba)-Dissolved (mg/L)	<0.000050				
	Beryllium (Be)-Dissolved (mg/L)	<0.00010				
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010				
	Calcium (Ca)-Dissolved (mg/L)	<0.050				
	Chromium (Cr)-Dissolved (mg/L)	<0.00010				
	Cobalt (Co)-Dissolved (mg/L)	<0.00010				
	Copper (Cu)-Dissolved (mg/L)	<0.00020				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	<0.00050				
	Magnesium (Mg)-Dissolved (mg/L)	<0.10				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1478694-1 Water 27-JUN-14 08:18 CH-P-13-05/50	L1478694-2 Water 27-JUN-14 08:18 DUP-2	L1478694-3 Water 27-JUN-14 14:42 MP09-08	L1478694-4 Water 27-JUN-14 10:52 MP09-02	L1478694-5 Water 27-JUN-14 07:10 GLL07-03
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	30.4	30.5	0.852	0.0130	10.4
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.00076	0.00075	0.000477	0.000126	0.00043
	Nickel (Ni)-Dissolved (mg/L)	0.0136	0.0135	<0.00050	<0.00050	0.0499
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	5.18	5.17	1.16	0.86	2.45
	Selenium (Se)-Dissolved (mg/L)	<0.00050 DLA	<0.00050 DLA	<0.00010	<0.00010	<0.00050 DLA
	Silicon (Si)-Dissolved (mg/L)	6.60	6.69	7.00	5.48	3.32
	Silver (Ag)-Dissolved (mg/L)	<0.000050 DLA	<0.000050 DLA	<0.000010	<0.000010	<0.000050 DLA
	Sodium (Na)-Dissolved (mg/L)	11.0	10.9	6.16	4.55	11.0
	Strontium (Sr)-Dissolved (mg/L)	0.647	0.668	1.29	0.652	0.334
	Sulfur (S)-Dissolved (mg/L)	589	580	60.9	53.2	313
	Thallium (Tl)-Dissolved (mg/L)	0.000458	0.000450	<0.000010	<0.000010	0.000391
	Tin (Sn)-Dissolved (mg/L)	<0.00050 DLA	<0.00050 DLA	<0.00010	<0.00010	<0.00050 DLA
	Titanium (Ti)-Dissolved (mg/L)	<0.050 DLA	<0.050 DLA	<0.010	<0.010	<0.050 DLA
	Uranium (U)-Dissolved (mg/L)	0.000931	0.000917	0.00316	0.00134	0.000117
	Vanadium (V)-Dissolved (mg/L)	<0.0050 DLA	<0.0050 DLA	<0.0010	<0.0010	<0.0050 DLA
	Zinc (Zn)-Dissolved (mg/L)	28.2	29.1	0.0012	0.0033	32.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1478694-6 Water 26-JUN-14 15:34 MW09-19	L1478694-7 Water 26-JUN-14 15:34 FB-1	L1478694-8 Water 26-JUN-14 13:40 MW09-16	L1478694-9 Water 26-JUN-14 13:40 DUP-1	L1478694-10 Water 26-JUN-14 16:57 MW09-18
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	4.54	0.000093 RRV	0.0321	0.0328	0.375
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.00012	0.000058 RRV	0.000089	0.000105	<0.00010 DLA
	Nickel (Ni)-Dissolved (mg/L)	<0.0010 DLA	<0.00050	0.00328	0.00336	<0.0010 DLA
	Phosphorus (P)-Dissolved (mg/L)	0.234	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	7.38	<0.10	5.95	5.83	7.29
	Selenium (Se)-Dissolved (mg/L)	0.00034	<0.00010	<0.00010	<0.00010	<0.00020 DLA
	Silicon (Si)-Dissolved (mg/L)	9.30	<0.050	4.78	4.78	4.85
	Silver (Ag)-Dissolved (mg/L)	<0.000020 DLA	<0.000010	<0.000010	0.000017	<0.000020 DLA
	Sodium (Na)-Dissolved (mg/L)	14.7	<0.050	7.08	7.07	10.7
	Strontium (Sr)-Dissolved (mg/L)	1.16	<0.00020	0.586	0.637	1.08
	Sulfur (S)-Dissolved (mg/L)	353	<0.50	258	261	439
	Thallium (Tl)-Dissolved (mg/L)	<0.000020 DLA	<0.000010	0.000250	0.000294	0.000280
	Tin (Sn)-Dissolved (mg/L)	<0.00020 DLA	<0.00010	<0.00010	<0.00010	<0.00020 DLA
	Titanium (Ti)-Dissolved (mg/L)	<0.020	<0.010	<0.010	<0.010	<0.020 DLA
	Uranium (U)-Dissolved (mg/L)	0.000560	<0.000010	0.00304	0.00353	0.00781
	Vanadium (V)-Dissolved (mg/L)	<0.0020 DLA	<0.0010	<0.0010	<0.0010	<0.0020 DLA
	Zinc (Zn)-Dissolved (mg/L)	<0.0020 DLA	<0.0010	3.84	3.78	0.0030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1478694-11 Water 27-JUN-14 15:09 MW09-04	L1478694-12 Water 27-JUN-14 13:23 MW09-02	L1478694-13 Water 27-JUN-14 13:23 DUP-3	L1478694-14 Water 27-JUN-14 16:08 MW09-03	L1478694-15 Water 27-JUN-14 16:50 MW09-22
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	4.25	30.7	31.0	50.2	17.9
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.00758	0.00564	0.00569	0.00371	0.00012
	Nickel (Ni)-Dissolved (mg/L)	<0.0010 DLA	0.0035	0.0036	<0.0025 DLA	0.0031
	Phosphorus (P)-Dissolved (mg/L)	0.072	<0.050	<0.050	0.060	<0.050
	Potassium (K)-Dissolved (mg/L)	39.5	67.0	66.0	20.6	5.92
	Selenium (Se)-Dissolved (mg/L)	<0.00020 DLA	<0.00050 DLA	<0.00050 DLA	<0.00050 DLA	0.00039
	Silicon (Si)-Dissolved (mg/L)	11.8	7.00	6.95	15.4	4.68
	Silver (Ag)-Dissolved (mg/L)	<0.000020 DLA	<0.000050 DLA	<0.000050 DLA	<0.000050 DLA	0.000045
	Sodium (Na)-Dissolved (mg/L)	43.5	64.1	63.6	26.2	82.0
	Strontium (Sr)-Dissolved (mg/L)	1.45	0.915	0.935	1.59	1.31
	Sulfur (S)-Dissolved (mg/L)	570	589	583	506	634
	Thallium (Tl)-Dissolved (mg/L)	0.000082	0.000254	0.000260	<0.000050 DLA	<0.000020 DLA
	Tin (Sn)-Dissolved (mg/L)	<0.00020 DLA	<0.00050 DLA	<0.00050 DLA	<0.00050 DLA	<0.00020 DLA
	Titanium (Ti)-Dissolved (mg/L)	<0.020 DLA	<0.050 DLA	<0.050 DLA	<0.050 DLA	<0.020 DLA
	Uranium (U)-Dissolved (mg/L)	0.000227	0.000678	0.000717	0.00143	0.000229
	Vanadium (V)-Dissolved (mg/L)	<0.0020 DLA	<0.0050 DLA	<0.0050 DLA	<0.0050 DLA	<0.0020 DLA
	Zinc (Zn)-Dissolved (mg/L)	0.953	0.312	0.309	0.0065	0.0047

