

Mount Nansen August 2016

Groundwater Monitoring and Sampling

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File: 1343-005.28
November 2016

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1.0 INTRODUCTION

This Work was performed in accordance with Contract C00033455 between Hemmera Envirochem Inc. (“Hemmera”) and Government of Yukon (“Client”), dated May 13, 2016 (“Contract”). In performing this Work, Hemmera has relied in good faith on information provided by others, and has assumed that the information provided by those individuals is both complete and accurate. This Work was performed to current industry standard practice for similar environmental work, within the relevant jurisdiction and same locale. The findings presented herein should be considered within the context of the scope of work and project terms of reference; further, the findings are time sensitive and are considered valid only at the time the Report was produced. The conclusions and recommendations contained in this Report are based upon the applicable guidelines, regulations, and legislation existing at the time the Report was produced; any changes in the regulatory regime may alter the conclusions and/or recommendations.

Hemmera Envirochem Inc. 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 (the Site) in August, 2016. Hemmera/ELR’s scope of work included the monitoring of groundwater wells and collection of groundwater samples from a series of existing groundwater wells at the Site. This report summarizes the monitoring and sampling activities, a description of methodologies and field conditions encountered, a summary of field *in-situ* and laboratory analytical results including a comparison to applicable guidelines, a description of any observations and/or occurrences that may have influenced program results, and recommendations relating to sample procedures and monitoring well conditions. This report does not provide an interpretation of the results, nor does it provide recommendations relating to groundwater quality at the Site.

1.1 SITE LOCATION

The Mount Nansen site is located approximately 45 kilometres (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**). Groundwater monitoring wells exist throughout the Site, a subset of which were sampled during the August 2016 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 for this program included the coordination and execution of the August 2016 groundwater monitoring and sampling, analysis of samples, and the presentation of results in a report.

Groundwater sampling at the Site was conducted over a four (4) day period, between August 29 and September 1, 2016. Sampling was conducted by a team of four (4) qualified field staff from Hemmera/ELR (Norbert Botca, Jeremy Chua, Aaron Nicholson and Michelle McKay). A total of 60 groundwater wells were included in the August 2016 sampling event (**Table 1-1**). It was not possible to sample two (2) of the groundwater wells listed in the scope of work as they appeared to have been destroyed during placer mining operations in the summer of 2015 (GSI-PC-02-B and MP09-02; Hemmera, 2015).

At each well (sampling station) headspace gas concentrations were measured, well and water level parameters were measured (depth to water, depth to bottom, well diameter, and well stick-up height), the well was purged, and then prescribed *in-situ* groundwater quality parameters were measured. Lastly, groundwater samples were collected for laboratory analysis. A detailed description of the sampling methods and measured groundwater quality parameters is provided in **Section 2**.

1.3 SAMPLE SITES

The groundwater wells included in the August 2016 monitoring and sampling event were grouped into six (6) main areas of the Mount Nansen Site (**Table 1-1**). The majority of groundwater wells were located around existing infrastructure including the tailings facility and seepage dam (24 wells), the Brown McDade Pit (11 wells) and the Mill Complex (9 wells). Additional wells (primarily drive-point piezometer installations) were sampled in the vicinity of Dome Creek (9 wells) and Pony Creek (7 wells). **Table 1-1** provides the location, status, and sample recovery details for groundwater wells included in the August 2016 sampling program. The well locations are also illustrated in **Figures 1-2** and **1-3**. Photographs of each sample site visited in August 2016 are included in **Appendix A**.

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NOTES:
 1. Units: Meters
 2. Projection: UTM Zone 8 NAD83
 3. 2008 Quickbird imagery (courtesy of Yukon Geomatics) and spatial data provided by Yukon government.

**Mount Nansen Site - August 2016
 Groundwater Monitoring Program**

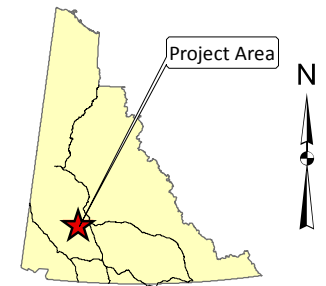


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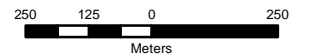


Legend

— Watercourses



Scale: 1:15,000



November 16, 2016

Hemerra Project: 1343-005.28

ELR Project: 16-239.2

FIGURE 1-1

Site Location - Mount Nansen Site

Table 1-1 Summary of Groundwater Well Locations and Samples Collected

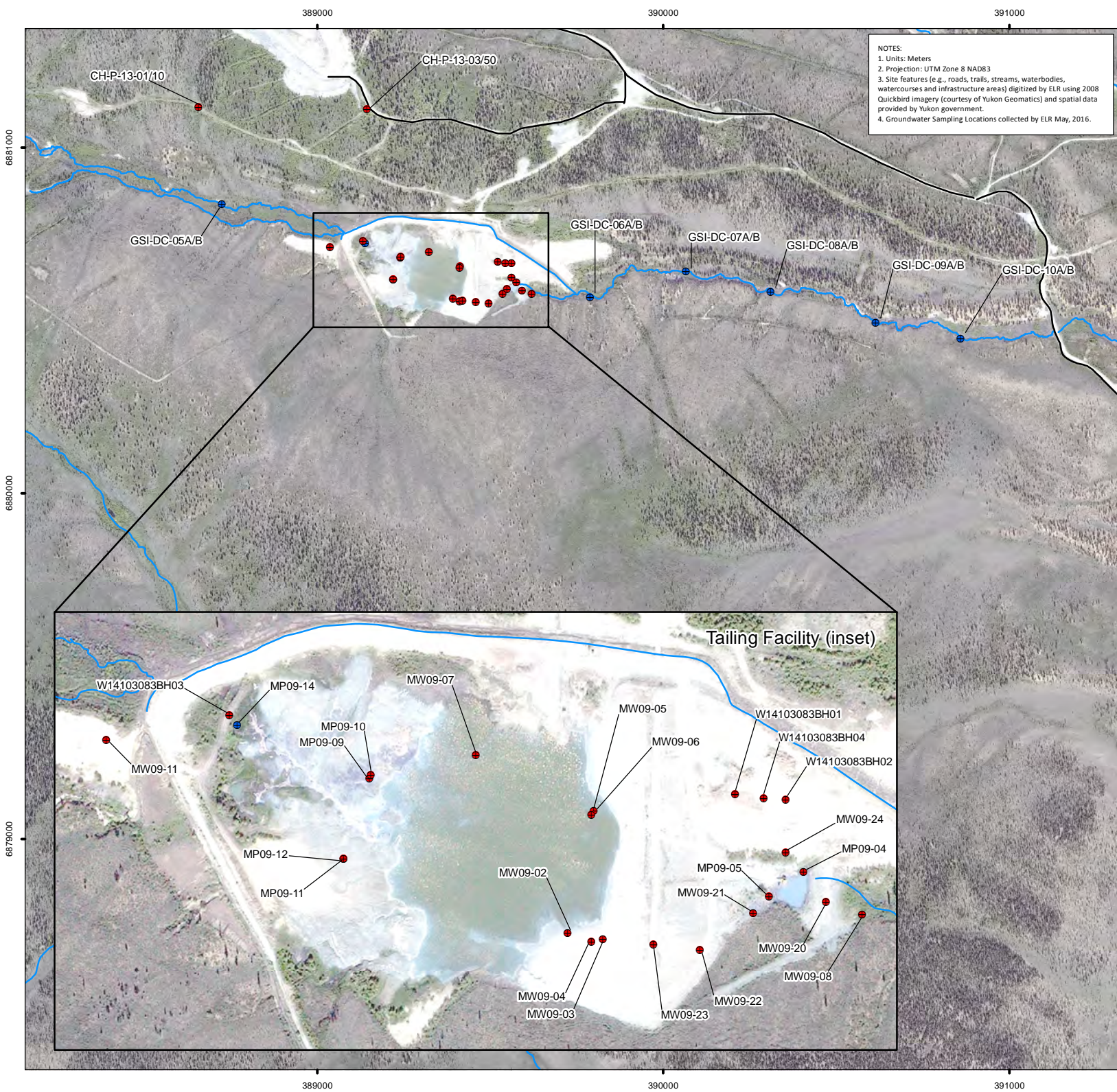
Area	Well Name	UTM (Zone 08N)		Status ^{1,2}	Sample Collected	QA/QC Sample Collected
		Easting	Northing			
Dome Creek	GSI-DC-01B	387675	6881124	Direct Sampled ¹	✓	-
	GSI-DC-02B	387879	6881129	Slow Recharge	✓	-
	GSI-DC-03B	388107	6881079	Slow Recharge	✓	-
	GSI-DC-05B	388725	6880836	Slow Recharge	✓	-
	GSI-DC-06B	389788	6880567	Good	✓	-
	GSI-DC-07B	390065	6880641	Good	✓	-
	GSI-DC-08-B	390311	6880583	Direct Sampled ¹	✓	-
	GSI-DC-09-B	390614	6880494	Good	✓	-
	GSI-DC-10-B	390859	6880447	Good	✓	-
Mill Complex	GSI-HA-01A	387842	6881132	Slow Recharge	✓	-
	GSI-HA-02A	387861	6881135	Slow Recharge	✓	-
	GSI-HA-03A	387878	6881131	Direct Sampled ¹	✓	-
	GSI-HA-04A	387916	6881130	Good	✓	-
	GSI-HA-05A	387898	6881125	Slow Recharge	✓	-
	MW09-16	387992	6881094	Good	✓	Duplicate, Field Blank
	MW09-17	388075	6880970	Dry	-	-
	MW09-18	388054	6880986	Good	✓	-
	MW09-19	388051	6881016	Good	✓	-
Brown McDade Pit	CH-P-13-01/10	388657	6881116	Frozen	-	-
	CH-P-13-03/50	389143	6881110	Direct Sampled ¹	✓	-
	CH-P-13-04/10	389138	6881472	Frozen	-	-
	CH-P-13-04/35	389138	6881472	Frozen	-	-
	CH-P-13-05/50	388954	6881466	Not Accessible ²	-	-
	GLL07-01	388851	6881783	Frozen	-	-
	GLL07-02	389069	6881703	Dry	-	-
	GLL07-03	388959	6881477	Not Accessible ²	-	-
	MW09-13	389006	6881664	Frozen	-	-
	MW09-14	389008	6881669	Frozen	-	-
	MW09-15	388920	6881727	Frozen	-	-

Area	Well Name	UTM (Zone 08N)		Status ^{1,2}	Sample Collected	QA/QC Sample Collected
		Easting	Northing			
Pony Creek	GSI-PC-02-B	388907	6881786	Destroyed ³	-	-
	GSI-PC-03-B	389256	6881706	Direct Sampled ¹	✓	-
	GSI-PC-04-B	389586	6881656	Direct Sampled ¹	✓	-
	GSI-PC-05-B	389713	6881661	Dry	-	-
	MP09-02	388867	6881816	Destroyed ³	-	-
	MP09-03	388956	6881739	Direct Sampled ¹	✓	-
	MP09-08	389160	6881718	Good	✓	Duplicate, Field Blank
Seepage Dam	W14103083BH01	389522	6880669	Frozen	-	-
	W14103083BH02	389561	6880665	Frozen	-	-
	W14103083BH04	389544	6880666	Frozen	-	-
Tailings Facility	MP09-04	389575	6880609	Good	✓	-
	MP09-05	389548	6880590	Good	✓	-
	MP09-09	389240	6880681	Good	✓	Duplicate
	MP09-10	389241	6880684	Frozen	-	-
	MP09-11	389220	6880619	Good	-	-
	MP09-12	389220	6880619	Good	-	Field Blank
	MP09-14	389138	6880722	Direct Sampled ¹	✓	-
	MW09-02	389393	6880562	Good	✓	-
	MW09-03	389411	6880555	Good	✓	-
	MW09-04	389420	6880557	Good	✓	-
	MW09-05	389413	6880656	Dry	-	-
	MW09-06	389411	6880653	Good	✓	-
	MW09-07	389322	6880699	Dry	-	-
	MW09-08	389620	6880576	Good	✓	-
	MW09-11	389037	6880711	Dry	-	-
	MW09-20	389592	6880586	Frozen	-	-
	MW09-21	389536	6880577	Good	✓	-
	MW09-22	389495	6880549	Good	✓	-
	MW09-23	389459	6880553	Good	✓	-
	MW09-24	389561	6880624	Good	✓	Duplicate, Field Blank
	W14103083BH03	389132	6880730	Frozen	-	-

Notes: ¹ Direct sampling was completed at sample stations where insufficient water volumes had been encountered during the event, which limited standard purging and sampling methodologies.

² Monitoring wells CH-P-13-05/50 and GLL07-03 were not visited during the August 2016 field event due to pit wall stability safety concerns.

³ Destroyed wells are included in the scope of work and are therefore listed above in the summary table.



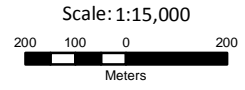
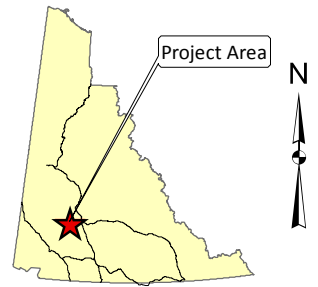
NOTES:
 1. Units: Meters
 2. Projection: UTM Zone 8 NAD83
 3. Site features (e.g., roads, trails, streams, waterbodies, watercourses and infrastructure areas) digitized by ELR using 2008 Quickbird imagery (courtesy of Yukon Geomatics) and spatial data provided by Yukon government.
 4. Groundwater Sampling Locations collected by ELR May, 2016.

**Mount Nansen Site - August 2016
 Groundwater Monitoring Program**



Client:
Yukon
 Energy, Mines and Resources
 Assessment and Abandoned Mines

- Legend**
- ⊕ Destroyed
 - Drive Point
 - Monitoring Well
 - Watercourses



November 16, 2016

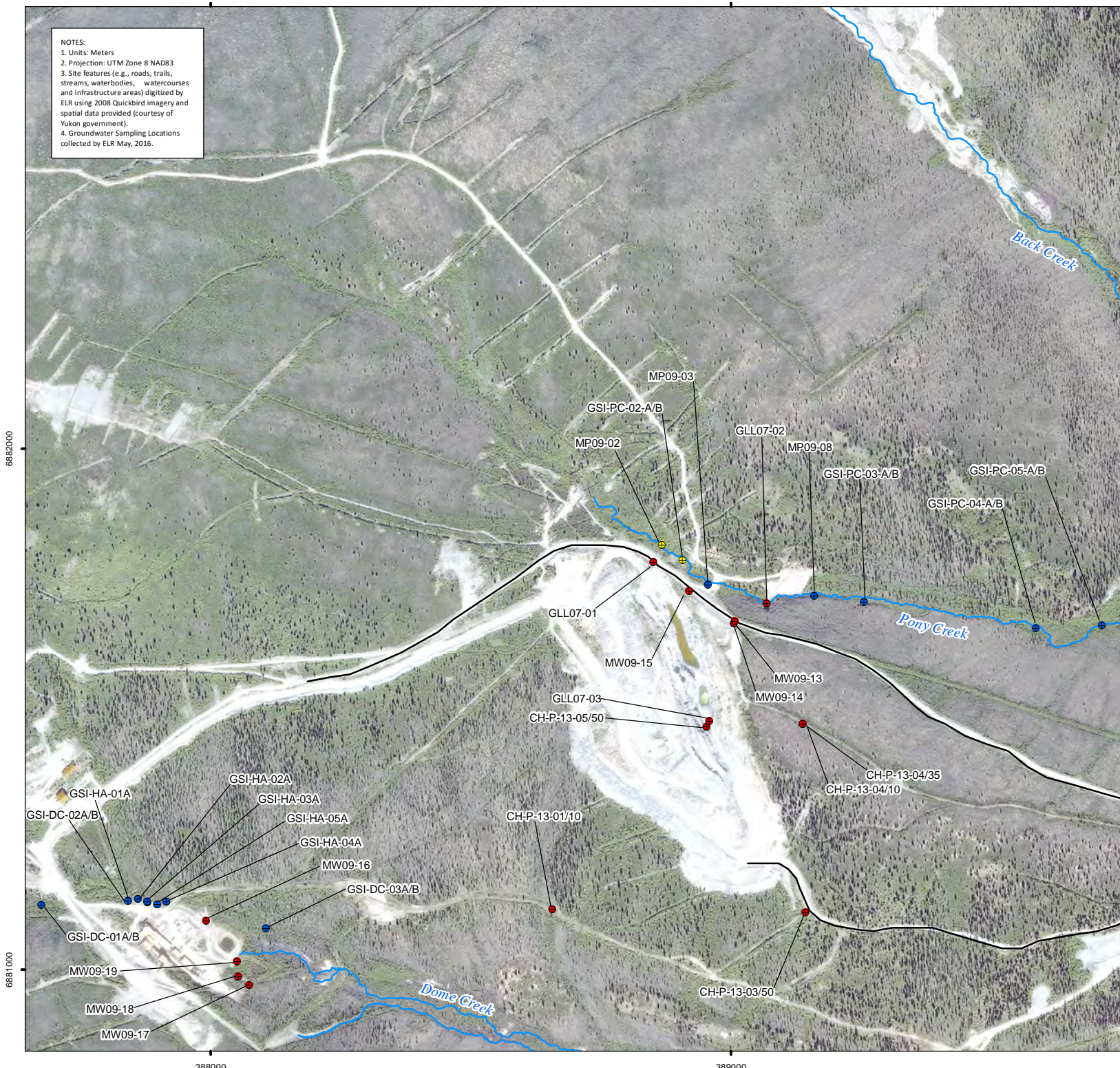
Hemmera Project: 1343-005.28
 ELR Project: 16-239.2

FIGURE 1-2
 Groundwater Sampling Locations
 Dome Creek and Tailings Facility

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NOTES:
 1. Units: Meters
 2. Projection: UTM Zone 8 NAD83
 3. Site features (e.g., roads, trails, streams, waterbodies, watercourses and infrastructure areas) digitized by ELR using 2008 Quickbird imagery and spatial data provided (courtesy of Yukon government).
 4. Groundwater Sampling Locations collected by ELR May, 2016.