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1478694-16	L1478694-17			
	Description	Water	Water			
	Sampled Date	27-JUN-14	28-JUN-14			
	Sampled Time	16:50				
	Client ID	FB-2	TRAVEL BLANK			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	<0.000050				
	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Phosphorus (P)-Dissolved (mg/L)	<0.050				
	Potassium (K)-Dissolved (mg/L)	<0.10				
	Selenium (Se)-Dissolved (mg/L)	<0.00010				
	Silicon (Si)-Dissolved (mg/L)	<0.050				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	<0.050				
	Strontium (Sr)-Dissolved (mg/L)	<0.00020				
	Sulfur (S)-Dissolved (mg/L)	<0.50				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	<0.000010				
	Vanadium (V)-Dissolved (mg/L)	<0.0010				
	Zinc (Zn)-Dissolved (mg/L)	<0.0010				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Total Organic Carbon	MS-B	L1478694-1, -10, -11, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Inorganic Carbon	MS-B	L1478694-1, -10, -11, -14, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Inorganic Carbon	MS-B	L1478694-1, -10, -11, -14, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1478694-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1478694-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1478694-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1478694-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1478694-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1478694-1, -10, -11, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Inorganic Carbon	MS-B	L1478694-12, -13, -15

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.
RRA	Reported Result Is The Average Of 2 Or More Analyses
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

ANIONS-CL-IC-WR	Water	Chloride by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

ANIONS-F-IC-WR	Water	Fluoride by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

ANIONS-NO2-IC-WR	Water	Nitrite Nitrogen by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

ANIONS-NO3-IC-WR	Water	Nitrate Nitrogen by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-WR	Water	Sulphate by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

CARBONS-TIC-VA	Water	Total inorganic carbon by CO2 purge	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CARBONS-TOC-VA	Water	Total 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)".

CN-FREE-CFA-VA	Water	Free Cyanide in water by CFA	ASTM 7237

Reference Information

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-SCN-VA Water Thiocyanate by Colour APHA 4500-CN CYANIDE

This analysis is carried out using procedures adapted from APHA Method 4500-CN- M "Thiocyanate" Thiocyanate is determined by the ferric nitrate colourimetric method.

CN-T-CFA-VA Water Total Cyanide in water by CFA ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

CN-WAD-CFA-VA Water Weak Acid Diss. Cyanide in water by CFA APHA 4500-CN CYANIDE

This analysis is carried out using procedures adapted from APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by in-line sample distillation with final determination by colourimetric analysis.

EC-PCT-VA Water Conductivity (Automated) APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

HARDNESS-CALC-VA Water Hardness APHA 2340B

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.

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 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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (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 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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

IONBALANCE-VA Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water 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 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 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

Reference Information

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

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.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

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.

S2-T-COL-VA Water Total Sulphide by Colorimetric APHA 4500-S2 Sulphide

This analysis is carried out using procedures adapted from APHA Method 4500-S2 "Sulphide". Sulphide is determined using the methlyene blue colourimetric method.

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
WR	ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1 2

Reference Information

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 (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1478694-COFC

COC Number: 1 -

Page 1 of 2

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Hemmera Environchem Inc.	Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Natasha Sandys	Quality Control (QC) Report with Report	☑ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	230 - 2237 2nd Avenue Whitehorse, YT	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
Phone:	867-456-4865	Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
		Email 1 or Fax	nsandys@hemmera.com, rmartinka@hemmera.com	Specify Date Required for E2,E or P:
		Email 2	chris@elr.ca	

Invoice To		Invoice Distribution	
	Same as Report To ☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
	Copy of Invoice with Report ☐ Yes ☑ No	Email 1 or Fax	nsandys@hemmera.com
Company:	Hemmera Environchem Inc.	Email 2	chris@elr.ca
Contact:	Natasha Sandys		

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q45291	Approver ID:	Cost Center:
Job #:	1343-005.03	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only)		ALS Contact:	Sampler: RM, AB, AN, MI

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conductivity, pH, Hardness (as CaCO3)	Total Alkalinity (as CaCO3)	Ammonia N (total), Total Kjeldahl N (TKN)	Nitrate, Nitrite	Cl, Fl, Sulfate (SO4)	Sulphide as S	Anion Sum, Cation Sum, Cation/Anion Balan	Cyanide - Weak Acid Diss.	Cyanide, Total	Cyanide, Free	Thiocyanate	Total Inorganic Carbon, Total Organic Carbo	Dissolved Metals, including Mercury (F/P)	Number of Containers
1	CH-P-13-05/50	27-Jun-14	8:18	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
2	DUP-2	27-Jun-14	8:18	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
3	MP09-08	27-Jun-14	14:42	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
4	MP09-02	27-Jun-14	10:52	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
5	GLL07-03	27-Jun-14	7:10	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
6	MW09-19	26-Jun-14	15:34	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
7	FB-1	26-Jun-14	15:34	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
8	MW09-16	26-Jun-14	13:40	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
9	DUP-1	26-Jun-14	13:40	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
10	MW09-18	26-Jun-14	16:57	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
11	MW09-04	27-Jun-14	15:09	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
12	MW09-02	27-Jun-14	13:23	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No Are samples for human drinking water use? ☐ Yes ☑ No	- See attached parameter sheet for required metals

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	
Ice packs	Yes ☐	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☐				

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
3.8	4.3	3.2, 5.4			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: C. Jastrebski	Date: 28-Jun-14	Time: 07:45	Received by:	Date: 28-JUN-14	Time: 19:15	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS-FM-0326a v39 Front/04 January 2014

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Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1478694-COFC

COC Number: 1 -

Report To		Report Format / Distribution	Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Hemmera Environchem Inc.	Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Natasha Sandys	Quality Control (QC) Report with Report ☑ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	230 - 2237 2nd Avenue Whitehorse, YT	☐ Criteria on Report - provide details below if box checked Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	867-456-4865	Email 1 or Fax nsandys@hemmera.com, rmartinka@hemmera.com	Specify Date Required for E2,E or P:
		Email 2 chris@elr.ca	

Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution	Analysis Request
	Copy of Invoice with Report ☐ Yes ☑ No	Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	Hemmera Environchem Inc.	Email 1 or Fax nsandys@hemmera.com	
Contact:	Natasha Sandys	Email 2 chris@elr.ca	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q45291	Approver ID:	Cost Center:
Job #:	1343-005.03	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only)		ALS Contact:	Sampler: RM, AB, AN, MI

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conductivity, pH, Hardness (as CaCO3)	Total Alkalinity (as CaCO3)	Ammonia N (total), Total Kjeldahl N (TKN)	Nitrate, Nitrite	Cl, Fl, Sulfate (SO4)	Sulphide as S	Anion Sum, Cation Sum, Cation/Anion Balar	Cyanide - Weak Add Diss.	Cyanide, Total	Cyanide, Free	Thiocyanate	Total Inorganic Carbon, Total Organic Carbo	Dissolved Metals, including Mercury	F/P	Number of Containers
13	DUP-3	27-Jun-14	13:23	Water	R	R	R	R	R	R	R	R	R	R	R	R	R		9
14	MW09-03	27-Jun-14	16:08	Water	R	R	R	R	R	R	R	R	R	R	R	R	R		9
15	MW09-22	27-Jun-14	16:50	Water	R	R	R	R	R	R	R	R	R	R	R	R	R		9
16	FB-2	27-Jun-14	16:50	Water	R	R	R	R	R	R	R	R	R	R	R	R	R		9
17	Travel Blank			Water	R	R	R	R	R	R	R	R	R	R	R	R	R		9

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)	SAMPLE CONDITION AS RECEIVED (lab use only)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	- See attached parameter sheet for required metals	Frozen ☐ SIF Observations Yes ☐ No ☐
Are samples for human drinking water use? ☐ Yes ☑ No		Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐
		Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
C. Testnebski	28/5-/14	07:45						

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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

Date Received: 30-JUN-14
Report Date: 11-JUL-14 16:01 (MT)
Version: FINAL

Client Phone: 867-456-4865

Certificate of Analysis

Lab Work Order #: L1478849

Project P.O. #: NOT SUBMITTED
Job Reference: 1343-005.03
C of C Numbers: 1, 2
Legal Site Desc:

Brent Mack
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1478849-1 Water 28-JUN-14 18:00 MW09-21	L1478849-2 Water 28-JUN-14 17:00 MP09-05	L1478849-3 Water 28-JUN-14 07:30 CH-P-13-03/50	L1478849-4 Water 28-JUN-14 11:40 MP09-04	L1478849-5 Water 28-JUN-14 10:20 MW09-24
WATER						
Physical Tests	Conductivity (uS/cm)	2500	2360	2130	1630	1430
	Hardness (as CaCO3) (mg/L)	1600	1360	1040	1070	907
	pH (pH)	7.40	7.68	8.07	7.92	8.06
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	359	330	338	243	272
	Ammonia, Total (as N) (mg/L)	11.6 DLA	8.16 DLA	0.153	0.0056 DLA	<0.0050 DLA
	Chloride (Cl) (mg/L)	<10 DLA	<10 DLA	21 DLA	<5.0 DLA	<5.0 DLA
	Fluoride (F) (mg/L)	<0.40 DLA	<0.40 DLA	<0.40 DLA	<0.20 DLA	<0.20 DLA
	Nitrate (as N) (mg/L)	<0.10 DLA	1.66	<0.10 DLA	0.478 DLA	1.45 DLA
	Nitrite (as N) (mg/L)	<0.020 DLA	0.035	<0.020 DLA	<0.010 DLA	<0.010 DLA
	Total Kjeldahl Nitrogen (mg/L)	16.8	12.4	3.20	0.199	0.331
	Sulfate (SO4) (mg/L)	1410	1310	1050	835	645
	Sulphide as S (mg/L)	<0.020	<0.020	0.027	<0.020	<0.020
	Anion Sum (meq/L)	36.5	34.0	29.3	22.3	19.0
	Cation Sum (meq/L)	37.2	33.0	27.4	22.0	18.5
	Cation - Anion Balance (%)	1.0	-1.5	-3.3	-0.7	-1.1
Cyanides	Cyanide, Weak Acid Diss (mg/L)	0.0070 CNP	0.0054	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	0.0107 CNP	0.0366	0.0088	0.0078	<0.0050
	Thiocyanate (SCN) (mg/L)	0.58	<2.50 DLM	<0.50	<0.50	<0.50
	Cyanide, Free (mg/L)	0.0066 CNP	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	73.3	70.4	78.4	52.3	59.7
	Total Organic Carbon (mg/L)	23.8	24.1	28.9	5.48	6.44
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1478849-6 Water 28-JUN-14 07:40 MW09-23	L1478849-7 Water 28-JUN-14 12:41 MW09-08	L1478849-8 Water 28-JUN-14 11:40 FB-3	L1478849-9 Water 28-JUN-14 12:00 TRAVEL BLANK	L1478849-10 Water 28-JUN-14 12:41 DUP-5
WATER						
Physical Tests	Conductivity (uS/cm)	2400	277	<2.0	<2.0	277
	Hardness (as CaCO3) (mg/L)	1350	139	<0.50	<0.50	139
	pH (pH)	7.83	7.49	5.53	5.22	7.30
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	326	147	<2.0	<2.0	147
	Ammonia, Total (as N) (mg/L)	7.77	2.01	<0.0050	0.0216 RRV	2.00
	Chloride (Cl) (mg/L)	<10 DLA	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	<0.40 DLA	0.077	<0.020	<0.020	0.071
	Nitrate (as N) (mg/L)	<0.10 DLA	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrite (as N) (mg/L)	<0.020 DLA	0.0017	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	11.8	2.90	<0.050	<0.050	2.67
	Sulfate (SO4) (mg/L)	1300	12.9	<0.50	<0.50	12.8
	Sulphide as S (mg/L)	<0.020	0.069	<0.020	<0.020	0.075
	Anion Sum (meq/L)	33.7	3.20	<0.10	<0.10	3.20
	Cation Sum (meq/L)	32.6	5.71	<0.10	<0.10	5.71
	Cation - Anion Balance (%)	-1.6	28.1	0.0	0.0	28.2
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	0.0097	<0.0050	<0.0050	<0.0050	<0.0050
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	67.0	33.2	<0.50	<0.50	30.9
	Total Organic Carbon (mg/L)	14.0	18.3	<0.50	<0.50	17.8
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	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1478849-11 Water 29-JUN-14 12:35 GSI-DC-09-B	L1478849-12 Water 29-JUN-14 14:38 GSI-DC-10-B	L1478849-13 Water 29-JUN-14 07:40 MW09-07	L1478849-14 Water 29-JUN-14 13:18 MP09-12	L1478849-15 Water 29-JUN-14 16:15 GSI-DC-07-B
WATER						
Physical Tests	Conductivity (uS/cm)	1510	1040	2240	746	1020
	Hardness (as CaCO3) (mg/L)	816	513	1300	444	554
	pH (pH)	7.49	6.71	7.60	8.16	7.48
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	145	72.1	225	429	131
	Ammonia, Total (as N) (mg/L)	3.03	2.32	4.60	3.91	1.81
	Chloride (Cl) (mg/L)	<5.0 DLA	<5.0 DLA	<10 DLA	<0.50	<5.0 DLA
	Fluoride (F) (mg/L)	<0.20 DLA	<0.20 DLA	<0.40 DLA	0.356	<0.20 DLA
	Nitrate (as N) (mg/L)	<0.050 DLA	<0.050 DLA	<0.10 DLA	0.0218	<0.050 DLA
	Nitrite (as N) (mg/L)	<0.010 DLA	<0.010 DLA	<0.020 DLA	0.0017	<0.010 DLA
	Total Kjeldahl Nitrogen (mg/L)	4.47	3.63	6.55	4.60	2.27
	Sulfate (SO4) (mg/L)	820	519	1320	48.5	466
	Sulphide as S (mg/L)	0.024	<0.020	0.097	<0.020	<0.020
	Anion Sum (meq/L)	20.0	12.2	32.0	9.60	12.3
	Cation Sum (meq/L)	22.4	16.4	32.0	9.75	13.9
	Cation - Anion Balance (%)	5.7	14.4	0.0	0.8	6.1
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	0.0099	<0.0050	<0.0050	0.0367	<0.0050
	Thiocyanate (SCN) (mg/L)	0.52	0.70	<0.50	<0.50	<0.50
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	29.9	13.6	46.0	89.8	17.2
	Total Organic Carbon (mg/L)	29.5	29.6	20.3	13.8	13.0
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1478849-16 Water 29-JUN-14 14:40 GSI-DC-06-B	L1478849-17 Water 29-JUN-14 12:25 MP09-09	L1478849-18 Water 29-JUN-14 13:39 MP09-11	L1478849-19 Water 29-JUN-14 11:07 MW09-17	L1478849-20 Water 29-JUN-14 16:15 FB-4
WATER						
Physical Tests	Conductivity (uS/cm)	1260	489	888	2800	<2.0
	Hardness (as CaCO3) (mg/L)	587	197	485	2010	<0.50
	pH (pH)	8.20	8.74	8.14	7.94	5.42
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	204	80.2	581	451	<2.0
	Ammonia, Total (as N) (mg/L)	2.92	4.12	5.03	<0.0050	<0.0050
	Chloride (Cl) (mg/L)	<5.0 DLA	2.50	<5.0 DLA	<10 DLA	<0.50
	Fluoride (F) (mg/L)	<0.20 DLA	1.65	0.49	<0.40 DLA	<0.020
	Nitrate (as N) (mg/L)	0.277	0.0191	<0.050 DLA	0.11	<0.0050
	Nitrite (as N) (mg/L)	0.020	0.0063	<0.010 DLA	<0.020 DLA	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	6.67	5.38	9.0	0.092	<0.050
	Sulfate (SO4) (mg/L)	583	136	31.2	1590	<0.50
	Sulphide as S (mg/L)	<0.020	<0.10 DLM	0.030	<0.020	<0.020
	Anion Sum (meq/L)	16.2	4.59	12.3	42.0	<0.10
	Cation Sum (meq/L)	14.2	5.46	12.0	40.9	<0.10
	Cation - Anion Balance (%)	-6.8	8.7	-1.4	-1.4	0.0
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	0.0319	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	0.292	0.0323	<0.0050	<0.0050
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	0.62	<0.50	<0.50
	Cyanide, Free (mg/L)	<0.0050	0.0176	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	19.7	9.20	89.1	108	<0.50
	Total Organic Carbon (mg/L)	74.3	28.3	48.4	2.49	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1478849-21				
	Description	Water				
	Sampled Date	29-JUN-14				
	Sampled Time	17:30				
	Client ID	MP09-10				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	683				
	Hardness (as CaCO3) (mg/L)	280				
	pH (pH)	9.07				
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	108				
	Ammonia, Total (as N) (mg/L)	7.74				
	Chloride (Cl) (mg/L)	2.84				
	Fluoride (F) (mg/L)	1.63				
	Nitrate (as N) (mg/L)	0.0306				
	Nitrite (as N) (mg/L)	0.0023				
	Total Kjeldahl Nitrogen (mg/L)	33.7				
	Sulfate (SO4) (mg/L)	253				
	Sulphide as S (mg/L)	<0.020				
	Anion Sum (meq/L)	7.60				
	Cation Sum (meq/L)	7.66				
	Cation - Anion Balance (%)	0.3				
Cyanides	Cyanide, Weak Acid Diss (mg/L)	3.49				
	Cyanide, Total (mg/L)	49.9				
	Thiocyanate (SCN) (mg/L)	0.85				
	Cyanide, Free (mg/L)	3.22				
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	66.4				
	Total Organic Carbon (mg/L)	45.6				
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1478849-1	L1478849-2	L1478849-3	L1478849-4	L1478849-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	28-JUN-14	28-JUN-14	28-JUN-14	28-JUN-14	28-JUN-14
	Sampled Time	18:00	17:00	07:30	11:40	10:20
	Client ID	MW09-21	MP09-05	CH-P-13-03/50	MP09-04	MW09-24
Grouping	**Analyte**					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Sulfur (S)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0588	0.0224	0.0115	0.0017	0.0033
	Antimony (Sb)-Dissolved (mg/L)	0.00031	0.00040	0.00105	0.00185	0.00033
	Arsenic (As)-Dissolved (mg/L)	0.0576	0.0276	0.00422	0.00097	0.00319
	Barium (Ba)-Dissolved (mg/L)	0.147	0.0811	0.0447	0.0807	0.0607
	Beryllium (Be)-Dissolved (mg/L)	<0.00020 DLA	<0.00020 DLA	<0.00020 DLA	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.0010 DLA	<0.0010 DLA	<0.0010 DLA	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	0.110	0.122	0.040	0.017	0.014
	Cadmium (Cd)-Dissolved (mg/L)	0.000029	0.000961	0.000134	0.000090	0.000100
	Calcium (Ca)-Dissolved (mg/L)	474	449	268	260	241
	Chromium (Cr)-Dissolved (mg/L)	0.00087	0.00079	<0.00020 DLA	0.00027	0.00035
	Cobalt (Co)-Dissolved (mg/L)	0.0160	0.0157	0.0212	0.00022	0.00014
	Copper (Cu)-Dissolved (mg/L)	<0.00040 DLA	0.00378	0.00095	0.00267	0.00911
	Iron (Fe)-Dissolved (mg/L)	45.0	21.5	1.72	<0.010	0.014
	Lead (Pb)-Dissolved (mg/L)	<0.00010 DLA	<0.00010 DLA	0.00027	<0.000050	0.000974
	Lithium (Li)-Dissolved (mg/L)	<0.0010 DLA	<0.0010 DLA	0.0035	0.00079	0.00096
	Magnesium (Mg)-Dissolved (mg/L)	101	57.4	90.7	102	74.1