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**Mount Nansen Site - August 2016
Groundwater Monitoring Program**

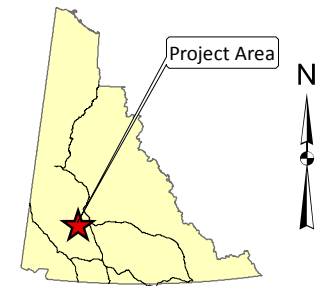


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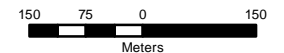


Legend

- Destroyed
- Drive Point
- Monitoring Well
- Watercourses



Scale: 1:10,000



November 16, 2016

Hemmera Project: 1343-005.28
 ELR Project: 16-239.2

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 were completed in accordance with the Groundwater Sampling Standard Operating Procedures included in the document *Scope of Work: Mount Nansen Groundwater Scope of Work*. These procedures were consistent with Environment Yukon's *Protocol for the Contaminated Sites Regulation #7 - Sampling and Decommissioning* (Environment Yukon, 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 sample station, 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 were inspected for damage, closure, and general conditions. Depth to water (DTW; m), depth to bottom (DTB; m), well diameter (cm), and well stick-up height (m) were then recorded at each well.

DTB and DTW were measured using either a Solinst - Model 102 Water Level Meter (for 2.54 cm diameter wells) or a Solinst – Model 122 Interface Meter (for wells with diameter greater than 2.54 cm). DTB and DTW were measured from (in order of preference): 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 cleaned between each sample site using Alconox low-foaming phosphate-free detergent solution and deionized water.

Following initial inspection and measurements, groundwater wells were purged and sampled using dedicated equipment. Groundwater wells were purged and sampled using one of three (3) techniques: 1) manual purging using high density polyethylene (HDPE) Waterra tubing and a footvalve, 2) GeoPump peristaltic pump with HDPE tubing, or 3) manual purging using disposable polyethylene bailers. The purging technique chosen for each well was that which would provide the most representative groundwater sample.

Groundwater wells were determined to be sufficiently purged when either three (3) 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 (3) standing well volumes of water had been purged.

Groundwater turbidity measured in Nephelometric Turbidity Units (NTU) or Attenuation Units (AU¹) was also measured prior to sampling (described below in **Section 2.4**) and was used as an indication of sample quality. Where possible, samples were not collected until turbidity was 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.

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 DIRECT SAMPLING

During previous events a select number of groundwater wells had insufficient volume of groundwater to sample using conventional methods, limiting the number of wells that were sampled during the event. An alternate sampling strategy was established in 2014 by AAM's consultant (AMEC) in order to obtain samples from low producing wells; this continued to be followed during the August 2016 sampling event. At wells identified as regularly having insufficient volume of water or insufficient recharge, Hemmera/ELR direct sampled (analytical samples collected prior to purging or collecting field parameter measurements), after which time field parameter measurements were collected if possible. Additionally, a priority ranking order for analytical sample collection previously established by AAM's consultant (AMEC) was used when collecting samples at these direct sampled wells (as summarized in **Table 2-2**). This ranking system was established to ensure that samples for the highest priority parameters were collected first at each well if limited recharge or volume was encountered. Where the volume or recharge limited sample collected, Hemmera/ELR also re-visited wells when feasible, to attempt to collect a more thorough or complete sample set.

¹ AU stands for Attenuation Units, which is an alternate unit of measure reported by some turbidity meters where turbidity is greater than 500 NTU. AU units are comparable with NTU units, but represent a measure calculated using transmitted rather than scattered light.

In addition to the priority ranking order, Hemmera/ELR also adhered to minimum required sample volumes for laboratory procedures (provided to Hemmera/ELR by ALS Laboratories) where well volume was limited. This allowed the maximum number of program parameters to be collected when volumes were limited.

2.4 FIELD PARAMETERS

Hemmera/ELR measured *in-situ* water quality parameters using YSI Professional Plus multi-parameter field meters, Lamotte 2020we turbidity meters, and Hach DR 890 Portable Colorimeters. Flow-through cells were used with the YSI meters to minimize field parameter variability; flow-through cells improve the precision of field measurements by limiting sample water contact with air, and by continuously moving sample water across the field meter sensors. The *in-situ* groundwater quality parameters recorded at each sample station included water temperature (°C), specific conductivity (µs/cm), conductivity (µs/cm), oxidation/reduction potential (ORP; mv), pH (pH units), sulphide (mg/l), dissolved oxygen (mg/l and percent saturation), and turbidity (NTU or AU).

During purging, field parameters were monitored at 3 minute intervals, or at volume related intervals (e.g., every 500 mL) in the case of wells with slow recharge. *In-situ* measurements for reporting purposes were recorded at the conclusion of purging.

2.5 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 laboratory chosen for this project, and a summary of the sample bottle set (including parameters analysed and preservation techniques) is provided in **Table 2-2**.

Table 2-2 Groundwater Sampling Parameter Priority, Preservation, and Intended Analysis

Priority	Bottle Type	Parameters Analyzed	Minimum Volume	Sample Treatment	Preservative Added
1a	120 ml (plastic)	Dissolved Metals	100 ml	Field Filtered and Preserved	HNO ₃
1b	40 ml (glass)	Dissolved Mercury	15 mL	Field Filtered and Preserved	HCl
2	500 ml (plastic)	General Chemistry	100 ml	-	-
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	Preserved	NaOH
4	120 ml (glass amber)	Ammonia (NH ₃)	60 ml	Preserved	H ₂ SO ₄
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	Preserved	HNO ₃
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-

2.6 DATA MANAGEMENT AND ANALYSIS

Groundwater analytical field and laboratory results were tabulated and reviewed using Hemmera/ELR's EQWin Data Manager water quality database. Data was tabulated for the report and compared to the Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Freshwater Aquatic Life (FAL; CCME, 2014) standards using the database application. All relevant CCME FAL guidelines are presented alongside data in **Table A**.

2.7 QUALITY ASSURANCE AND QUALITY CONTROL

2.7.1 FIELD QA/QC

Several controls were used by Hemmera/ELR staff while in the field to 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 HDPE tubing and Waterra footvalves, laboratory provided pre-cleaned sample bottles, disposable filters, disposable syringes, and disposable polyethylene bailers. Field staff used dedicated disposable nitrile gloves for all measurements, purging, and sampling. Water level meters were cleaned between well locations using Alconox low-foaming phosphate-free detergent and deionized water, and field instruments (YSI field meters, turbidity meters, and portable colorimeters) were checked and calibrated before the 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.

2.7.2 ANALYTICAL QA/QC

Analytical QA/QC measures were included in the August 2016 sampling program as outlined in the scope of work and as per standard industry practice. This included the collection of field duplicates and field blanks, and the use of travel blanks. Duplicate samples were collected at a ratio of 10% of the regular samples (1 duplicate was collected for every 10 samples), and one (1) field blank was prepared during each day of sampling (4 field blanks collected). Two travel blanks accompanied the analytical supplies and samples from the laboratory to the field, and back to the laboratory again (one for each two shipments).

The variation between sample and duplicate results was calculated 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 greater than expected variation in data that could

potentially have affected the precision of sampling or analysis. RPD was calculated according to the following formula:

$$\%RPD = \left(\frac{X_1 - X_2}{\left(\frac{X_1 + X_2}{2} \right)} \right) \times 100$$

Where X_1 is the sample result and X_2 is the corresponding duplicate result. RPD is not considered valid and is therefore 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

A summary of laboratory analytical results in the context of CCME FAL guidelines is presented in **Table A** of this report. A summary of the QA/QC sampling results is presented in **Table B**, including analytical data for duplicates, field blanks, and travel blanks. Laboratory analytical reports are presented in **Appendix C**.

3.1 GROUNDWATER SAMPLING SUMMARY

Groundwater sampling was completed between August 29 and 31, 2016. Weather conditions varied throughout the time of sampling with ambient air temperature ranging from 0 to 10 °C. Periods of light snow and rain, and heavy to light wind occurred throughout the sampling event.

Of the sixty (60) wells specified for the August 2016 sampling event, fifty-six (56) were located and assessed during the program. As noted in **Section 1.2**, two (2) groundwater wells listed in the scope of work had previously been reported as destroyed (GSI-PC-02-B and MP09-02), and two (2) were not accessible due to safety concerns at the Brown McDade Pit (GLL07-03 and CH-P-13-05/50). Further details concerning these wells are provided in **Section 3.2**.

Of the fifty-six (56) wells located, thirty-five (35) wells were sampled; twenty-seven (27) using purging and sample methods as per the program protocols, and eight (8) direct sampled without purging according to the sample priority ranking (**Table 2-2**). In five (5) of the eight (8) direct sampled wells, volumes were insufficient to collect a full sample set. **Table 3-1** provides a summary of limited sample set collection.

Of the remaining twenty-one (21) wells that were assessed but not sampled during the program, fourteen (14) wells were frozen, and seven (7) wells were dry. Despite not collecting water quality samples, these wells were still assessed and water/ice depth, well depth, and headspace gas measurements were collected to the extent possible. A summary of the overall condition (status) and sampling result for groundwater wells is provided in **Table 1-1**, and a summary of all well measurements, purge details, and *in-situ* parameter results is provided in **Table 3-2**.

Table 3-1 Summary of Direct Samples Collected During August 2016 Sampling Program

Well Name	Dissolved Metals	Dissolved Mercury	Physical Parameters/Anions/ Nutrients	Cyanide	Ammonia	Thiocyanate	Total Inorganic Carbon
Priority	1a	1b	2	3	4	5	6
GSI-DC-01B	✓	-	-	-	-	-	-
GSI-DC-08B	✓	✓	✓	✓	✓	✓	✓
GSI-HA-03A	✓	✓	✓	✓	✓	✓	✓
CH-P-13-03/50	✓	✓	✓	✓	✓	✓	✓
GSI-PC-03B	✓	✓	✓	-	-	-	-
GSI-PC-04B	✓	✓	✓	✓	-	-	-
MP09-03	✓	✓	✓	✓	-	-	-
MP09-14	✓	✓	✓	-	-	-	-

Notes: Refer to **Section 2.2** for details concerning direct sampling methodologies, including minimum volume collection. Samples were collected based on field priority ranking as specified in **Table 2-2**.

Table 3-2 Groundwater Field Parameters and Well Measurements for August 2016 Sampling Program

Area	Location ID	Sample Date	Status	Stick up Height (m)	Depth To Water (m)	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/DS)	Draw Down (m)	pH	Temperature (°C)	Conductivity (µS/cm)	Specific Conductivity (µS/cm)	ORP (mV)	Dissolved Oxygen (mg/L)	Field Sulphide (mg/L)	Methane (%LEL)	Oxygen (%)	Carbon Dioxide (ppm)	Field Turbidity (NTU)	Method Used	Well Diameter (cm)	
Dome Creek	GSI-DC-01A	8/29/2016	Good	0.93	0.857	1.552	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	300	-	peristaltic	2.54		
	GSI-DC-01B ²	8/29/2016	Direct Sample	0.96	1.247	1.702	0.2	-	-	-	-	-	DS	-	-	-	-	-	-	-	-	0	20.9	300	-	peristaltic	2.54	
	GSI-DC-02A	8/29/2016	Good	1.02	1.603	1.861	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	500	-	peristaltic	2.54	
	GSI-DC-02B	8/30/2016	Slow Recharge	0.88	1.845	3.800	1.0	0.5	-	-	-	-	PDR	1.955	7.57	4.1	612	1018	-59.9	5.60	0.11	0	20.9	500	46.5	peristaltic	2.54	
	GSI-DC-03A	8/29/2016	Good	0.99	1.248	1.855	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	300	-	peristaltic	2.54	
	GSI-DC-03B	8/30/2016	Slow Recharge	0.96	1.405	1.860	0.2	0.5	13:04	13:06	0:02	-	PDR	0.455	7.28	4.4	556	916	172.9	5.63	0.25	0	20.9	300	58.2	peristaltic	2.54	
	GSI-DC-05A	8/29/2016	Good	1.15	1.334	1.940	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	300	-	peristaltic	2.54	
	GSI-DC-05B	8/30/2016	Slow Recharge	0.65	0.930	2.865	1.0	0.5	16:35	16:38	0:03	-	PDR	1.935	7.23	1.9	770	1380	50.9	2.39	0.80	0	20.9	500	920 ³	peristaltic	2.54	
	GSI-DC-06A	8/31/2016	Good	0.84	1.816	2.001	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	300	-	peristaltic	2.54	
	GSI-DC-06B	8/31/2016	Good	0.49	0.720	2.910	1.2	2.9	10:43	11:05	0:22	0.1	PS	-	7.50	2.7	570	993	-143.4	0.69	0.06	0	20.9	300	42.7	peristaltic	2.54	
	GSI-DC-07A	8/31/2016	Good	1.06	1.845	1.853	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	300	-	peristaltic	2.54	
	GSI-DC-07B	8/31/2016	Good	1.05	1.370	3.770	1.3	4.0	11:57	12:23	0:26	0.2	3WV	-	6.96	2.9	590	1022	-64.3	0.96	0.05	0	20.9	400	8.7	peristaltic	2.54	
	GSI-DC-08A	8/31/2016	Good	1.05	1.309	2.008	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.7	300	-	peristaltic	2.54	
	GSI-DC-08B ²	8/31/2016	Direct Sample	0.46	0.796	2.902	1.2	-	-	-	-	-	-	DS	-	6.60	8.9	839	1212	-35.7	2.48	0.80	0	20.7	200	1540 ³	peristaltic	2.54
	GSI-DC-09A	8/31/2016	Good	0.94	1.136	2.000	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.7	300	-	peristaltic	2.54	
	GSI-DC-09B	8/31/2016	Good	0.91	1.125	3.852	1.5	3.0	13:50	14:12	0:22	0.1	PS	-	7.12	2.7	219	382	-66.0	-	-	0	20.7	300	8.4	peristaltic	2.54	
GSI-DC-10A	8/31/2016	Good	1.29	1.060	2.009	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.7	300	-	peristaltic	2.54		
GSI-DC-10B	8/31/2016	Good	1.22	1.121	3.794	1.5	3.0	12:45	13:10	0:25	0.1	PS	-	6.65	1.8	696	1251	-45.7	0.26	0.02	0	20.7	300	6.6	peristaltic	2.54		
Mill Complex	GSI-HA-01A	8/30/2016	Slow Recharge	1.23	2.065	3.130	0.6	0.5	-	-	-	-	PDR	-	7.07	4.3	664	1097	-19.8	5.12	-	0	20.9	400	-	peristaltic	2.54	
	GSI-HA-02A	8/30/2016	Slow Recharge	1.54	1.828	2.785	0.6	0.5	-	-	-	-	PDR	-	6.89	6.6	680	1047	-44.2	2.57	-	0	20.9	300	-	peristaltic	2.54	
	GSI-HA-03A ²	8/29/2016	Direct Sample	1.00	1.141	2.190	0.6	-	-	-	-	-	DS	-	-	-	-	-	-	-	-	0	20.9	300	-	peristaltic	2.54	
	GSI-HA-04A	8/29/2016	Good	0.68	1.015	2.194	0.7	2.0	10:32	10:47	0:15	0.1	PS	-	6.66	4.0	525	877	-26.6	7.70	0.06	0	20.9	300	2.8	peristaltic	2.54	
	GSI-HA-05A	8/30/2016	Slow Recharge	1.14	1.340	2.189	0.5	2.5	10:11	10:13	0:02	-	PDR	-	7.15	7.1	686	1042	-87.9	6.53	0.15	0	20.9	300	42.1	peristaltic	2.54	
	MW09-16	8/29/2016	Good	1.39	1.922	2.730	1.6	4.0	11:07	11:25	0:18	0.1	PS	-	6.63	6.6	1086	1673	170.0	2.26	0.01	0	24.7	1900	0.2	peristaltic	5.08	
	MW09-17	8/29/2016	Dry	0.98	-	5.725	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4.2	427	-	-	5.08	
	MW09-18	8/29/2016	Good	0.88	4.460	7.794	6.6	2.0	12:29	12:42	0:13	0.5	PS	-	6.91	1.8	1591	2862	41.5	0.18	0.01	0	20.9	800	7.1	peristaltic	5.08	
MW09-19	8/29/2016	Good	0.99	2.400	5.900	7.0	3.5	13:28	13:50	0:22	0.3	PS	-	6.77	4.0	1360	2271	-28.4	0.24	0.15	0	20.9	300	2.6	peristaltic	5.08		