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1478849-6	L1478849-7	L1478849-8	L1478849-9	L1478849-10
Description	Water	Water	Water	Water	Water
Sampled Date	28-JUN-14	28-JUN-14	28-JUN-14	28-JUN-14	28-JUN-14
Sampled Time	07:40	12:41	11:40	12:00	12:41
Client ID	MW09-23	MW09-08	FB-3	TRAVEL BLANK	DUP-5
Grouping / **Analyte**					
WATER					
Total Metals Magnesium (Mg)-Total (mg/L)				<0.10	
Manganese (Mn)-Total (mg/L)				<0.000050	
Mercury (Hg)-Total (mg/L)				<0.000010	
Molybdenum (Mo)-Total (mg/L)				<0.000050	
Nickel (Ni)-Total (mg/L)				<0.00050	
Phosphorus (P)-Total (mg/L)				<0.050	
Potassium (K)-Total (mg/L)				<0.10	
Selenium (Se)-Total (mg/L)				<0.00010	
Silicon (Si)-Total (mg/L)				<0.050	
Silver (Ag)-Total (mg/L)				<0.000010	
Sodium (Na)-Total (mg/L)				<0.050	
Strontium (Sr)-Total (mg/L)				<0.00020	
Sulfur (S)-Total (mg/L)				<0.50	
Thallium (Tl)-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	FIELD	FIELD	FIELD		FIELD
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		FIELD
Aluminum (Al)-Dissolved (mg/L)	0.0154	0.0686	<0.0010		0.0693
Antimony (Sb)-Dissolved (mg/L)	0.00034	0.00024	<0.00010		0.00024
Arsenic (As)-Dissolved (mg/L)	0.00119	0.198	<0.00010		0.197
Barium (Ba)-Dissolved (mg/L)	0.0649	0.128	<0.000050		0.127
Beryllium (Be)-Dissolved (mg/L)	<0.00020 DLA	<0.00010	<0.00010		<0.00010
Bismuth (Bi)-Dissolved (mg/L)	<0.0010 DLA	<0.00050	<0.00050		<0.00050
Boron (B)-Dissolved (mg/L)	0.180	<0.010	<0.010		<0.010
Cadmium (Cd)-Dissolved (mg/L)	0.000032	<0.000010	<0.000010		<0.000010
Calcium (Ca)-Dissolved (mg/L)	355	41.6	<0.050		42.0
Chromium (Cr)-Dissolved (mg/L)	0.00026	0.00093	<0.00010		0.00096
Cobalt (Co)-Dissolved (mg/L)	0.0258	0.00124	<0.00010		0.00117
Copper (Cu)-Dissolved (mg/L)	<0.00040 DLA	<0.00020	<0.00020		<0.00020
Iron (Fe)-Dissolved (mg/L)	6.21	47.7	<0.010		47.6
Lead (Pb)-Dissolved (mg/L)	<0.00010 DLA	0.000052	<0.000050		0.000059
Lithium (Li)-Dissolved (mg/L)	<0.0010 DLA	<0.00050	<0.00050		<0.00050
Magnesium (Mg)-Dissolved (mg/L)	113	8.43	<0.10		8.37