Area	Location ID	Sample Date	Status	Stick up Height (m)	Depth To Water (m)	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/DS)	Draw Down (m)	pH	Temperature (°C)	Conductivity (µS/cm)	Specific Conductivity (µS/cm)	ORP (mV)	Dissolved Oxygen (mg/L)	Field Sulphide (mg/L)	Methane (%LEL)	Oxygen (%)	Carbon Dioxide (ppm)	Field Turbidity (NTU)	Method Used	Well Diameter (cm)
Brown McDade Pit	CH-P-13-01/10	8/29/2016	Frozen	0.48	6.800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	500	-	-	3.81	
	CH-P-13-03/50 ²	8/29/2016	Direct Sample	0.56	46.921	50.528	1.8	-	-	-	-	-	DS	-	-	-	-	-	-	-	0.09	0	20.9	400	28.1	disp. bailer	3.81
	CH-P-13-04/10	8/29/2016	Frozen	0.68	6.100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	22.3	200	-	-	3.81
	CH-P-13-04/35	8/29/2016	Frozen	0.61	6.500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21.6	300	-	-	3.81
	CH-P-13-05/50 ⁴	-	Not Accessible	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.08
	GLL07-01	8/29/2016	Frozen	0.75	13.824	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	200	-	-	5.08
	GLL07-02	8/29/2016	Dry	1.27	-	7.257	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	19.5	4600	-	-	5.08
	GLL07-03 ⁴	-	Not Accessible	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.08
	MW09-13	8/29/2016	Frozen	0.76	8.710	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.3	3500	-	-	5.08
	MW09-14	8/29/2016	Frozen	0.74	6.835	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.7	500	-	-	5.08
	MW09-15	8/29/2016	Frozen	0.88	14.161	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.7	300	-	-	-
Pony Creek	GSI-PC-02B ⁵	-	Destroyed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	GSI-PC-03A	8/31/2016	Good	0.97	1.016	2.002	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	300	-	peristaltic	1.27	
	GSI-PC-03B ²	8/31/2016	Direct Sample	0.96	1.972	2.834	0.6	-	-	-	-	-	DS	0.862	-	-	-	-	-	-	-	0	20.9	300	-	peristaltic	1.27
	GSI-PC-04A	8/31/2016	Frozen	0.98	1.342	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	300	-	-	1.27
	GSI-PC-04B ²	8/31/2016	Direct Sample	1.05	1.850	2.900	0.6	-	-	-	-	-	DS	1.050	-	-	-	-	-	-	-	0	20.9	500	-	peristaltic	1.27
	GSI-PC-05A	8/31/2016	Dry	0.89	-	2.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	1000	-	-	1.27
	GSI-PC-05B	8/31/2016	Dry	0.89	-	3.715	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	9.0	6500	-	-	-
	MP09-02 ⁵	-	Destroyed	0.62	1.618	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	MP09-03 ²	8/31/2016	Direct Sample	0.62	1.058	1.980	1.1	-	-	-	-	-	DS	0.922	-	-	-	-	-	-	-	0	20.9	200	-	peristaltic	1.27
MP09-08	8/31/2016	Good	0.57	0.450	1.974	0.8	3.5	10:30	10:59	0:29	0.1	PS	-	7.14	1.1	457	840	-16.8	0.24	0.05	0	20.3	500	2.6	peristaltic	1.27	
Seepage Dam	W14103083BH01	8/30/2016	Frozen	0.65	6.496	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	500	-	-	5.08	
	W14103083BH02	8/30/2016	Frozen	0.78	6.705	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	300	-	-	5.08	
	W14103083BH04	8/30/2016	Frozen	0.77	6.570	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	320	-	-	5.08	

Area	Location ID	Sample Date	Status	Stick up Height (m)	Depth To Water (m)	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/DS)	Draw Down (m)	pH	Temperature (°C)	Conductivity (µS/cm)	Specific Conductivity (µS/cm)	ORP (mV)	Dissolved Oxygen (mg/L)	Field Sulphide (mg/L)	Methane (%LEL)	Oxygen (%)	Carbon Dioxide (ppm)	Field Turbidity (NTU)	Method Used	Well Diameter (cm)	
Tailings Facility	MP09-04	8/30/2016	Good	1.20	2.070	3.080	1.1	4.6	9:40	10:01	0:21	0.2	PS	-	6.96	2.8	659	1142	86.8	1.96	0.01	0	20.9	500	2.4	peristaltic	5.08	
	MP09-05	8/30/2016	Good	1.10	1.386	1.830	0.5	2.4	10:34	10:56	0:22	0.1	PS	-	6.69	6.4	1221	1895	25.2	1.55	0.03	0	20.9	1400	5.4	peristaltic	5.08	
	MP09-09	8/30/2016	Good	2.59	3.782	5.653	3.7	3.5	16:28	17:07	0:39	0.1		-	9.52	6.3	344	536	-25.6	0.11	0.31	0	20.7	300	98.2	peristaltic	5.08	
	MP09-10	8/30/2016	Frozen	2.31	3.446	3.952	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.7	200	-	-	2.54	
	MP09-11	8/30/2016	Good	2.10	2.115	4.959	3.1	2.4	18:07	18:34	0:27	0.1	PS	-	7.79	7.4	473	713	-130.5	0.80	-	14	19.9	3000	83.1	peristaltic	2.54	
	MP09-12	9/1/2016	Good	2.01	2.170	4.240	3.1	2.5	18:00	18:05	0:05	-	PS	-	8.04	8.4	460	690	-75.6	11.30	0.80	0	20.9	400	3050 ³	peristaltic	2.54	
	MP09-14 ²	8/29/2016	Direct Sample	0.73	0.752	1.610	0.4	-	-	-	-	-	-	DS	0.858	-	-	-	-	-	-	-	0	20.9	300	-	peristaltic	2.54
	MW09-02	8/30/2016	Good	0.73	2.888	4.737	3.6	2.5	13:13	13:36	0:23	0.2	PS	-	7.16	4.2	1499	2487	-79.4	0.05	0.02	0	20.7	500	6.5	peristaltic	2.54	
	MW09-03	8/30/2016	Good	0.38	6.356	9.962	7.2	2.0	11:12	11:33	0:21	0.3	PS	-	8.25	3.3	1544	2634	-72.4	0.07	0.00	0	20.9	300	10.8	peristaltic	2.54	
	MW09-23	8/30/2016	Good	0.18	12.614	15.842	6.5	6.0	10:12	10:41	0:29	0.2	PS	-	7.18	1.2	776	1425	-66.9	2.18	0.05	0	20.9	300	11.7	Waterra	5.08	
	MW09-24	8/30/2016	Good	0.67	9.628	11.945	4.6	70.0	9:00	9:31	0:31	2.3	PS	-	7.23	0.7	455	850	197.0	5.07	0.09	0	20.9	1400	28.4	Waterra	5.08	
	W14103083BH03	8/29/2016	Frozen	0.80	1.865	4.560	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	500	-	-	5.08	
	MW09-04	8/30/2016	Good	0.24	3.926	7.694	7.5	3.5	11:52	12:25	0:33	0.1	PS	-	8.41	4.4	1602	2634	-64.8	0.08	0.00	0	20.7	300	0.5	peristaltic	5.08	
	MW09-05	8/30/2016	Dry	1.45	-	7.572	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	10.8	7900	-	-	5.08	
	MW09-06	8/30/2016	Good	2.37	3.809	6.055	4.5	4.5	14:30	15:11	0:41	0.1	PS	-	7.39	8.5	1034	1512	32.6	1.20	0.01	0	20.6	300	7.1	peristaltic	5.08	
	MW09-07	8/29/2016	Dry	1.26	-	3.399	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	900	-	-	5.08	
	MW09-08	8/30/2016	Good	1.14	1.167	3.900	5.5	6.2	8:43	9:09	0:26	0.2	PS	-	6.71	4.7	160	262	-97.3	2.00	0.04	19	20.0	4900	4.2	peristaltic	5.08	
	MW09-11	8/29/2016	Dry	0.85	-	4.930	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	1200	-	-	5.08	
	MW09-20	8/29/2016	Frozen	0.93	3.690	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20.9	1400	-	-	5.08	
MW09-21	8/30/2016	Good	0.74	1.704	3.603	3.6	4.2	11:17	11:53	0:36	0.1	PS	-	6.81	5.3	1135	1820	-27.5	1.25	0.06	0	20.7	300	28.6	peristaltic	5.08		
MW09-22	8/29/2016	Good	0.87	4.224	5.299	2.0	1.5	16:54	17:20	0:26	0.1	PS	-	6.44	4.5	395	649	9.3	0.59	0.08	0	20.9	400	21.3	peristaltic	5.08		

Notes: To maximize the sample return for analytical analysis, field parameters were not collected at all direct sampled wells. Shaded rows indicate monitoring stations where analytical samples were collected.

¹ 3WV = Three standing well volumes purged prior to sample collection, PS = field parameters stabilized prior to sample collection, PDR = purge dry and return, and DS = sample collected directly without purging.

² Due to low well volumes (direct sampling), field parameters were not measured.

³ Turbidity measurement exceed Nephelometric Turbidity Units and was therefore measured in Attenuation Unit (AU).

⁴ Well was not accessible during the sampling event due to health and safety concerns in the Brown McDade Pit.

⁵ Well has been destroyed by placer mining activity.

3.2 ANALYTICAL RESULTS

Analytical results are summarized below, including a brief summary of CCME FAL guideline exceedances and a description of factors that may have influenced the data. Details regarding well status, including a description of damaged or underperforming wells, are also provided.

In several instances, laboratory reportable detection limits (RDL) for parameters exceeded applicable CCME FAL standards (lightly shaded values in **Table A**). In these cases, samples having elevated levels of certain parameters required laboratory dilution prior to performing the required analyses, thereby resulting in an elevated RDL. For the purpose of this report, samples where the reported RDL is greater than the applicable guideline have not been reported as CCME FAL exceedances.

3.2.1 DOME CREEK

Groundwater wells along Dome Creek were monitored between August 29 and September 1, 2016. All nine (9) drive-point piezometers located in this area were sampled. Of the nine (9) wells sampled, two (2) were direct sampled, four (4) were sampled as per normal groundwater sampling protocol, and three (3) were purged dry on a first site visit then sampled the following day when full or nearly full recharge had occurred. A summary of field measurements, including headspace gases, is provided in **Table 3-2**.

CCME FAL guideline exceedances were observed at all of nine (9) sites sampled in the Mill Complex area, including exceedances of ammonia (one site), dissolved fluoride (three sites), dissolved arsenic (seven sites), dissolved copper (one site), dissolved iron (seven sites) and dissolved selenium (one site). Where measured (seven sites), field dissolved oxygen concentrations were less than the CCME FAL minimum concentration. A summary of CCME FAL guideline exceedances is provided in **Table 3-3**.

Where measured, groundwater turbidity of the samples collected was less than 50 NTU in five (5) of the eight (8) sites. Groundwater turbidity measurements at three (3) sites were greater than 50 NTU; GSI-DC-05B (920 AU), GSI-DC-08B (1549 AU), and GSI-DC-03B (58.2 NTU). Due to limited well volumes, groundwater turbidity was not measured at the sample location (GSI-DC-01B) within the Dome Creek area (**Table 3-2**).

3.2.2 MILL COMPLEX

Groundwater in the Mill Complex Area was sampled between August 29 and August 30, 2016. Samples were obtained from eight (8) of the nine (9) wells identified in this area. One (1) of the wells identified in this area was found dry at the time of sampling (MW09-17). Hemmera/ELR observed bentonite residue at the bottom of the well, which appears to be from a breakage at approximately 1.3 m down the well. The frozen blockage of bentonite that was encountered at this well in May of 2016 (1.310 m deep) appears to have thawed and dispersed through the summer of 2016. Drive-point GSI-HA-03A was direct sampled without purging, while wells GSI-HA-04A, MW09-16, MW09-18, and MW09-19 were sampled according

program protocols. Drive-points GSI-HA-01A, GSI-HA-02A, and GSI-HA-05A were direct sampled, but Hemmera/ELR returned to these wells and found that they had nearly fully recharged, and therefore the original samples were discarded and new more representative samples were collected (thus the purge criteria was classified as purged dry and returned to sample). A summary of the samples collected is provided in **Table 3-1**, and analytical results are provide in **Table A**.

CCME FAL guideline exceedances were observed at all of the eight (8) sites sampled in the Mill Complex area, including exceedances of ammonia (two sites), dissolved fluoride (two sites), dissolved arsenic (seven sites), dissolved copper (one site), dissolved iron (six sites) and dissolved zinc (two sites). Where measured (seven sites), field dissolved oxygen concentrations were less than the CCME FAL minimum concentration. A summary of CCME FAL guideline exceedances is provided in **Table 3-3**.

Where measured, groundwater turbidity of the samples collected was less than 50 NTU. (**Table 3-2**).

3.2.3 BROWN McDADE PIT

Groundwater wells in the Brown McDade Pit area were sampled on August 29, 2016. Samples were obtained from only one (1) of the eleven (11) sites identified in this area (CH-P-13-03/50), which was direct sampled without purging. Seven (7) wells were frozen during the site visit (CH-P-13-01/10, CH-P-13-04/10, CH-P-13-04/35, GLL07-01, MW09-13, MW09-14, and MW09-15), and one (1) well was dry (GLL07-02). Two (2) wells (CH-P-13-05/50 and GLL07-03) were not accessible during the time of sampling due to safety concerns due to pit wall instability (access to the Brown McDade Pit was restricted by AAM). A summary of the samples collected is provided in **Table 3-2**, and analytical results are provide in **Table A**.

CCME FAL guideline exceedances were observed in the one (1) site sampled in this area, including dissolved fluoride, dissolved copper, and dissolved selenium. A summary of CCME FAL guideline exceedances is provided in **Table 3-3**.

Groundwater turbidity was less than 50 NTU at the sample site (CH-P-13-03/50) within the Brown McDade Pit area (**Table 3-2**).

Table 3-3 Summary of CCME FAL Guideline Exceedances for August 2016 Sampling Program

Area	Sample ID	Date Sampled	ALS Work Number	Parameter	Field pH	Field Dissolved Oxygen	Ammonia, Total (as N)	Fluoride (F)	Nitrite (as N)	Cyanide, Free	Arsenic (As)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Mercury (Hg)	Selenium (Se)	Silver (Ag)	Zinc (Zn)		
				Units	pH units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CCME-FAL ^{1,6}	6.5-9.0	9.5	Varies	0.12	0.06	0.005	0.005	Varies	0.3	Varies	0.000026	0.001	0.0001	0.03		
Dome Creek	GSI-DC-01B	8/29/2016	L1823304	Direct Sample	-	-	-	-	-	-	-	0.0276	-	-	-	-	-	-		
	GSI-DC-02B	8/30/2016	L1822156	Slow Recharge	-	5.60	-	-	-	-	0.162	-	42.7	-	-	-	-	-		
	GSI-DC-03B	8/30/2016	L1822156	Slow Recharge	-	5.63	-	0.123	-	-	-	-	-	-	-	-	-	-		
	GSI-DC-05B	8/30/2016	L1822156	Slow Recharge	-	2.39	0.899	-	-	-	0.0385	-	6.67	-	-	-	-	-		
	GSI-DC-06B	8/31/2016	L1823304	Good	-	0.69	-	0.35	-	-	0.444	-	19.5	-	-	-	-	-		
	GSI-DC-07B	8/31/2016	L1823304	Good	-	0.96	-	-	-	-	0.140	-	19.2	-	-	-	-	-		
	GSI-DC-08B	8/31/2016	L1823304	Direct Sample	-	2.48	-	0.16	-	-	0.106	-	134	-	-	0.00155	-	-		
	GSI-DC-09B	8/31/2016	L1823304	Good	-	-	-	-	-	-	0.0696	-	8.75	-	-	-	-	-		
	GSI-DC-10B	8/31/2016	L1823304	Good	-	0.26	-	-	-	-	0.132	-	67.5	-	-	-	-	-		
	Mill Complex	GSI-HA-01A	8/30/2016	L1822156	Slow Recharge	-	5.12	-	0.137	-	-	-	-	0.825	-	-	-	-	-	
GSI-HA-02A		8/30/2016	L1822156	Slow Recharge	-	2.57	-	-	-	-	0.0283	-	47.5	-	-	-	-	0.0362		
GSI-HA-03A ²		8/29/2016	L1822156	Direct Sample	-	-	-	-	-	<0.050	0.0238	-	33.5	-	-	-	-	-		
GSI-HA-04A		8/29/2016	L1822156	Good	-	7.70	-	-	-	-	0.0342	-	8.16	-	-	-	-	-		
GSI-HA-05A		8/30/2016	L1822156	Slow Recharge	-	6.53	-	-	-	-	0.0256	-	6.60	-	-	-	-	-		
MW09-16		8/29/2016	L1822156	Good	-	2.26	-	0.15	-	-	0.0113	0.00612	-	-	-	-	-	-	3.54	
MW09-18		8/29/2016	L1822156	Good	-	0.18	-	-	-	-	0.0554	-	-	-	-	-	-	-		
MW09-19		8/29/2016	L1822156	Good	-	0.24	-	-	-	-	0.140	-	15.0	-	-	-	-	-		
Brown McDade Pit	CH-P-13-03/50	8/29/2016	L1822156	Direct Sample	-	-	-	0.16	-	-	-	0.00445	-	-	-	0.00639	-	-		
Pony Creek	GSI-PC-03B	8/31/2016	L1823304	Direct Sample	-	-	-	<0.40	-	-	0.0458	-	15.7	-	-	-	-	-		
	GSI-PC-04B ³	8/31/2016	L1823304	Direct Sample	-	-	-	-	-	-	0.0115	-	4.59	-	-	-	-	-		
	MP09-03 ⁴	8/31/2016	L1823304	Direct Sample	-	-	-	-	-	-	0.0342	-	2.15	-	-	-	-	-		
	MP09-08	8/31/2016	L1823304	Good	-	0.24	-	-	-	-	0.0140	-	0.862	-	-	-	-	-		

Table 3-3 Summary of CCME FAL Guideline Exceedances for August 2016 Sampling Program (Con't)

Area	Sample ID	Date Sampled	ALS Work Number	Parameter	Field pH	Field Dissolved Oxygen	Ammonia, Total (as N)	Fluoride (F)	Nitrite (as N)	Cyanide, Free	Arsenic (As)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Mercury (Hg)	Selenium (Se)	Silver (Ag)	Zinc (Zn)			
				Units	pH units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CCME-FAL ^{1,6}	6.5-9.0	9.5	Varies	0.12	0.06	0.005	0.005	Varies	0.3	Varies	0.000026	0.001	0.0001	0.0001	0.03		
	MP09-04	8/30/2016	L1822156	Good	-	1.96	-	0.42	-	-	3.52	-	-	-	-	-	-	-	0.554		
	MP09-05	8/30/2016	L1822156	Good	-	1.55	-	-	-	-	0.0128	0.00587	3.84	-	-	-	-	-	-		
	MP09-09	8/30/2016	L1822156	Good	9.52	0.11	3.91	1.81	-	1.15	23.4	0.214	-	-	0.0000395	0.00110	0.00151	-			
	MP09-11	8/30/2016	L1822156	Good	-	0.80	15.1	0.625	-	-	4.58	-	15.0	0.0560	-	-	-	-	0.0475		
	MP09-12	9/1/2016	L1823304	Good	-	-	5.96	0.30	-	-	7.40	-	6.32	-	-	-	-	-	0.0397		
	MP09-14 ⁵	8/29/2016	L1823304	Direct Sample	-	-	-	0.24	-	-	0.502	-	0.767	-	-	-	-	-	-		
	MW09-02	8/30/2016	L1822156	Good	-	0.05	-	0.55	-	-	13.8	-	18.1	-	-	-	-	-	0.352		
	MW09-03	8/30/2016	L1822156	Good	-	0.07	6.59	0.32	-	0.0085	2.26	-	-	-	-	-	-	-	-		
	MW09-04	8/30/2016	L1822156	Good	-	0.08	-	-	-	-	-	-	-	-	-	-	-	-	-		
	MW09-06	8/30/2016	L1822156	Good	-	1.20	-	0.261	-	-	0.124	0.00509	-	-	-	-	-	-	0.113		
	MW09-08	8/30/2016	L1822156	Good	-	2.00	-	0.147	-	-	0.110	-	31.8	-	-	-	-	-	-		
	MW09-21	8/30/2016	L1822156	Good	-	1.25	-	-	-	-	0.0535	-	15.3	-	-	-	-	-	-		
	MW09-22	8/29/2016	L1822156	Good	6.44	0.59	-	-	0.0646	-	0.0111	-	15.2	-	-	-	-	-	-		
	MW09-23	8/30/2016	L1822156	Good	-	2.18	-	-	-	-	0.0353	-	15.7	-	-	-	-	-	-		
	MW09-24	8/30/2016	L1822156	Good	-	5.07	-	-	-	-	-	0.00666	-	-	-	-	-	-	-		

Notes: ¹ CCME guideline exceedances shaded with dark grey. Light grey shading denotes reportable detection limit in exceedance of CCME guideline.

² Due to slow recharge and low well volumes, samples were collected from GSI-HA-03A between August 29 and August 30, 2016. Thiocyanate, total ammonia, and TIC were collected on August 30, 2016. All other parameters were collected on August 29, 2016.

³ Due to slow recharge and low well volumes, samples were collected from GSI-PC-04B between August 31 and September 1, 2016. Dissolved metals, dissolved mercury, and general chemistry were collected on August 31, 2016. Cyanide was collected on September 1, 2016.

⁴ Due to slow recharge and low well volumes, samples were collected from MP09-03 between August 31 and September 1, 2016. Dissolved metals, dissolved mercury, and general chemistry were collected on August 31, 2016. Cyanide was collected on September 1, 2016.

⁵ Due to slow recharge and low well volumes, samples were collected from MP09-14 between August 29 and August 31, 2016. Dissolved metals was collected on August 29, 2016. Dissolved mercury and general chemistry was collected on August 31, 2016.

⁶ Refer to **Table A** for full analytical report.

“-“ indicates either no exceedance was observed or no analysis was conducted.

3.2.4 PONY CREEK

Groundwater wells along Pony Creek were monitored between August 30 and 31, 2016. One (1) of the seven (7) groundwater wells identified in the Pony Creek area was dry during the time of sampling (GSI-PC-05B). Two (2) of the six (6) remaining wells identified in this area had been previously destroyed by placer mining activity (GSI-PC-02B and MP09-02) and therefore could not be monitored. Of the remaining four (4) wells sampled, three (3) were sampled directly without purging (GSI-PC-03B, GSI-PC-04B, and MP09-03), and one (1) was sampled according to program protocols (MP09-08). A summary of the samples collected is provided in **Table 3-2**, and analytical results are provide in **Table A**.

CCME FAL guideline exceedances were observed at the four (4) sites sampled in the Pony Creek area, including exceedances of dissolved arsenic (four sites) and dissolved iron (four sites). Where measured (one site), field dissolved oxygen concentration was less than the minimum CCME FAL guideline level. A summary of CCME FAL guideline exceedances is provided in **Table 3-3**.

Groundwater turbidity of the one sample measured in this area was less than 50 NTU. Due to limited well volumes, groundwater turbidity was not measured at the other sample locations (GSI-PC-03B, GSI-PC-04B, and MP09-03) within the Pony Creek area (**Table 3-2**).

3.2.5 SEEPAGE DAM

Groundwater wells in the Seepage Dam area were monitored on August 30, 2016. All three (3) of the groundwater wells in this area were frozen at the time of sampling. A summary of field measurements collected for each site is provided **Table 3-2**.

3.2.6 TAILINGS FACILITY

Groundwater wells in the Tailings Facility area were sampled between August 29 and September 1, 2016. Samples were obtained from fifteen (15) of the twenty-one (21) sample sites located in this area. Three (3) of the twenty-one (21) groundwater wells identified in the Tailings Facility area were frozen at the time of sampling (MP09-10, MW09-20, and W14103083BH03), and another three (3) were dry at the time of sampling (MW09-05, MW09-07, and MW09-11). Of the fifteen (15) wells sampled in the Tailings Facility area, one (1) was direct sampled (MP09-14), while the other fourteen (14) were purged prior to sampling (MP09-04, MP09-05, MP09-09, MP09-11, MP09-12, MW09-02, MW09-03, MW09-04, MW09-06, MW09-08, MW09-21, MW09-22, MW09-23, and MW09-24). A summary of the samples collected is provided in **Table 3-2**, and analytical results are provide in **Table A**.

CCME FAL guideline exceedances were observed at all fifteen (15) sites sampled in the Tailings Facility area, including exceedances of total ammonia (four sites), dissolved fluoride (nine sites), nitrite (one site), free cyanide (two sites), dissolved arsenic (thirteen sites), dissolved copper (four sites), dissolved iron (nine sites), dissolved mercury (one site), dissolved selenium (one site), dissolved silver (one site), and

dissolved zinc (five sites). Field dissolved oxygen concentrations, were less than the minimum CCME FAL guideline level at thirteen (13) sites where it was measured. A summary of CCME FAL guideline exceedances is provided in **Table 3-3**.

Groundwater turbidity exceeded 50 NTU at two (2) of the fourteen (14) sites measured, MP09-09 (98.2 NTU), and MP09-12 (3050 AU) (**Table 3-2**).

3.3 QUALITY ASSURANCE AND QUALITY CONTROL RESULTS

Four (4) duplicate groundwater samples were collected during the August 2016 sampling event. Two (2) travel blanks were provided by the laboratory and accompanied the samples throughout the sampling program, and four (4) field blanks were prepared on site during the sampling program. Detailed results of QA/QC sampling are provided in **Table B**, including RPD values for all duplicate and sample pairs.

3.3.1 FIELD AND TRAVEL BLANKS

All travel blank analytical results were reported as less than the RDL (**Table B**). In three (3) of the four (4) field blanks, analytical results were all reported as less than the RDL (**Table B**). In the other field blank (FB-3) dissolved cadmium was detected at 0.00002 mg/L. Although detected, the observed values were very close to (4 times) the RDL of 0.000005 mg/L. At the sampling location, field crew had observed small amounts of dust, as well as moisture/splashes from the creek that could have potentially accounted for the detected cadmium.

3.3.2 FIELD DUPLICATES

3.3.2.1 MW09-16 and DUP-1

All sample and duplicate pair analytical results for MW09-16 and DUP-1 produced RPD values less than the 20% RPD threshold limit (**Table B**).

3.3.2.2 MW09-24 and DUP-2

All sample and duplicate pair analytical results produced RPD values for samples MW09-24 and DUP-2 less than the 20% RPD threshold limit (**Table B**).

3.3.2.3 MP09-09 and DUP-3

Sample and duplicate pair analytical results produced RPD values for dissolved copper (59.90%), dissolved manganese (41.51%), and dissolved silver (128.18%), which were greater than the acceptable RPD limit. Field notes and measurements show that the source of variability could potentially be due to a high turbidity measurement (98.2 NTU). (**Table 3-2**).

All other sample and duplicate pair analytical results produced RPD values for samples MP09-09 and DUP-3 were less than the 20% RPD threshold limit (**Table B**).

3.3.2.4 MP09-08 and DUP-4

Sample and duplicate pair analytical results produced RPD values for dissolved antimony (35.29%), dissolved molybdenum (31.15%), total organic carbon (20.69%), and Total Kjeldahl Nitrogen (35.13%) greater than the acceptable RPD limit. Field notes and measurements do not identify any potential source of contamination or suggest variability in groundwater quality during the purging process (**Table 3-2**).

All other sample and duplicate pair analytical results produced RPD values for samples MP09-08 and DUP-4 were less than the 20% RPD threshold limit (**Table B**).

3.3.3 QUALITY ASSURANCE AND QUALITY CONTROL SUMMARY

Results for the QA/QC analytical program show minimal evidence of sampling variation or contamination during the field collection process and transportation, and that program results are acceptable.

The single detection of low levels (near RDL) of cadmium suggests that slight contamination from the field environment may have occurred, but the level of this detection suggests that this type of contamination would not affect program results. The lack of detections in the other three field blanks also suggests that it is not a systematic occurrence.

Across the results for four (4) sample and duplicate pairs, RPD threshold exceedances were observed at two (2) sites. Field notes for the sample duplicate pair MP09-09 and DUP-3 did not identify any potential sources of contamination, however a high turbidity measurement (98.2 NTU) suggests variability in groundwater quality during the sampling process is due to a high amount of suspended solids (**Table 3-2**). No specific observations were noted for the sample and duplicate pair MP09-08 and DUP-4. Generally, the number of parameters where variations were noted suggest some variability that is most likely attributable to variations in groundwater, and are not likely to represent a larger sampling bias.

4.0 RECOMMENDATIONS

Hemmera/ELR do not have program recommendations based on the observations and results of the August 2016 groundwater sampling program.

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.