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1478849-11 Water 29-JUN-14 12:35 GSI-DC-09-B	L1478849-12 Water 29-JUN-14 14:38 GSI-DC-10-B	L1478849-13 Water 29-JUN-14 07:40 MW09-07	L1478849-14 Water 29-JUN-14 13:18 MP09-12	L1478849-15 Water 29-JUN-14 16:15 GSI-DC-07-B
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Sulfur (S)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0205	0.142	0.0306	0.0018	0.0087
	Antimony (Sb)-Dissolved (mg/L)	0.00033	0.00031	0.00850	0.0331	0.00020
	Arsenic (As)-Dissolved (mg/L)	0.0361	0.0931	0.564	5.41	0.167
	Barium (Ba)-Dissolved (mg/L)	0.0702	0.443	0.0270	0.0532	0.158
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00020 DLA	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.0010 DLA	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	0.015	<0.010	0.089	0.052	0.012
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	0.000011	0.000049	0.000313	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	199	147	396	103	153
	Chromium (Cr)-Dissolved (mg/L)	0.00049	0.00207	0.00040	0.00029	0.00035
	Cobalt (Co)-Dissolved (mg/L)	0.00340	0.0153	0.0243	0.00169	0.00298
	Copper (Cu)-Dissolved (mg/L)	0.00024	<0.00020	0.00224	0.00052	<0.00020
	Iron (Fe)-Dissolved (mg/L)	61.7	82.4	34.2	3.89	31.5
	Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000139	0.00024	0.00631	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.00059	0.00054	0.0082	0.00208	0.00167
	Magnesium (Mg)-Dissolved (mg/L)	77.7	35.5	76.6	45.6	41.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1478849-16 Water 29-JUN-14 14:40 GSI-DC-06-B	L1478849-17 Water 29-JUN-14 12:25 MP09-09	L1478849-18 Water 29-JUN-14 13:39 MP09-11	L1478849-19 Water 29-JUN-14 11:07 MW09-17	L1478849-20 Water 29-JUN-14 16:15 FB-4
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Sulfur (S)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0507	0.0048	0.0050	<0.0020 DLA	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	0.00034	0.0897	0.0195	0.00043	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.303	18.7	11.3	0.0207	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.220	0.00127	0.0884	0.00842	<0.000050
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00020 DLA	<0.00020 DLA	<0.00020 DLA	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.0010 DLA	<0.0010 DLA	<0.0010 DLA	<0.00050
	Boron (B)-Dissolved (mg/L)	0.014	0.299	0.037	0.096	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	0.000102	<0.000020 DLA	<0.000020 DLA	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	143	77.6	112	367	<0.050
	Chromium (Cr)-Dissolved (mg/L)	0.00472	<0.00020 DLA	0.00152	<0.00020 DLA	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00282	0.0402	0.00189	<0.00020 DLA	<0.00010
	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.383	0.00049	0.00056	<0.00020
	Iron (Fe)-Dissolved (mg/L)	20.5	0.401	11.7	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	0.000055	0.00185	0.00144	<0.00010 DLA	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.00050	<0.0010 DLA	0.0031	0.0201	<0.00050
	Magnesium (Mg)-Dissolved (mg/L)	55.5	0.81	49.8	266	<0.10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1478849-21				
	Description	Water				
	Sampled Date	29-JUN-14				
	Sampled Time	17:30				
	Client ID	MP09-10				
Grouping	**Analyte**					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Sulfur (S)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0088				
	Antimony (Sb)-Dissolved (mg/L)	0.0907				
	Arsenic (As)-Dissolved (mg/L)	9.72				
	Barium (Ba)-Dissolved (mg/L)	0.00083				
	Beryllium (Be)-Dissolved (mg/L)	<0.00020 DLA				
	Bismuth (Bi)-Dissolved (mg/L)	<0.0010 DLA				
	Boron (B)-Dissolved (mg/L)	0.342				
	Cadmium (Cd)-Dissolved (mg/L)	0.000658				
	Calcium (Ca)-Dissolved (mg/L)	111				
	Chromium (Cr)-Dissolved (mg/L)	<0.00020 DLA				
	Cobalt (Co)-Dissolved (mg/L)	0.0468				
	Copper (Cu)-Dissolved (mg/L)	0.0349				
	Iron (Fe)-Dissolved (mg/L)	0.229				
	Lead (Pb)-Dissolved (mg/L)	0.00280				
	Lithium (Li)-Dissolved (mg/L)	<0.0010 DLA				
	Magnesium (Mg)-Dissolved (mg/L)	0.88				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1478849-1	L1478849-2	L1478849-3	L1478849-4	L1478849-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	28-JUN-14	28-JUN-14	28-JUN-14	28-JUN-14	28-JUN-14
	Sampled Time	18:00	17:00	07:30	11:40	10:20
	Client ID	MW09-21	MP09-05	CH-P-13-03/50	MP09-04	MW09-24
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	14.9	10.6	16.7	0.00340	0.00292
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.00043	0.00053	0.00404	0.000162	0.000305
	Nickel (Ni)-Dissolved (mg/L)	0.0016	0.0036	0.0339	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	12.9	9.57	8.84	2.72	1.85
	Selenium (Se)-Dissolved (mg/L)	<0.00020 DLA	<0.00020 DLA	0.00089	0.00012	0.00020
	Silicon (Si)-Dissolved (mg/L)	4.91	5.68	7.15	6.69	5.48
	Silver (Ag)-Dissolved (mg/L)	<0.000020 DLA	<0.000020 DLA	<0.000020 DLA	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	26.3	80.6	131	12.8	8.30
	Strontium (Sr)-Dissolved (mg/L)	1.29	1.13	0.777	0.927	0.632
	Sulfur (S)-Dissolved (mg/L)	433	398	316	265	199
	Thallium (Tl)-Dissolved (mg/L)	<0.000020 DLA	0.000045	0.000029	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00020 DLA	<0.00020 DLA	0.00107	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.020 DLA	<0.020 DLA	<0.020 DLA	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00193	0.00205	0.00809	0.00247	0.00584
	Vanadium (V)-Dissolved (mg/L)	0.0039	<0.0020 DLA	<0.0020 DLA	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.0025	0.0130	0.0317	0.0036	0.0021

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1478849-6 Water 28-JUN-14 07:40 MW09-23	L1478849-7 Water 28-JUN-14 12:41 MW09-08	L1478849-8 Water 28-JUN-14 11:40 FB-3	L1478849-9 Water 28-JUN-14 12:00 TRAVEL BLANK	L1478849-10 Water 28-JUN-14 12:41 DUP-5
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	12.2	3.52	<0.000050		3.45
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.00611	0.000071	<0.000050		0.000075
	Nickel (Ni)-Dissolved (mg/L)	0.0020	<0.00050	<0.00050		<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	0.104	<0.050		0.102
	Potassium (K)-Dissolved (mg/L)	15.7	1.45	<0.10		1.42
	Selenium (Se)-Dissolved (mg/L)	<0.00020 DLA	0.00011	<0.00010		0.00011
	Silicon (Si)-Dissolved (mg/L)	5.35	9.30	<0.050		9.28
	Silver (Ag)-Dissolved (mg/L)	<0.000020 DLA	<0.000010	<0.000010		<0.000010
	Sodium (Na)-Dissolved (mg/L)	89.7	1.44	<0.050		1.41
	Strontium (Sr)-Dissolved (mg/L)	0.873	0.182	<0.00020		0.184
	Sulfur (S)-Dissolved (mg/L)	405	3.99	<0.50		3.94
	Thallium (Tl)-Dissolved (mg/L)	<0.000020 DLA	<0.000010	<0.000010		<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00020 DLA	<0.00010	<0.00010		<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.020 DLA	<0.010	<0.010		<0.010
	Uranium (U)-Dissolved (mg/L)	0.00311	0.000077	<0.000010		0.000079
	Vanadium (V)-Dissolved (mg/L)	<0.0020 DLA	0.0030	<0.0010		0.0030
	Zinc (Zn)-Dissolved (mg/L)	0.0299	0.0017	<0.0010		0.0013