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6.0 REFERENCES

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TABLES

Table A: Groundwater Sampling Analytical Results and CCME Guideline Exceedances for 2016 August Sampling Program

Site Location		Dome Creek									Mill Complex									
Sample ID		GSI-DC-01B	GSI-DC-02B	GSI-DC-03B	GSI-DC-05B	GSI-DC-06B	GSI-DC-07B	GSI-DC-08B	GSI-DC-09B	GSI-DC-10B	GSI-HA-01A	GSI-HA-02A	GSI-HA-03A ¹³	GSI-HA-04A	GSI-HA-05A	MW09-16	MW09-17	MW09-18	MW09-19	
Date Sampled		29/08/2016	30/08/2016	30/08/2016	30/08/2016	31/08/2016	31/08/2016	31/08/2016	31/08/2016	31/08/2016	30/08/2016	30/08/2016	29/08/2016	29/08/2016	30/08/2016	29/08/2016	29/08/2016	29/08/2016	29/08/2016	
ALS Work Number		L1823304	L1822156	L1822156	L1822156	L1823304	L1823304	L1823304	L1823304	L1823304	L1822156	L1822156	L1822156	L1822156	L1822156	L1822156		L1822156	L1822156	
Station Status		Direct Sample	Slow Recharge	Slow Recharge	Slow Recharge	Good	Good	Direct Sample	Good	Good	Slow Recharge	Slow Recharge	Direct Sample	Good	Slow Recharge	Good	Dry	Good	Good	
Parameter	Units	CCME-FAL ^{1,2,3,4}																		
Physical Tests																				
Lab pH	pH units	6.5-9.0 ⁵	-	7.69	7.68	7.42	8.07	7.78	7.21	7.68	6.79	7.89	7.30	7.81	7.38	7.37	7.65	-	7.87	7.44
Field pH	pH units	6.5-9.0 ⁵	-	7.57	7.28	7.23	7.50	6.96	6.60	7.12	6.65	7.07	6.89	-	6.66	7.15	6.63	-	6.91	6.77
Field Temperature	C	-	-	4.1	4.4	1.9	2.7	2.9	8.9	2.7	1.8	4.3	6.6	-	4.0	7.1	6.6	-	1.8	4.0
Lab Conductivity	uS/cm	-	-	1020	1210	1300	960	995	892	363	1070	1140	988	669	862	794	1760	-	2770	2200
Field Conductivity	uS/cm	-	-	612	556	770	570	590	839	219	696	664	680	-	525	686	1086	-	1591	1360
Field Specific Conductivity	uS/cm	-	-	1018	916	1380	993	1022	1212	382	1251	1097	1047	-	877	1042	1673	-	2862	2271
Total Hardness (as CaCO3)	mg/L	-	119	608	737	796	578	572	429	174	568	691	568	364	487	456	1120	-	1890	1440
Field Dissolved Oxygen	mg/L	9.5 ⁶	-	5.60	5.63	2.39	0.69	0.96	2.48	-	0.26	5.12	2.57	-	7.70	6.53	2.26	-	0.18	0.24
Field Oxidation - Redox Potent	mV	-	-	-59.9	172.9	50.9	-143.4	-64.3	-35.7	-66.0	-45.7	-19.8	-44.2	-	-26.6	-87.9	170.0	-	41.5	-28.4
Field Turbidity	NTU	-	-	46.5	58.2	920 ¹⁸	42.7	8.7	1549 ¹⁸	8.4	6.6	-	-	-	2.8	42.1	0.2	-	7.1	2.6
Anions Nutrients																				
Alkalinity, Total (CaCO3)	mg/L	-	-	289	265	255	595	201	406	95.3	113	291	222	131	170	158	327	-	529	524
Alkalinity, Total (CaCO3, filt)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia, Total (as N)	mg/L	Varies ⁷	-	1.12	0.277	0.899	3.39	2.38	11.6	1.51	1.54	0.0480	1.00	0.392	0.184	0.291	<0.0050	-	<0.0050	3.42
Ammonia CCME-FAL	mg/L	-	-	4.438	8.427	0.019011	5.844	19.89	28.06	13.99	44.45	13.77	17.29	-	36.24	9.138	31.45	-	24.44	28.13
Chloride (Cl)	mg/L	-	-	<1.0	<1.0	<1.0	8.1	<2.5	3.2	<0.50	<2.5	<1.0	<1.0	0.74	<0.50	<0.50	<2.5	-	<2.5	<2.5
Fluoride (F)	mg/L	0.12	-	0.062	0.123	0.074	0.35	<0.10	0.16	0.086	<0.10	0.137	0.052	0.050	0.058	0.059	0.15	-	0.11	0.10
Nitrate (as N)	mg/L	13	-	<0.010	0.044	<0.010	<0.025	<0.025	0.049	0.0196	<0.025	0.011	0.044	0.0193	<0.0050	0.0238	0.174	-	0.046	<0.025
Nitrite (as N)	mg/L	0.06	-	<0.0020	<0.0020	<0.0020	<0.0050	<0.0050	0.0168	0.0017	<0.0050	<0.0020	<0.0020	<0.0010	<0.0010	0.0064	<0.0050	-	<0.0050	<0.0050
Total Kjeldahl Nitrogen	mg/L	-	-	1.55	0.578	1.64	5.20	3.00	32.0	2.4	2.56	0.240	1.56	0.658	0.840	10.4	0.148	-	0.119	4.07
Sulfate (SO4)	mg/L	-	-	326	474	550	1.9	388	105	94.7	508	405	350	234	316	296	835	-	1490	1000
Field Sulphide	mg/L	-	-	0.11	0.25	0.80	0.06	0.05	0.80	-	0.02	-	-	-	0.06	0.15	0.01	-	0.01	0.15
Anion Sum	meq/L	-	-	12.6	15.2	16.5	12.2	12.1	10.4	3.88	12.8	14.3	11.7	7.51	9.97	9.32	23.9	-	41.7	31.4
Cation Sum	meq/L	-	-	15.0	15.2	16.9	14.0	13.4	17.4	4.48	16.8	14.2	14.5	9.39	10.5	9.78	22.9	-	38.4	30.8
Cation - Anion Balance	%	-	-	8.8	0.0	1.0	6.9	5.3	25.1	7.1	13.4	-0.3	10.4	11.1	2.7	2.4	-2.2	-	-4.1	-0.9
Cyanide																				
Cyanide, Total	mg/L	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<0.0050	<0.0050	<0.0050	-	<0.0050	<0.0050
Cyanide, Free	mg/L	0.005	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<0.0050	<0.0050	<0.0050	-	<0.0050	<0.0050
Cyanide, Weak Acid Diss	mg/L	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<0.0050	<0.0050	<0.0050	-	<0.0050	<0.0050
Thiocyanate (SCN)	mg/L	-	-	<0.50	<0.50	<0.50	0.54	<0.50	2.93	<0.50	0.61	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	<0.50	0.55
Organic/Inorganic Carbon																				
Total Inorganic Carbon	mg/L	-	-	77.1	65.7	64.7	142	59.3	128	29.3	38.4	71.2	55.3	49.3	45.9	38.1	86.1	-	137	139
Total Organic Carbon	mg/L	-	-	11.8	7.47	12.5	52.6	15.9	451	23.3	35.0	4.95	14.9	7.80	15.7	146	3.35	-	3.36	24.1

Table A: Groundwater Sampling Analytical Results and CCME Guideline Exceedances for 2016 August Sampling Program

Site Location		Brown McDade Pit											Pony Creek							Seepage Dam			
Sample ID	CH-P-13-01/10	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	MW09-13	MW09-14	MW09-15	GSI-PC-02B	GSI-PC-03B	GSI-PC-04B ¹⁵	GSI-PC-05B	MP09-02	MP09-03 ¹⁵	MP09-08	W14103083BH01	W14103083BH02	W14103083BH04		
Date Sampled	29/08/2016	29/08/2016	29/08/2016	29/08/2016	30/08/2016	29/08/2016	29/08/2016	30/08/2016	29/08/2016	29/08/2016	29/08/2016	30/08/2016	31/08/2016	31/08/2016	31/08/2016	30/08/2016	31/08/2016	31/08/2016	30/08/2016	30/08/2016	30/08/2016		
ALS Work Number		L1822156											L1823304	L1823304			L1823304	L1823304					
Station Status	Frozen	Direct Sampled	Frozen	Frozen	Not Accessible	Frozen	Dry	Not Accessible	Frozen	Frozen	Frozen	Destroyed	Direct Sampled	Direct Sampled	Dry	Destroyed	Direct Sampled	Good	Frozen	Frozen	Frozen		
Parameter	Units	CCME-FAL ^{1, 2, 3, 4}																					
Physical Tests																							
Lab pH	pH units	6.5-9.0 ⁵	-	7.62	-	-	-	-	-	-	-	-	-	-	8.22	7.30	-	-	8.02	8.11	-	-	-
Field pH	pH units	6.5-9.0 ⁵	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.14	-	-	-
Field Temperature	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.1	-	-	-
Lab Conductivity	uS/cm	-	-	2250	-	-	-	-	-	-	-	-	-	-	2600	825	-	-	675	814	-	-	-
Field Conductivity	uS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	457	-	-	-
Field Specific Conductivity	uS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	840	-	-	-
Total Hardness (as CaCO3)	mg/L	-	-	1400	-	-	-	-	-	-	-	-	-	-	1710	457	-	-	380	482	-	-	-
Field Dissolved Oxygen	mg/L	9.5 ⁶	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.24	-	-	-
Field Oxidation - Redox Potent	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-16.8	-	-	-
Field Turbidity	NTU	-	-	28.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.6	-	-	-
Anions Nutrients																							
Alkalinity, Total (CaCO3)	mg/L	-	-	376	-	-	-	-	-	-	-	-	-	-	610	201	-	-	196	270	-	-	-
Alkalinity, Total (CaCO3, filt)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia, Total (as N)	mg/L	Varies ⁷	-	0.0151	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0222	-	-	-
Ammonia CCME-FAL	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.26	-	-	-
Chloride (Cl)	mg/L	-	-	<2.5	-	-	-	-	-	-	-	-	-	-	<10	<2.5	-	-	<2.5	<2.5	-	-	-
Fluoride (F)	mg/L	0.12	-	0.16	-	-	-	-	-	-	-	-	-	-	<0.40	<0.10	-	-	<0.10	<0.10	-	-	-
Nitrate (as N)	mg/L	13	-	2.72	-	-	-	-	-	-	-	-	-	-	0.21	<0.025	-	-	<0.025	<0.025	-	-	-
Nitrite (as N)	mg/L	0.06	-	<0.0050	-	-	-	-	-	-	-	-	-	-	0.055	<0.0050	-	-	0.0059	<0.0050	-	-	-
Total Kjeldahl Nitrogen	mg/L	-	-	0.58	-	-	-	-	-	-	-	-	-	-	3.9	1.24 ¹⁹	-	-	5.66 ¹⁹	0.753	-	-	-
Sulfate (SO4)	mg/L	-	-	1140	-	-	-	-	-	-	-	-	-	-	1300	272	-	-	193	213	-	-	-
Field Sulphide	mg/L	-	-	0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05	-	-	-
Anion Sum	meq/L	-	-	31.5	-	-	-	-	-	-	-	-	-	-	39.2	9.67	-	-	7.95	9.84	-	-	-
Cation Sum	meq/L	-	-	30.3	-	-	-	-	-	-	-	-	-	-	38.6	10.1	-	-	8.18	10.1	-	-	-
Cation - Anion Balance	%	-	-	-2.0	-	-	-	-	-	-	-	-	-	-	-0.8	2.2	-	-	1.4	1.1	-	-	-
Cyanide																							
Cyanide, Total	mg/L	-	-	<0.0050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0050	<0.0050	-	-	-
Cyanide, Free	mg/L	0.005	-	<0.0050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0050	<0.0050	-	-	-
Cyanide, Weak Acid Diss	mg/L	-	-	<0.0050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0050	<0.0050	-	-	-
Thiocyanate (SCN)	mg/L	-	-	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.50	-	-	-
Organic/Inorganic Carbon																							
Total Inorganic Carbon	mg/L	-	-	90.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	67.3	-	-	-
Total Organic Carbon	mg/L	-	-	30.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.8	-	-	-

Table A: Groundwater Sampling Analytical Results and CCME Guideline Exceedances for 2016 August Sampling Program

Site Location		Tailings Facility																					
Sample ID	MP09-04	MP09-05	MP09-09	MP09-10	MP09-11	MP09-12	MP09-14 ¹⁷	MW09-02	MW09-03	MW09-04	MW09-05	MW09-06	MW09-07	MW09-08	MW09-11	MW09-20	MW09-21	MW09-22	MW09-23	MW09-24	W14103083BH03		
Date Sampled	30/08/2016	30/08/2016	30/08/2016	30/08/2016	30/08/2016	01/09/2016	29/08/2016	30/08/2016	30/08/2016	30/08/2016	30/08/2016	30/08/2016	29/08/2016	30/08/2016	29/08/2016	29/08/2016	30/08/2016	29/08/2016	30/08/2016	30/08/2016	29/08/2016		
ALS Work Number	L1822156	L1822156	L1822156		L1822156	L1823304	L1823304	L1822156	L1822156	L1822156		L1822156		L1822156			L1822156	L1822156	L1822156	L1822156	L1822156		
Station Status	Good	Good	Good	Frozen	Good	Good	Direct Sampled	Good	Good	Good	Dry	Good	Dry	Good	Dry	Frozen	Good	Good	Good	Good	Frozen		
Parameter	Units	CCME-FAL ^{1, 2, 3, 4}																					
Physical Tests																							
Lab pH	pH units	6.5-9.0 ⁵	8.04	7.27	8.90	-	7.66	8.10	8.27	6.64	7.82	7.43	-	7.48	-	6.55	-	-	6.93	7.50	7.35	7.46	-
Field pH	pH units	6.5-9.0 ⁵	6.96	6.69	9.52	-	7.79	8.04	-	7.16	8.25	8.41	-	7.39	-	6.71	-	-	6.81	6.44	7.18	7.23	-
Field Temperature	C	-	2.8	6.4	6.3	-	7.4	8.4	-	4.2	3.3	4.4	-	8.5	-	4.7	-	-	5.3	4.5	1.2	0.7	-
Lab Conductivity	uS/cm	-	2530	1960	534	-	710	925	1470	2500	2530	1160	-	1490	-	189	-	-	1850	593	1440	848	-
Field Conductivity	uS/cm	-	659	1221	344	-	473	460	-	1499	1544	1602	-	1034	-	160	-	-	1135	395	776	455	-
Field Specific Conductivity	uS/cm	-	1142	1895	536	-	713	690	-	2487	2634	2634	-	1512	-	262	-	-	1820	649	1425	850	-
Total Hardness (as CaCO3)	mg/L	-	1490	1080	204	-	350	524	535	1390	1530	708	-	852	-	87.1	-	-	1060	287	857	503	-
Field Dissolved Oxygen	mg/L	9.5 ⁶	1.96	1.55	0.11	-	0.80	11.30	-	0.05	0.07	0.08	-	1.20	-	2.00	-	-	1.25	0.59	2.18	5.07	-
Field Oxidation - Redox Potent	mV	-	86.8	25.2	-25.6	-	-130.5	-75.6	-	-79.4	-72.4	-64.8	-	32.6	-	-97.3	-	-	-27.5	9.3	-66.9	197.0	-
Field Turbidity	NTU	-	2.4	5.4	98.2	-	83.1	3050 ¹⁸	-	6.5	10.8	0.5	-	7.1	-	4.2	-	-	28.6	21.3	11.7	28.4	-
Anions Nutrients																							
Alkalinity, Total (CaCO3)	mg/L	-	91.0	307	99.9	-	414	386	295	65.1	111	263	-	162	-	105	-	-	287	138	329	311	-
Alkalinity, Total (CaCO3, filt)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia, Total (as N)	mg/L	Varies ⁷	9.48	6.35	3.91	-	15.1	5.96	-	9.51	6.59	<0.0050	-	0.142	-	2.23	-	-	1.09	2.41	0.0112	-	-
Ammonia CCME-FAL	mg/L	-	20.05	27.84	0.06048	-	2.059	1.078	-	11.29	1.005	0.6423	-	4.713	-	30.50	-	-	23.08	57.72	13.80	12.83	-
Chloride (Cl)	mg/L	-	<2.5	<2.5	4.93	-	<0.50	<2.5	<2.5	<2.5	<2.5	<1.0	-	<1.0	-	<0.50	-	-	<2.5	<0.50	<1.0	<0.50	-
Fluoride (F)	mg/L	0.12	0.42	<0.10	1.81	-	0.625	0.30	0.24	0.55	0.32	<0.040	-	0.261	-	0.147	-	-	<0.10	0.088	0.105	0.047	-
Nitrate (as N)	mg/L	13	0.331	3.66	0.0058	-	<0.0050	<0.025	<0.025	<0.025	0.906	2.26	-	0.016	-	<0.0050	-	-	0.054	0.187	<0.010	1.82	-
Nitrite (as N)	mg/L	0.06	0.0502	<0.0050	<0.0010	-	0.0193	<0.0050	<0.0050	<0.0050	<0.0050	<0.0020	-	<0.0020	-	<0.0010	-	-	0.0198	0.0646	<0.0020	<0.0010	-
Total Kjeldahl Nitrogen	mg/L	-	10.1	7.98	5.97	-	17.4	6.12	10.5 ¹⁹	10.7	7.53	0.32	-	0.507	-	2.65	-	-	6.78	2.11	2.99	0.526	-
Sulfate (SO4)	mg/L	-	1640	908	148	-	3.26	178	620	1580	1590	446	-	739	-	<0.30	-	-	887	182	551	190	-
Field Sulphide	mg/L	-	0.01	0.03	0.31	-	-	0.80	-	0.02	0.00	0.00	-	0.01	-	0.04	-	-	0.06	0.08	0.05	0.09	-
Anion Sum	meq/L	-	36.0	25.3	5.31	-	8.37	11.4	-	34.3	35.3	14.7	-	18.6	-	2.10	-	-	24.2	6.57	18.1	10.3	-
Cation Sum	meq/L	-	33.3	24.5	6.10	-	9.45	11.7	-	32.0	33.8	14.6	-	18.1	-	3.80	-	-	25.8	7.59	19.6	10.4	-
Cation - Anion Balance	%	-	-3.8	-1.5	6.9	-	6.1	1.3	-	-3.4	-2.2	-0.4	-	-1.4	-	28.8	-	-	3.2	7.2	4.1	0.5	-
Cyanide																							
Cyanide, Total	mg/L	-	<0.0050	0.0083	1.93	-	0.0150	0.422	-	0.0258	0.0175	<0.0050	-	<0.0050	-	<0.0050	-	-	0.0110	0.0102	0.0236	<0.0050	-
Cyanide, Free	mg/L	0.005	<0.0050	<0.0050	1.15	-	<0.0050	<0.0050	-	<0.0050	0.0085	<0.0050	-	<0.0050	-	<0.0050	-	-	<0.0050	<0.0050	<0.0050	<0.0050	-
Cyanide, Weak Acid Diss	mg/L	-	<0.0050	<0.0050	1.36	-	<0.0050	<0.0050	-	<0.0050	0.0101	<0.0050	-	<0.0050	-	<0.0050	-	-	0.0057	<0.0050	<0.0050	<0.0050	-
Thiocyanate (SCN)	mg/L	-	<0.50	<0.50	1.12	-	0.55	<0.50	-	<0.50	<0.50	<0.50	-	<0.50	-	0.51	-	-	<0.50	<0.50	<0.50	<0.50	-
Organic/Inorganic Carbon																							
Total Inorganic Carbon	mg/L	-	53.4	80.5	13.6	-	102	98.2	-	17.2	27.5	68.7	-	39.5	-	30.5	-	-	70.9	39.4	84.9	78.8	-
Total Organic Carbon	mg/L	-	7.11	17.4	37.0	-	33.1	18.6	-	5.92	6.73	6.77	-	5.54	-	27.5	-	-	23.1	14.3	17.5	10.8	-

Table A: Groundwater Sampling Analytical Results and CCME Guideline Exceedances for 2016 August Sampling Program

Site Location		Dome Creek										Mill Complex								
Sample ID		GSI-DC-01B	GSI-DC-02B	GSI-DC-03B	GSI-DC-05B	GSI-DC-06B	GSI-DC-07B	GSI-DC-08B	GSI-DC-09B	GSI-DC-10B	GSI-HA-01A	GSI-HA-02A	GSI-HA-03A ¹³	GSI-HA-04A	GSI-HA-05A	MW09-16	MW09-17	MW09-18	MW09-19	
Date Sampled		29/08/2016	30/08/2016	30/08/2016	30/08/2016	31/08/2016	31/08/2016	31/08/2016	31/08/2016	31/08/2016	30/08/2016	30/08/2016	29/08/2016	29/08/2016	30/08/2016	29/08/2016	29/08/2016	29/08/2016	29/08/2016	
ALS Work Number		L1823304	L1822156	L1822156	L1822156	L1823304	L1823304	L1823304	L1823304	L1823304	L1822156	L1822156	L1822156	L1822156	L1822156	L1822156		L1822156	L1822156	
Station Status		Direct Sample	Slow Recharge	Slow Recharge	Slow Recharge	Good	Good	Direct Sample	Good	Good	Slow Recharge	Slow Recharge	Direct Sample	Good	Slow Recharge	Good	Dry	Good	Good	
Parameter	Units	CCME-FAL ^{1,2,3,4}																		
Dissolved Metals																				
Aluminum (Al)-Dissolved	mg/L	Varies ⁸	0.0057	0.0180	0.0058	0.0081	0.0139	0.0084	0.589	0.0642	0.140	0.0014	0.0175	0.0229	0.0284	0.0329	0.0010	-	<0.0020	0.0101
Aluminum CCME-FAL	mg/L	-	0.20	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-	0.1	0.1
Antimony (Sb)-Dissolved	mg/L	0.005	0.00374	0.00025	0.00080	0.00027	0.00027	0.00016	0.00217	0.00018	0.00028	0.00017	0.00019	0.00064	0.00047	0.00049	0.0602	-	0.00036	<0.00020
Arsenic (As)-Dissolved	mg/L	-	0.00314	0.162	0.00087	0.0385	0.444	0.140	0.106	0.0696	0.132	0.00287	0.0283	0.0238	0.0342	0.0256	0.0113	-	0.0554	0.140
Barium (Ba)-Dissolved	mg/L	-	0.0110	0.227	0.0253	0.0379	0.0812	0.175	0.305	0.0356	0.389	0.147	0.161	0.0532	0.144	0.133	0.0145	-	0.00893	0.0496
Beryllium (Be)-Dissolved	mg/L	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000109	0.000024	<0.000040	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	-	<0.000040	<0.000040
Bismuth (Bi)-Dissolved	mg/L	1.5	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	-	<0.00010	<0.00010
Boron (B)-Dissolved	mg/L	Varies ⁹	0.022	<0.010	<0.010	0.013	<0.010	0.021	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	0.099	-	<0.020	0.336
Cadmium (Cd)-Dissolved	mg/L	-	0.0000640	0.0000168	0.000656	0.0000124	<0.000050	<0.000050	0.0000295	<0.000050	<0.000010	0.0000120	0.0000357	0.0000184	0.0000085	0.0000094	0.0270	-	0.000063	<0.000010
Cadmium CCME-FAL	mg/L	-	0.00018	0.00037	0.00037	0.00037	0.00037	0.00037	0.00037	0.00025	0.00037	0.00037	0.00037	0.00037	0.00037	0.00037	0.00037	-	0.00037	0.00037
Calcium (Ca)-Dissolved	mg/L	-	39.1	155	190	187	142	159	128	36.8	153	180	142	92.3	125	116	259	-	349	308
Chromium (Cr)-Dissolved	mg/L	-	0.00334	0.00024	0.00136	0.00011	0.00144	0.00032	0.0140	0.00100	0.00211	<0.00010	0.00028	0.00274	0.00021	0.00029	<0.00010	-	<0.00020	0.00030
Cobalt (Co)-Dissolved	mg/L	Varies ¹⁰	0.00083	0.00275	0.00106	0.00303	0.00108	0.00162	0.00829	0.00065	0.0183	0.00046	0.00152	0.00028	0.00022	0.00020	0.00013	-	<0.00020	0.00164
Copper (Cu)-Dissolved	mg/L	-	0.0276	<0.00020	0.00294	<0.00020	<0.00020	<0.00020	0.00152	<0.00020	<0.00040	0.00044	0.00025	0.00095	<0.00020	0.00022	0.000612	-	<0.00040	<0.00040
Copper CCME-FAL	mg/L	0.3	0.00274	0.004	0.004	0.004	0.004	0.004	0.00380	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	-	0.004	0.004
Iron (Fe)-Dissolved	mg/L	Varies ¹¹	0.058	42.7	0.013	6.67	19.5	19.2	134	8.75	67.5	0.825	47.5	33.5	8.16	6.60	<0.010	-	0.013	15.0
Lead (Pb)-Dissolved	mg/L	-	0.00115	<0.000050	0.000110	0.000068	<0.000050	<0.000050	0.00178	0.000064	<0.00010	<0.000050	<0.000050	0.000180	0.000057	<0.000050	0.00642	-	<0.00010	<0.00010
Lead CCME-FAL	mg/L	-	0.00397	0.007	0.007	0.007	0.007	0.007	0.00644	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	-	0.007	0.007
Lithium (Li)-Dissolved	mg/L	-	<0.0010	<0.0010	0.0051	0.0020	<0.0010	0.0012	<0.0010	<0.0010	<0.0020	0.0077	<0.0010	<0.0010	0.0029	0.0021	0.0114	-	0.0230	0.0132
Magnesium (Mg)-Dissolved	mg/L	-	5.13	53.5	63.6	79.9	54.1	42.6	26.4	20.0	44.8	58.9	51.8	32.5	42.3	40.3	114	-	246	162
Manganese (Mn)-Dissolved	mg/L	0.000026	0.369	4.04	2.32	3.32	2.25	1.50	2.34	0.591	14.5	0.122	5.29	3.10	2.49	1.66	0.0217	-	0.308	4.95
Mercury (Hg)-Dissolved	mg/L	0.073	-	<0.000050	0.000013	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	-	<0.000050	<0.000050
Molybdenum (Mo)-Dissolved	mg/L	Varies ¹²	0.00628	0.000365	0.00143	0.000574	0.00211	0.000356	0.00254	0.000240	0.00061	0.000190	0.000659	0.00135	0.000110	0.000166	0.000076	-	<0.00010	<0.00010
Nickel (Ni)-Dissolved	mg/L	-	0.0138	0.00311	0.00923	0.00359	0.00275	0.00062	0.0149	0.00083	0.0039	0.00139	0.00547	0.00637	<0.00050	<0.00050	0.00426	-	<0.00050	0.0013
Nickel CCME-FAL	mg/L	-	0.109	0.15	0.15	0.15	0.15	0.15	0.15	0.146	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-	0.15	0.15
Phosphorus (P)-Dissolved	mg/L	-	0.090	<0.050	<0.050	<0.050	0.271	0.098	0.320	0.156	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	<0.050	0.153
Potassium (K)-Dissolved	mg/L	0.001	1.26	3.55	2.67	2.60	2.95	3.60	3.18	1.91	2.01	3.74	3.52	1.47	2.63	2.44	6.01	-	7.15	7.82
Selenium (Se)-Dissolved	mg/L	0.001	0.000075	0.000075	0.000210	0.000069	0.000472	0.000134	0.00155	0.000121	0.00027	<0.000050	<0.000050	0.000056	0.000107	0.000097	0.000097	-	0.00057	0.00032
Silicon (Si)-Dissolved	mg/L	-	2.07	9.03	7.66	7.73	8.87	8.09	9.31	7.58	7.97	6.51	7.43	5.50	8.74	9.02	5.61	-	4.75	9.55
Silver (Ag)-Dissolved	mg/L	0.0001	0.000042	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000030	<0.000010	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000017	-	<0.000020	<0.000020
Sodium (Na)-Dissolved	mg/L	-	2.26	4.91	6.18	8.39	22.6	15.3	12.1	7.73	25.8	4.88	4.92	3.57	4.38	4.02	8.32	-	12.6	15.6
Strontium (Sr)-Dissolved	mg/L	-	0.0854	0.367	0.489	0.605	0.768	0.498	0.515	0.119	0.574	0.432	0.424	0.268	0.328	0.308	0.594	-	0.975	0.999
Sulfur (S)-Dissolved	mg/L	-	11.2	109	155	177	2.04	127	34.0	31.1	167	132	116	77.8	106	99.5	254	-	439	312
Thallium (Tl)-Dissolved	mg/L	0.0008	0.000010	<0.000010	0.000013	0.000011	<0.000010	<0.000010	<0.000010	<0.000010	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000285	-	0.000273	<0.000020
Tin (Sn)-Dissolved	mg/L	-	0.00022	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	<0.00020	<0.00020
Titanium (Ti)-Dissolved	mg/L	-	<0.00030	0.00079	<0.00030	0.00039	0.00325	0.00059	0.0387	0.00390	0.00221	<0.00030	0.00064	0.00098	0.00106	0.00103	<0.00030	-	<0.00060	0.00106
Uranium (U)-Dissolved	mg/L	0.015	0.000159	0.000187	0.00114	0.00163	0.000082	0.000040	0.000552	0.000142	0.000235	0.000187	0.000351	0.000025	0.000112	0.000085	0.00287	-	0.00774	0.000559
Vanadium (V)-Dissolved	mg/L	-	<0.00050	0.00083	<0.00050	<0.00050	0.00759	0.00129	0.0766	0.00503	0.0108	<0.00050	<0.00050	0.00052	0.00072	0.00071	<0.00050	-	<0.0010	0.0011
Zinc (Zn)-Dissolved	mg/L	0.03	0.0076	0.0051	0.0193	0.0020	0.0010	0.0011	0.0085	0.0025	0.0051	0.0055	0.0362	0.0138	0.0047	0.0027	3.54	-	0.0037	<0.0020
Zirconium (Zr)-Dissolved	mg/L	-	<0.00030	<0.00030	<0.00030	<0.00030	0.00199	0.00035	0.00540	0.00061	0.00127	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	-	<0.00060	<0.00060

Table A: Groundwater Sampling Analytical Results and CCME Guideline Exceedances for 2016 August Sampling Program

Site Location		Brown McDade Pit											Pony Creek						Seepage Dam			
Sample ID	CH-P-13-01/10	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	MW09-13	MW09-14	MW09-15	GSI-PC-02B	GSI-PC-03B	GSI-PC-04B ¹⁵	GSI-PC-05B	MP09-02	MP09-03 ¹⁶	MP09-08	W14103083BH01	W14103083BH02	W14103083BH04	
Date Sampled	29/08/2016	29/08/2016	29/08/2016	29/08/2016	30/08/2016	29/08/2016	29/08/2016	30/08/2016	29/08/2016	29/08/2016	29/08/2016	30/08/2016	31/08/2016	31/08/2016	31/08/2016	30/08/2016	31/08/2016	31/08/2016	30/08/2016	30/08/2016	30/08/2016	
ALS Work Number		L1822156											L1823304	L1823304			L1823304	L1823304				
Station Status	Frozen	Direct Sampled	Frozen	Frozen	Not Accessible	Frozen	Dry	Not Accessible	Frozen	Frozen	Frozen	Destroyed	Direct Sampled	Direct Sampled	Dry	Destroyed	Direct Sampled	Good	Frozen	Frozen	Frozen	
Parameter	Units	CCME-FAL ^{1, 2, 3, 4}																				
Dissolved Metals																						
Aluminum (Al)-Dissolved	mg/L	Varies ⁹	-	0.0066	-	-	-	-	-	-	-	-	-	0.0512	0.0532			0.0400	0.0037	-	-	-
Aluminum CCME-FAL	mg/L	-	-	0.1	-	-	-	-	-	-	-	-	-	0.1	0.1	not available for this	not available for this	0.1	0.1	-	-	-
Antimony (Sb)-Dissolved	mg/L	0.005	-	0.00096	-	-	-	-	-	-	-	-	0.00607	0.00095				0.00183	0.00050	-	-	-
Arsenic (As)-Dissolved	mg/L	-	-	0.00046	-	-	-	-	-	-	-	-	0.0458	0.0115				0.0342	0.0140	-	-	-
Barium (Ba)-Dissolved	mg/L	-	-	0.0275	-	-	-	-	-	-	-	-	0.102	0.102				0.147	0.0518	-	-	-
Beryllium (Be)-Dissolved	mg/L	-	-	<0.000040	-	-	-	-	-	-	-	-	<0.000040	<0.000020				<0.000020	<0.000020	-	-	-
Bismuth (Bi)-Dissolved	mg/L	1.5	-	<0.00010	-	-	-	-	-	-	-	-	<0.00010	<0.000050				<0.000050	<0.000050	-	-	-
Boron (B)-Dissolved	mg/L	Varies ⁹	-	<0.020	-	-	-	-	-	-	-	-	0.039	<0.010				<0.010	<0.010	-	-	-
Cadmium (Cd)-Dissolved	mg/L	-	-	0.000463	-	-	-	-	-	-	-	-	0.000030	0.0000475				0.0000578	<0.000050	-	-	-
Cadmium CCME-FAL	mg/L	-	-	0.00037	-	-	-	-	-	-	-	-	0.00037	0.00037	or not recorded f	or not recorded f		0.00037	0.00037	-	-	-
Calcium (Ca)-Dissolved	mg/L	-	-	364	-	-	-	-	-	-	-	-	98.5	111				103	133	-	-	-
Chromium (Cr)-Dissolved	mg/L	-	-	<0.00020	-	-	-	-	-	-	-	-	0.0262	0.0133				0.00043	<0.00010	-	-	-
Cobalt (Co)-Dissolved	mg/L	Varies ¹⁰	-	<0.00020	-	-	-	-	-	-	-	-	0.00420	0.00325				0.00313	0.00069	-	-	-
Copper (Cu)-Dissolved	mg/L	-	-	0.00445	-	-	-	-	-	-	-	-	0.00390	0.00301				0.00096	<0.00020	-	-	-
Copper CCME-FAL	mg/L	0.3	-	0.004	-	-	-	-	-	-	-	-	0.004	0.004	or not recorded f	or not recorded f		0.004	0.004	-	-	-
Iron (Fe)-Dissolved	mg/L	Varies ¹¹	-	0.012	-	-	-	-	-	-	-	-	15.7	4.59				2.15	0.862	-	-	-
Lead (Pb)-Dissolved	mg/L	-	-	<0.00010	-	-	-	-	-	-	-	-	0.00071	0.000920				0.000801	<0.000050	-	-	-
Lead CCME-FAL	mg/L	-	-	0.007	-	-	-	-	-	-	-	-	0.007	0.007	or not recorded f	or not recorded f		0.007	0.007	-	-	-
Lithium (Li)-Dissolved	mg/L	-	-	0.0034	-	-	-	-	-	-	-	-	0.0339	0.0029				<0.0010	0.0049	-	-	-
Magnesium (Mg)-Dissolved	mg/L	-	-	120	-	-	-	-	-	-	-	-	356	43.8				30.0	36.1	-	-	-
Manganese (Mn)-Dissolved	mg/L	0.000026	-	0.207	-	-	-	-	-	-	-	-	2.21	2.24				2.27	1.04	-	-	-
Mercury (Hg)-Dissolved	mg/L	0.073	-	<0.0000050	-	-	-	-	-	-	-	-	<0.0000050	<0.0000050				<0.0000050	<0.0000050	-	-	-
Molybdenum (Mo)-Dissolved	mg/L	Varies ¹²	-	0.00065	-	-	-	-	-	-	-	-	0.0116	0.00665				0.00182	0.00141	-	-	-
Nickel (Ni)-Dissolved	mg/L	-	-	0.0145	-	-	-	-	-	-	-	-	0.0681	0.0480				0.00465	<0.00050	-	-	-
Nickel CCME-FAL	mg/L	-	-	0.15	-	-	-	-	-	-	-	-	0.15	0.15	or not recorded f	or not recorded f		0.15	0.15	-	-	-
Phosphorus (P)-Dissolved	mg/L	-	-	<0.050	-	-	-	-	-	-	-	-	0.066	<0.050				<0.050	<0.050	-	-	-
Potassium (K)-Dissolved	mg/L	0.001	-	7.23	-	-	-	-	-	-	-	-	13.5	3.41				3.54	1.21	-	-	-
Selenium (Se)-Dissolved	mg/L	0.001	-	0.00639	-	-	-	-	-	-	-	-	0.00023	0.000079				0.000093	0.000123	-	-	-
Silicon (Si)-Dissolved	mg/L	-	-	6.05	-	-	-	-	-	-	-	-	9.68	6.11				6.17	8.01	-	-	-
Silver (Ag)-Dissolved	mg/L	0.0001	-	<0.000020	-	-	-	-	-	-	-	-	<0.000020	<0.000010				0.000018	<0.000010	-	-	-
Sodium (Na)-Dissolved	mg/L	-	-	47.5	-	-	-	-	-	-	-	-	73.0	12.7				6.56	7.39	-	-	-
Strontium (Sr)-Dissolved	mg/L	-	-	0.861	-	-	-	-	-	-	-	-	1.45	0.650				0.567	1.41	-	-	-
Sulfur (S)-Dissolved	mg/L	-	-	356	-	-	-	-	-	-	-	-	384	89.6				73.7	70.7	-	-	-
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.000052	-	-	-	-	-	-	-	-	<0.000020	<0.000010				<0.000010	<0.000010	-	-	-
Tin (Sn)-Dissolved	mg/L	-	-	0.00225	-	-	-	-	-	-	-	-	0.00023	0.00020				<0.00010	<0.00010	-	-	-
Titanium (Ti)-Dissolved	mg/L	-	-	<0.00060	-	-	-	-	-	-	-	-	0.00464	0.00099				0.00227	<0.00030	-	-	-
Uranium (U)-Dissolved	mg/L	0.015	-	0.0122	-	-	-	-	-	-	-	-	0.00893	0.000270				0.00153	0.00437	-	-	-
Vanadium (V)-Dissolved	mg/L	-	-	<0.0010	-	-	-	-	-	-	-	-	0.0028	0.00128				0.00186	<0.00050	-	-	-
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.0138	-	-	-	-	-	-	-	-	0.0135	0.0294				0.0180	<0.0010	-	-	-
Zirconium (Zr)-Dissolved	mg/L	-	-	<0.00060	-	-	-	-	-	-	-	-	0.00081	<0.00030				<0.00030	<0.00030	-	-	-

Table A: Groundwater Sampling Analytical Results and CCME Guideline Exceedances for 2016 August Sampling Program

Site Location		Tailings Facility																					
Sample ID	MP09-04	MP09-05	MP09-09	MP09-10	MP09-11	MP09-12	MP09-14 ¹⁷	MW09-02	MW09-03	MW09-04	MW09-05	MW09-06	MW09-07	MW09-08	MW09-11	MW09-20	MW09-21	MW09-22	MW09-23	MW09-24	W14103083BH03		
Date Sampled	30/08/2016	30/08/2016	30/08/2016	30/08/2016	30/08/2016	01/09/2016	29/08/2016	30/08/2016	30/08/2016	30/08/2016	30/08/2016	30/08/2016	29/08/2016	30/08/2016	29/08/2016	29/08/2016	30/08/2016	29/08/2016	30/08/2016	30/08/2016	29/08/2016		
ALS Work Number	L1822156	L1822156	L1822156		L1822156	L1823304	L1823304	L1822156	L1822156	L1822156		L1822156		L1822156			L1822156	L1822156	L1822156	L1822156	L1822156		
Station Status	Good	Good	Good	Frozen	Good	Good	Direct Sampled	Good	Good	Good	Dry	Good	Dry	Good	Dry	Frozen	Good	Good	Good	Good	Frozen		
Parameter	Units	CCME-FAL ^{1, 2, 3, 4}																					
Dissolved Metals																							
Aluminum (Al)-Dissolved	mg/L	Varies ⁹	0.0021	0.0148	<0.0050	-	0.0207	0.0074	0.0057	<0.0050	0.0172	0.0011	-	0.0013	-	0.105	-	-	0.0431	0.0481	0.0401	0.0032	-
Aluminum CCME-FAL	mg/L	-	0.1	0.1	0.1	-	0.1	0.1	0.1	0.1	0.1	0.1	-	0.1	-	0.1	-	-	0.1	0.005	0.1	0.1	-
Antimony (Sb)-Dissolved	mg/L	0.005	0.291	0.00037	0.120	-	0.0172	0.0215	0.00198	0.00486	0.378	0.00155	-	0.287	-	0.00028	-	-	0.00028	0.00012	0.00021	0.00017	-
Arsenic (As)-Dissolved	mg/L	-	3.52	0.0128	23.4	-	4.58	7.40	0.502	13.8	2.26	0.00096	-	0.124	-	0.110	-	-	0.0535	0.0111	0.0353	0.00158	-
Barium (Ba)-Dissolved	mg/L	-	0.0111	0.0578	0.00056	-	0.235	0.0458	0.0917	0.00512	0.0228	0.0699	-	0.00632	-	0.107	-	-	0.143	0.0654	0.0466	0.0707	-
Beryllium (Be)-Dissolved	mg/L	-	<0.000040	<0.000040	<0.00010	-	<0.000020	<0.000020	<0.000020	<0.00010	<0.000040	<0.000020	-	<0.000020	-	0.000026	-	-	<0.000020	<0.000020	<0.000040	<0.000020	-
Bismuth (Bi)-Dissolved	mg/L	1.5	<0.00010	<0.00010	<0.00025	-	0.000159	<0.000050	<0.000050	<0.00025	<0.00010	<0.000050	-	<0.000050	-	<0.000050	-	-	<0.000050	<0.000050	<0.00010	<0.000050	-
Boron (B)-Dissolved	mg/L	Varies ⁹	0.236	0.155	0.191	-	0.032	0.104	0.050	0.083	0.224	0.012	-	0.131	-	<0.010	-	-	0.115	0.029	0.070	<0.010	-
Cadmium (Cd)-Dissolved	mg/L	-	0.000046	0.00129	0.000769	-	0.000541	0.000103	0.0000670	0.000933	0.000364	0.0000690	-	0.00553	-	<0.000050	-	-	0.000186	0.0000240	0.000018	0.0000511	-
Cadmium CCME-FAL	mg/L	-	0.00037	0.00037	0.00029	-	0.00037	0.00037	0.00037	0.00037	0.00037	0.00037	-	0.00037	-	0.00014	-	-	0.00037	0.00037	0.00037	0.00037	-
Calcium (Ca)-Dissolved	mg/L	-	462	332	80.7	-	76.8	144	149	457	465	187	-	275	-	25.5	-	-	298	101	216	138	-
Chromium (Cr)-Dissolved	mg/L	-	<0.00020	0.00040	<0.00050	-	0.00155	0.00032	0.00022	<0.00050	<0.00020	0.00018	-	<0.00010	-	0.00134	-	-	0.00093	0.00089	0.00047	0.00031	-
Cobalt (Co)-Dissolved	mg/L	Varies ¹⁰	0.00117	0.0170	0.0468	-	0.00149	0.00288	0.00076	0.0115	0.00188	0.00017	-	0.00091	-	0.00078	-	-	0.0156	0.00533	0.0107	0.00013	-
Copper (Cu)-Dissolved	mg/L	-	<0.00040	0.00587	0.214	-	0.00141	0.00073	<0.00020	<0.0010	0.00150	0.00273	-	0.00509	-	<0.00020	-	-	0.00315	0.00123	<0.00040	0.00666	-
Copper CCME-FAL	mg/L	0.3	0.004	0.004	0.004	-	0.004	0.004	0.004	0.004	0.004	0.004	-	0.004	-	0.002102	-	-	0.004	0.004	0.004	0.004	-
Iron (Fe)-Dissolved	mg/L	Varies ¹¹	<0.010	3.84	0.174	-	15.0	6.32	0.767	18.1	0.017	<0.010	-	<0.010	-	31.8	-	-	15.3	15.2	15.7	<0.010	-
Lead (Pb)-Dissolved	mg/L	-	0.00047	<0.00010	0.00054	-	0.0560	0.00443	0.000246	<0.00025	<0.00010	<0.000050	-	0.000282	-	0.000190	-	-	<0.000050	0.000059	<0.00010	<0.000050	-
Lead CCME-FAL	mg/L	-	0.007	0.007	0.007	-	0.007	0.007	0.007	0.007	0.007	0.007	-	0.007	-	0.002669	-	-	0.007	0.007	0.007	0.007	-
Lithium (Li)-Dissolved	mg/L	-	0.0114	<0.0020	<0.0050	-	0.0012	0.0046	0.0096	0.0157	<0.0020	<0.0010	-	0.0123	-	<0.0010	-	-	<0.0010	<0.0010	<0.0020	<0.0010	-
Magnesium (Mg)-Dissolved	mg/L	-	81.6	61.4	0.52	-	38.4	39.7	39.7	60.5	91.0	58.2	-	40.2	-	5.69	-	-	77.2	8.41	77.2	38.6	-
Manganese (Mn)-Dissolved	mg/L	0.000026	7.21	6.85	0.0352	-	1.62	4.61	0.113	22.1	19.1	0.00077	-	2.15	-	2.30	-	-	5.51	2.88	14.7	0.0463	-
Mercury (Hg)-Dissolved	mg/L	0.073	<0.0000050	<0.0000050	0.0000395	-	0.0000070	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	-	0.0000062	-	<0.0000050	-	-	<0.0000050	0.0000060	<0.0000050	<0.0000050	-
Molybdenum (Mo)-Dissolved	mg/L	Varies ¹²	0.00675	0.00046	0.0138	-	0.00246	0.00485	0.000892	0.00740	0.00574	0.000204	-	0.00317	-	<0.000050	-	-	0.000448	0.000454	0.00142	0.000339	-
Nickel (Ni)-Dissolved	mg/L	-	<0.0010	0.0023	0.0113	-	0.00479	0.00643	0.00324	0.0101	0.0010	<0.00050	-	0.00174	-	<0.00050	-	-	0.00170	0.00112	0.0012	<0.00050	-
Nickel CCME-FAL	mg/L	-	0.15	0.15	0.15	-	0.15	0.15	0.15	0.15	0.15	0.15	-	0.15	-	0.08605	-	-	0.15	0.15	0.15	0.15	-
Phosphorus (P)-Dissolved	mg/L	-	0.076	<0.050	0.392	-	0.080	0.089	<0.050	<0.050	<0.050	<0.050	-	<0.050	-	0.120	-	-	<0.050	<0.050	<0.050	<0.050	-
Potassium (K)-Dissolved	mg/L	0.001	51.1	9.48	9.05	-	6.48	6.93	34.6	29.0	28.7	1.80	-	15.1	-	1.16	-	-	11.0	3.22	5.67	1.84	-
Selenium (Se)-Dissolved	mg/L	0.001	<0.00010	0.00013	0.00110	-	0.000264	0.000090	0.000377	<0.00025	<0.00010	0.000737	-	0.000259	-	0.000139	-	-	0.000222	0.000221	0.00011	0.000415	-
Silicon (Si)-Dissolved	mg/L	-	14.0	4.40	7.15	-	10.1	12.5	4.80	7.11	12.1	5.90	-	8.57	-	10.2	-	-	5.82	4.68	6.62	6.48	-
Silver (Ag)-Dissolved	mg/L	0.0001	<0.000020	<0.000020	0.00151	-	0.000046	0.000014	<0.000010	<0.000050	<0.000020	<0.000010	-	0.000041	-	<0.000010	-	-	0.000011	0.000028	<0.000020	<0.000010	-
Sodium (Na)-Dissolved	mg/L	-	30.0	40.5	34.6	-	8.09	3.35	19.7	24.0	28.1	9.21	-	14.6	-	1.50	-	-	46.1	17.8	17.4	6.97	-
Strontium (Sr)-Dissolved	mg/L	-	1.19	0.880	0.124	-	0.655	0.536	0.772	1.13	1.37	0.470	-	0.626	-	0.117	-	-	0.824	0.340	0.536	0.434	-
Sulfur (S)-Dissolved	mg/L	-	466	279	52.7	-	1.65	52.2	142	452	486	142	-	232	-	1.16	-	-	281	64.7	184	60.6	-
Thallium (Tl)-Dissolved	mg/L	0.0008	0.000116	0.000109	0.000051	-	0.000304	0.000042	<0.000010	0.000278	0.000027	<0.000010	-	0.000296	-	<0.000010	-	-	0.000015	<0.000010	<0.000020	<0.000010	-
Tin (Sn)-Dissolved	mg/L	-	<0.00020	<0.00020	<0.00050	-	<0.00010	<0.00010	0.00020	<0.00050	<0.00020	<0.00010	-	<0.00010	-	<0.00010	-	-	<0.00010	<0.00010	<0.00020	<0.00010	-
Titanium (Ti)-Dissolved	mg/L	-	<0.00060	<0.00060	<0.0015	-	0.00259	<0.00030	<0.00030	<0.0015	<0.00060	<0.00030	-	<0.00030	-	0.00593	-	-	0.00208	0.00182	0.00106	<0.00030	-
Uranium (U)-Dissolved	mg/L	0.015	0.000194	0.00161	0.00189	-	0.000183	0.00116	0.000076	0.00109	0.00108	0.00454	-	0.00126	-	0.000095	-	-	0.000815	0.000187	0.00128	0.00331	-
Vanadium (V)-Dissolved	mg/L	-	<0.0010	<0.0010	<0.0025	-	0.00869	0.00059	<0.00050	<0.0025	<0.0010	<0.00050	-	<0.00050	-	0.00473	-	-	0.00287	0.00189	0.0025	<0.00050	-
Zinc (Zn)-Dissolved	mg/L	0.03	0.554	0.0116	0.0068	-	0.0475	0.0397	0.0106	0.352	0.0034	0.0044	-	0.113	-	0.0066	-	-	0.0045	0.0029	0.0128	0.0010	-
Zirconium (Zr)-Dissolved	mg/L	-	<0.00060	<0.00060	<0.0015	-	0.00218	0.00031	<0.00030	<0.0015	<0.00060	<0.00030	-	<0.00030	-	0.00088	-	-	0.00086	0.00049	0.00062	<0.00030	-

Table B: QA/QC Analytical Data

		Site Location		MW09-16				MP09-08				MP09-09				MW09-24				Field Blanks				Travel Blanks	
		Sample ID	Dup-1	MW09-16	RPD (%) ¹⁴	Dup-4	MP09-08	RPD (%) ¹⁴	Dup-3	MP09-09	RPD (%) ¹⁴	Dup-2	MW09-24	RPD (%) ¹⁴	FB-1 (MW09-16)	FB-2 (MW09-24)	FB-3 (MP09-08)	FB-4 (MP09-12)	TRAVEL_BLANK	TRAVEL_BLANK					
Date Sampled	29/08/2016	29/08/2016		31/08/2016		31/08/2016			30/08/2016	30/08/2016			30/08/2016		30/08/2016		29/08/2016	30/08/2016	31/08/2016	01/09/2016	30/08/2016	01/09/2016			
ALS Work Number	L1822156	L1822156		L1823304		L1823304			L1822156	L1822156			L1822156		L1822156		L1822156	L1822156	L1823304	L1823304	L1822156	L1823304			
Station Status	Good	Good		Good		Good			Good	Good			Good		Good		Good	Good	Good	Good					
Parameter	Units	CCME-FAL ^{1,2,3,4}																							
Physical Tests																									
Lab pH	pH units	6.5-9.0 ⁵	7.77	7.65	1.56	8.15	8.11	0.49	9.09	8.90	2.11	7.46	7.46	0.00	5.32	5.53	5.37	5.01	5.56	5.35					
Field pH	pH units	6.5-9.0 ⁵	6.63	6.63	-	7.14	7.14	-	9.52	9.52	-	7.23	7.23	-	6.63	7.23	7.14	8.04	-	-					
Field Temperature	C	-	6.6	6.6	-	1.1	1.1	-	6.3	6.3	-	0.7	0.7	-	6.6	0.7	1.1	8.4	-	-					
Lab Conductivity	uS/cm	-	1750	1760	0.57	814	814	0.00	532	534	0.38	857	848	1.06	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0					
Field Conductivity	uS/cm	-	1086	1086	-	457	457	-	344	344	-	455	455	-	1086	455	457	460	-	-					
Field Specific Conductivity	uS/cm	-	1673	1673	-	840	840	-	536	536	-	850	850	-	1673	850	840	690	-	-					
Total Hardness (as CaCO3)	mg/L	-	1100	1120	1.80	484	482	0.41	212	204	3.85	514	503	2.16	<0.50	<0.50	<0.50	<0.50	<0.50	-					
Field Dissolved Oxygen	mg/L	9.5 ⁶	2.26	2.26	-	0.24	0.24	-	0.11	0.11	-	5.07	5.07	-	2.26	5.07	0.24	11.30	-	-					
Field Oxidation - Redox Potent	mV	-	170.0	170.0	-	-16.8	-16.8	-	-25.6	-25.6	-	197.0	197.0	-	170.0	197.0	-16.8	-75.6	-	-					
Field Turbidity	NTU	-	0.2	0.2	-	2.6	2.6	-	98.2	98.2	-	28.4	28.4	-	0.2	28.4	2.6	3050 ¹⁸	-	-					
Anions Nutrients																									
Alkalinity, Total (CaCO3)	mg/L	-	330	327	0.91	273	270	1.10	98.1	99.9	1.82	303	311	2.61	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0					
Alkalinity, Total (CaCO3, filt)	mg/L	-	-	-	nc	-	-	nc	-	-	nc	-	-	nc	-	-	-	-	-	-					
Ammonia, Total (as N)	mg/L	Varies ⁷	<0.0050	<0.0050	nc	0.0231	0.0222	nc	4.34	3.91	nc	0.0109	0.0112	nc	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050					
Ammonia CCME-FAL	mg/L	-	31.45	31.45	-	15.26	15.26	-	0.06048	0.06048	-	12.83	12.83	-	-	-	-	-	-	-					
Chloride (Cl)	mg/L	-	<2.5	<2.5	nc	<2.5	<2.5	nc	4.94	4.93	0.20	<0.50	<0.50	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50					
Fluoride (F)	mg/L	0.12	0.15	0.15	0.00	<0.10	<0.10	nc	1.67	1.81	8.05	0.048	0.047	2.11	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020					
Nitrate (as N)	mg/L	13	0.182	0.174	4.49	<0.025	<0.025	nc	<0.0050	0.0058	nc	1.79	1.82	1.66	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050					
Nitrite (as N)	mg/L	0.06	<0.0050	<0.0050	nc	<0.0050	<0.0050	nc	0.0020	<0.0010	nc	0.0052	<0.0010	nc	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010					
Total Kjeldahl Nitrogen	mg/L	-	0.117	0.148	nc	0.528	0.753	35.13	5.88	5.97	1.52	0.53	0.526	0.76	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050					
Sulfate (SO4)	mg/L	-	825	835	1.20	216	213	1.40	148	148	0.00	188	190	1.06	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30					
Field Sulphide	mg/L	-	0.01	0.01	-	0.05	0.05	-	0.31	0.31	-	0.09	0.09	-	0.01	0.09	0.05	0.80	-	-					
Anion Sum	meq/L	-	23.8	23.9	0.42	9.95	9.84	1.11	5.28	5.31	0.57	10.1	10.3	1.96	<0.10	<0.10	<0.10	<0.10	<0.10	-					
Cation Sum	meq/L	-	22.6	22.9	1.32	10.1	10.1	0.00	6.21	6.10	1.79	10.6	10.4	1.90	<0.10	<0.10	<0.10	<0.10	<0.10	-					
Cation - Anion Balance	%	-	-2.5	-2.2	-	0.9	1.1	-	8.2	6.9	-	2.5	0.5	-	0.0	0.0	0.0	0.0	0.0	-					
Cyanide																									
Cyanide, Total	mg/L	-	<0.0050	<0.0050	nc	<0.0050	<0.0050	nc	1.79	1.93	7.53	<0.0050	<0.0050	nc	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050					
Cyanide, Free	mg/L	0.005	<0.0050	<0.0050	nc	<0.0050	<0.0050	nc	0.944	1.15	19.68	<0.0050	<0.0050	nc	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050					
Cyanide, Weak Acid Diss	mg/L	-	<0.0050	<0.0050	nc	<0.0050	<0.0050	nc	1.25	1.36	8.43	<0.0050	<0.0050	nc	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050					
Thiocyanate (SCN)	mg/L	-	<0.50	<0.50	nc	<0.50	<0.50	nc	1.14	1.12	1.77	<0.50	<0.50	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50					
Organic/Inorganic Carbon																									
Total Inorganic Carbon	mg/L	-	83.8	86.1	2.71	67.1	67.3	0.30	13.6	13.6	0.00	79.7	78.8	1.14	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50					
Total Organic Carbon	mg/L	-	3.23	3.35	3.65	10.4	12.8	20.69	37.1	37.0	0.27	10.8	10.8	0.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50					

Table B: QA/QC Analytical Data

		Site Location		MW09-16			MP09-08			MP09-09			MW09-24			Field Blanks				Travel Blanks			
		Sample ID	Dup-1	MW09-16	RPD (%) ¹⁴	Dup-4	MP09-08	RPD (%) ¹⁴	Dup-3	MP09-09	RPD (%) ¹⁴	Dup-2	MW09-24	RPD (%) ¹⁴	FB-1 (MW09-16)	FB-2 (MW09-24)	FB-3 (MP09-08)	FB-4 (MP09-12)	TRAVEL_BLANK	TRAVEL_BLANK			
Date Sampled	29/08/2016	29/08/2016		31/08/2016		31/08/2016			30/08/2016	30/08/2016			30/08/2016		30/08/2016		29/08/2016	30/08/2016	31/08/2016	01/09/2016	30/08/2016	01/09/2016	
ALS Work Number	L1822156	L1822156		L1822304		L1822304			L1822156	L1822156			L1822156		L1822156		L1822156	L1822156	L1823304	L1823304	L1823304	L1822156	L1823304
Station Status	Good	Good		Good		Good			Good	Good			Good		Good		Good	Good	Good	Good			
Parameter	Units	CCME-FAL ^{1,2,3,4}																					
Dissolved Metals																							
Aluminum (Al)-Dissolved	mg/L	Varies ⁸	0.0022	0.0010	nc	0.0036	0.0037	nc	0.0070	<0.0050	nc	0.0035	0.0032	nc	<0.0010	<0.0010	<0.0010	<0.0010	-	-			
Aluminum CCME-FAL	mg/L	-	0.1	0.1	-	0.1	0.1	-	0.1	0.1	-	0.1	0.1	-	-	-	-	-	-	-			
Antimony (Sb)-Dissolved	mg/L	0.005	0.0605	0.0602	0.50	0.00035	0.00050	35.29	0.118	0.120	1.68	0.00018	0.00017	5.71	<0.00010	<0.00010	<0.00010	<0.00010	-	-			
Arsenic (As)-Dissolved	mg/L	-	0.0121	0.0113	6.84	0.0133	0.0140	5.13	25.0	23.4	6.61	0.00151	0.00158	4.53	<0.00010	<0.00010	<0.00010	<0.00010	-	-			
Barium (Ba)-Dissolved	mg/L	-	0.0149	0.0145	2.72	0.0522	0.0518	0.77	0.00062	0.00056	10.17	0.0708	0.0707	0.14	<0.000050	<0.000050	<0.000050	<0.000050	-	-			
Beryllium (Be)-Dissolved	mg/L	-	<0.000020	<0.000020	nc	<0.000020	<0.000020	nc	<0.00010	<0.00010	nc	<0.000020	<0.000020	nc	<0.000020	<0.000020	<0.000020	<0.000020	-	-			
Bismuth (Bi)-Dissolved	mg/L	1.5	<0.000050	<0.000050	nc	<0.000050	<0.000050	nc	<0.00025	<0.00025	nc	<0.000050	<0.000050	nc	<0.000050	<0.000050	<0.000050	<0.000050	-	-			
Boron (B)-Dissolved	mg/L	Varies ⁹	0.097	0.099	2.04	<0.010	<0.010	nc	0.197	0.191	3.09	<0.010	<0.010	nc	<0.010	<0.010	<0.010	<0.010	-	-			
Cadmium (Cd)-Dissolved	mg/L	-	0.0271	0.0270	0.37	<0.000050	<0.000050	nc	0.000792	0.000769	2.95	0.0000518	0.0000511	1.36	<0.000050	<0.000050	0.00002	<0.000050	-	-			
Cadmium CCME-FAL	mg/L	-	0.00037	0.00037	-	0.00037	0.00037	-	0.00030	0.00029	-	0.00037	0.00037	-	-	-	-	-	-	-			
Calcium (Ca)-Dissolved	mg/L	-	254	259	1.95	134	133	0.75	83.8	80.7	3.77	141	138	2.15	<0.050	<0.050	<0.050	<0.050	-	-			
Chromium (Cr)-Dissolved	mg/L	-	<0.00010	<0.00010	nc	<0.00010	<0.00010	nc	<0.00050	<0.00050	nc	0.00031	0.00031	nc	<0.00010	<0.00010	<0.00010	<0.00010	-	-			
Cobalt (Co)-Dissolved	mg/L	Varies ¹⁰	0.00013	0.00013	0.00	0.00069	0.00069	0.00	0.0436	0.0468	7.08	0.00013	0.00013	0.00	<0.00010	<0.00010	<0.00010	<0.00010	-	-			
Copper (Cu)-Dissolved	mg/L	-	0.00623	0.00612	1.78	<0.00020	<0.00020	nc	0.397	0.214	59.90	0.00679	0.00666	1.93	<0.00020	<0.00020	<0.00020	<0.00020	-	-			
Copper CCME-FAL	mg/L	0.3	0.004	0.004	-	0.004	0.004	-	0.004	0.004	-	0.004	0.004	-	-	-	-	-	-	-			
Iron (Fe)-Dissolved	mg/L	Varies ¹¹	<0.010	<0.010	nc	0.846	0.862	1.87	0.175	0.174	0.57	<0.010	<0.010	nc	<0.010	<0.010	<0.010	<0.010	-	-			
Lead (Pb)-Dissolved	mg/L	-	0.00645	0.00642	0.47	<0.000050	<0.000050	nc	0.00053	0.00054	1.87	<0.000050	<0.000050	nc	<0.000050	<0.000050	<0.000050	<0.000050	-	-			
Lead CCME-FAL	mg/L	-	0.007	0.007	-	0.007	0.007	-	0.007	0.007	-	0.007	0.007	-	-	-	-	-	-	-			
Lithium (Li)-Dissolved	mg/L	-	0.0113	0.0114	0.88	0.0048	0.0049	2.06	<0.0050	<0.0050	nc	<0.0010	<0.0010	nc	<0.0010	<0.0010	<0.0010	<0.0010	-	-			
Magnesium (Mg)-Dissolved	mg/L	-	113	114	0.88	36.4	36.1	0.83	0.55	0.52	5.61	39.2	38.6	1.54	<0.10	<0.10	<0.10	<0.10	-	-			
Manganese (Mn)-Dissolved	mg/L	0.000026	0.0233	0.0217	7.11	1.05	1.04	0.96	0.0231	0.0352	41.51	0.0436	0.0463	6.01	<0.00010	<0.00010	<0.00010	<0.00010	-	-			
Mercury (Hg)-Dissolved	mg/L	0.073	<0.000050	<0.000050	nc	<0.000050	<0.000050	nc	0.0000413	0.0000395	4.46	<0.000050	<0.000050	nc	<0.000050	<0.000050	<0.000050	<0.000050	-	-			
Molybdenum (Mo)-Dissolved	mg/L	Varies ¹²	0.000073	0.000076	4.03	0.00103	0.00141	31.15	0.0139	0.0138	0.72	0.000324	0.000339	4.52	<0.000050	<0.000050	<0.000050	<0.000050	-	-			
Nickel (Ni)-Dissolved	mg/L	-	0.00435	0.00426	2.09	<0.00050	<0.00050	nc	0.0197	0.0113	54.19	<0.00050	<0.00050	nc	<0.00050	<0.00050	<0.00050	<0.00050	-	-			
Nickel CCME-FAL	mg/L	-	0.15	0.15	-	0.15	0.15	-	0.15	0.15	-	0.15	0.15	-	-	-	-	-	-	-			
Phosphorus (P)-Dissolved	mg/L	-	<0.050	<0.050	nc	<0.050	<0.050	nc	0.414	0.392	5.46	<0.050	<0.050	nc	<0.050	<0.050	<0.050	<0.050	-	-			
Potassium (K)-Dissolved	mg/L	0.001	5.84	6.01	2.87	1.21	1.21	0.00	10.2	9.05	11.95	1.93	1.84	4.77	<0.10	<0.10	<0.10	<0.10	-	-			
Selenium (Se)-Dissolved	mg/L	0.001	0.000106	0.000097	8.87	0.000076	0.000123	nc	0.00118	0.00110	7.02	0.000478	0.000415	14.11	<0.000050	<0.000050	<0.000050	<0.000050	-	-			
Silicon (Si)-Dissolved	mg/L	-	5.51	5.61	1.80	8.03	8.01	0.25	7.54	7.15	5.31	6.67	6.48	2.89	<0.050	<0.050	<0.050	<0.050	-	-			
Silver (Ag)-Dissolved	mg/L	0.0001	0.000024	0.000017	nc	<0.000010	<0.000010	nc	0.00690	0.00151	128.18	<0.000010	<0.000010	nc	<0.000010	<0.000010	<0.000010	<0.000010	-	-			
Sodium (Na)-Dissolved	mg/L	-	8.40	8.32	0.96	7.42	7.39	0.41	32.0	34.6	7.81	6.94	6.97	0.43	<0.050	<0.050	<0.050	<0.050	-	-			
Strontium (Sr)-Dissolved	mg/L	-	0.593	0.594	0.17	1.41	1.41	0.00	0.124	0.124	0.00	0.412	0.434	5.20	<0.00020	<0.00020	<0.00020	<0.00020	-	-			
Sulfur (S)-Dissolved	mg/L	-	255	254	0.39	70.6	70.7	0.14	54.1	52.7	2.62	60.9	60.6	0.49	<0.50	<0.50	<0.50	<0.50	-	-			
Thallium (Tl)-Dissolved	mg/L	0.0008	0.000287	0.000285	0.70	<0.000010	<0.000010	nc	0.000063	0.000051	nc	<0.000010	<0.000010	nc	<0.000010	<0.000010	<0.000010	<0.000010	-	-			
Tin (Sn)