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1478849-11 Water 29-JUN-14 12:35 GSI-DC-09-B	L1478849-12 Water 29-JUN-14 14:38 GSI-DC-10-B	L1478849-13 Water 29-JUN-14 07:40 MW09-07	L1478849-14 Water 29-JUN-14 13:18 MP09-12	L1478849-15 Water 29-JUN-14 16:15 GSI-DC-07-B
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	1.97	11.0	15.4	2.70	2.41
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000346	0.000565	0.00343	0.00255	0.000363
	Nickel (Ni)-Dissolved (mg/L)	0.00176	0.00386	0.0231	0.00521	0.00103
	Phosphorus (P)-Dissolved (mg/L)	0.142	<0.050	<0.050	0.097	0.061
	Potassium (K)-Dissolved (mg/L)	3.90	2.54	22.1	5.23	3.25
	Selenium (Se)-Dissolved (mg/L)	0.00027	0.00023	<0.00020 DLA	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	6.51	8.18	10.1	9.61	6.95
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	0.000113	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	54.4	24.3	59.5	3.50	20.0
	Strontium (Sr)-Dissolved (mg/L)	0.633	0.555	0.915	0.468	0.474
	Sulfur (S)-Dissolved (mg/L)	246	162	396	16.3	148
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	0.000016	<0.000020 DLA	0.000084	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00020 DLA	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.020 DLA	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000157	0.000294	0.00315	0.000713	0.000067
	Vanadium (V)-Dissolved (mg/L)	0.0017	0.0107	<0.0020 DLA	<0.0010	0.0013
	Zinc (Zn)-Dissolved (mg/L)	0.0024	0.0088	1.61	0.0403	0.0012

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1478849-16	L1478849-17	L1478849-18	L1478849-19	L1478849-20
Description	Water	Water	Water	Water	Water
Sampled Date	29-JUN-14	29-JUN-14	29-JUN-14	29-JUN-14	29-JUN-14
Sampled Time	14:40	12:25	13:39	11:07	16:15
Client ID	GSI-DC-06-B	MP09-09	MP09-11	MW09-17	FB-4
Grouping / **Analyte**					
WATER					
Dissolved Metals Manganese (Mn)-Dissolved (mg/L)	4.87	0.0591	4.15	0.0369	<0.000050
Mercury (Hg)-Dissolved (mg/L)	<0.000010	0.000036	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved (mg/L)	0.00960	0.0130	0.00818	<0.00010 DLA	<0.000050
Nickel (Ni)-Dissolved (mg/L)	0.0194	0.0143	0.0093	<0.0010 DLA	<0.00050
Phosphorus (P)-Dissolved (mg/L)	0.159	0.179	0.083	<0.050	<0.050
Potassium (K)-Dissolved (mg/L)	3.53	8.18	8.22	7.58	<0.10
Selenium (Se)-Dissolved (mg/L)	0.00051	0.00183	0.00032	<0.00020 DLA	<0.00010
Silicon (Si)-Dissolved (mg/L)	10.1	8.71	10.8	5.00	<0.050
Silver (Ag)-Dissolved (mg/L)	<0.000010	0.00189	<0.000020 DLA	<0.000020 DLA	<0.000010
Sodium (Na)-Dissolved (mg/L)	19.7	22.7	21.0	11.7	<0.050
Strontium (Sr)-Dissolved (mg/L)	0.726	0.146	0.596	1.10	<0.00020
Sulfur (S)-Dissolved (mg/L)	1.61	132 DLA	11.9	482	<0.50
Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000020 DLA	<0.000020 DLA	0.000103	<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00020 DLA	<0.00020 DLA	<0.00020 DLA	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.020 DLA	<0.020 DLA	<0.020 DLA	<0.010
Uranium (U)-Dissolved (mg/L)	0.000084	0.000542	0.000762	0.00794	<0.000010
Vanadium (V)-Dissolved (mg/L)	0.0131	<0.0020 DLA	0.0056	<0.0020 DLA	<0.0010
Zinc (Zn)-Dissolved (mg/L)	0.0063	0.0090	0.0206	<0.0020 DLA	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1478849-21				
	Description	Water				
	Sampled Date	29-JUN-14				
	Sampled Time	17:30				
	Client ID	MP09-10				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	0.0291				
	Mercury (Hg)-Dissolved (mg/L)	<0.000050 DLIV				
	Molybdenum (Mo)-Dissolved (mg/L)	0.0142				
	Nickel (Ni)-Dissolved (mg/L)	0.0146				
	Phosphorus (P)-Dissolved (mg/L)	0.199				
	Potassium (K)-Dissolved (mg/L)	10.5				
	Selenium (Se)-Dissolved (mg/L)	0.00150				
	Silicon (Si)-Dissolved (mg/L)	6.67				
	Silver (Ag)-Dissolved (mg/L)	0.00891				
	Sodium (Na)-Dissolved (mg/L)	28.1				
	Strontium (Sr)-Dissolved (mg/L)	0.180				
	Sulfur (S)-Dissolved (mg/L)	116				
	Thallium (Tl)-Dissolved (mg/L)	0.000046				
	Tin (Sn)-Dissolved (mg/L)	<0.00020 DLA				
	Titanium (Ti)-Dissolved (mg/L)	<0.020 DLA				
	Uranium (U)-Dissolved (mg/L)	0.000975				
	Vanadium (V)-Dissolved (mg/L)	<0.0020 DLA				
	Zinc (Zn)-Dissolved (mg/L)	0.0082				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Total Organic Carbon	MS-B	L1478849-10, -11, -12, -14, -15, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -8, -9
Matrix Spike	Total Organic Carbon	MS-B	L1478849-1, -13, -16, -7
Matrix Spike	Total Inorganic Carbon	MS-B	L1478849-1, -10, -11, -12, -13, -14, -15, -16, -17, -19, -2, -20, -21, -4, -5, -6, -8
Matrix Spike	Total Inorganic Carbon	MS-B	L1478849-1, -10, -11, -12, -13, -14, -15, -16, -17, -19, -2, -20, -21, -4, -5, -6, -8
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1478849-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1478849-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1478849-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1478849-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1478849-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8
Matrix Spike	Total Inorganic Carbon	MS-B	L1478849-18, -3, -7, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
CNP	Cyanide test sample appears to have been preserved, but pH was <10 at time of testing. Results may be biased low, particularly for Free CN species.
DLA	Detection Limit adjusted for required dilution
DLIV	Detection Limit Adjusted: Lower Initial Volume
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

ANIONS-CL-IC-WR	Water	Chloride by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

ANIONS-F-IC-WR	Water	Fluoride by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

ANIONS-NO2-IC-WR	Water	Nitrite Nitrogen by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

ANIONS-NO3-IC-WR	Water	Nitrate Nitrogen by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-WR	Water	Sulphate by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

CARBONS-TIC-VA	Water	Total inorganic carbon by CO2 purge	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)

Reference Information

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CN-FREE-CFA-VA Water Free Cyanide in water by CFA ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-SCN-VA Water Thiocyanate by Colour APHA 4500-CN CYANIDE

This analysis is carried out using procedures adapted from APHA Method 4500-CN- M "Thiocyanate" Thiocyanate is determined by the ferric nitrate colourimetric method.

CN-T-CFA-VA Water Total Cyanide in water by CFA ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

CN-WAD-CFA-VA Water Weak Acid Diss. Cyanide in water by CFA APHA 4500-CN CYANIDE

This analysis is carried out using procedures adapted from APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by in-line sample distillation with final determination by colourimetric analysis.

EC-PCT-VA Water Conductivity (Automated) APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

HARDNESS-CALC-VA Water Hardness APHA 2340B

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.

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 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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (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 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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

IONBALANCE-VA Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water 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 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).

Reference Information

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).

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

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.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

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.

S2-T-COL-VA	Water	Total Sulphide by Colorimetric	APHA 4500-S2 Sulphide

This analysis is carried out using procedures adapted from APHA Method 4500-S2 "Sulphide". Sulphide is determined using the methlyene blue colourimetric method.

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
WR	ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1 2

Reference Information

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 (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1478849-COFC

COC Number: 1 -

Page 1 of 2

Report To		Report Format / Distribution	Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Hemmera Environchem Inc.	Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Natasha Sandys	Quality Control (QC) Report with Report ☑ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	230 - 2237 2nd Avenue Whitehorse, YT	☐ Criteria on Report - provide details below if box checked	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
		Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	867-456-4865	Email 1 or Fax nsandys@hemmera.com, rmartinka@hemmera.com	Specify Date Required for E2,E or P:
		Email 2 chris@elr.ca	

Invoice To		Invoice Distribution	
	Same as Report To ☑ Yes ☐ No	Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX	
	Copy of Invoice with Report ☐ Yes ☑ No	Email 1 or Fax nsandys@hemmera.com	
Company:	Hemmera Environchem Inc.	Email 2 chris@elr.ca	
Contact:	Natasha Sandys	**Oil and Gas Required Fields (client use)**	

Project Information			
ALS Quote #:	Q45291	Approver ID:	Cost Center:
Job #:	1343-005.03	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only)		ALS Contact:	Sampler: RM, AB, AN, MI

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conductivity, pH, Hardness (as CaCO3)	Total Alkalinity (as CaCO3)	Ammonia N (total), Total Kjeldahl N (TKN)	Nitrate, Nitrite	Cl, Fl, Sulfate (S04)	Sulphide as S	Anion Sum, Cation Sum, Cation/Anion Balan	Cyanide - Weak Acid Diss.	Cyanide, Total	Cyanide, Free	Thiocyanate	Total Inorganic Carbon, Total Organic Carbo	Dissolved metals, including mercury (F/P)	Number of Containers
	MW09-21	28-Jun-14	16:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	MP09-05	28-Jun-14	17:00	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	CH-P-13-03/50	28-Jun-14	7:30	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	MP09-04	28-Jun-14	11:40	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	MW09-24	28-Jun-14	10:20	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	MW09-23	28-Jun-14	7:40	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	MW09-08	28-Jun-14	12:41	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	FB-3	28-Jun-14	11:40	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	Travel Blank			Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	DUP-5	28-Jun-14	12:41	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	GSI-DC-09-B	29-Jun-14	12:35	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	GSI-DC-10-B	29-Jun-14	14:38	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ Yes ☑ No

Are samples for human drinking water use?
☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

1) See attached parameter sheet for required metals 2) Please hold sulphide analysis until further notified. 3) Please run nitrate , nitrite analysis on sample MP09-10, but hold other analysis until otherwise notified.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	
Ice packs	Yes ☐	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☐				

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
7.8, 5.7	3.4	4.4, 5.0			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)		
Released by: C. Jostrae Stlo	Date: June 30/14	Time: 09:00	Received by:	Date: 30-Jun-14	Time: 9:15

FINAL SHIPMENT RECEPTION (lab use only)		
Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1478849-COFC

COC Number: 1 -

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Report To		Report Format / Distribution	Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Hemmera Environchem Inc.	Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Natasha Sandys	Quality Control (QC) Report with Report ☑ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	230 - 2237 2nd Avenue Whitehorse, YT	☐ Criteria on Report - provide details below if box checked Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	867-456-4865	Email 1 or Fax nsandys@hemmera.com, rmartinka@hemmera.com	Specify Date Required for E2,E or P:
		Email 2 chris@elr.ca	

Invoice To		Invoice Distribution	Analysis Request
	Same as Report To ☑ Yes ☐ No	Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
	Copy of Invoice with Report ☐ Yes ☑ No		
Company:	Hemmera Environchem Inc.	Email 1 or Fax nsandys@hemmera.com	
Contact:	Natasha Sandys	Email 2 chris@elr.ca	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q45291	Approver ID:	Cost Center:
Job #:	1343-005.03	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact:	Sampler: RM, AB, AN, MI

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conductivity, pH, Hardness (as CaCO3)	Total Alkalinity (as CaCO3)	Ammonia N (total), Total Kjeldahl N (TKN)	Nitrate, Nitrite	Cl, Fl, Sulfate (S04)	Sulphide as S	Anion Sum, Cation Sum, Cation/Anion Balan	Cyanide - Weak Acid Diss.	Cyanide, Total	Cyanide, Free	Thiocyanate	Total Inorganic Carbon, Total Organic Carbo	Dissolved Metals, Including Mercury	F/P	Number of Containers
	MW09-07	29-Jun-14	7:40	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	MP09-12	29-Jun-14	13:18	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	GSI-DC-07-B	29-Jun-14	16:15	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	GSI-DC-06-B	29-Jun-14	14:40	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	MP09-09	29-Jun-14	12:25	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	MP09-11	29-Jun-14	13:39	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	MW09-17	29-Jun-14	11:07	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	FB-4	29-Jun-14	16:15	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9
	MP09-10	29-Jun-14	17:30	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9
				Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
				Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
				Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No Are samples for human drinking water use? ☐ Yes ☑ No	1) See attached parameter sheet for required metals 2) Please hold sulphide analysis until further notified. 3) Please run nitrate , nitrite analysis on sample MP09-10, but hold other analysis until otherwise notified.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: C. Jastrebski	Date: Jun 30/14	Time: 09:00	Received by:	Date:	Time:	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY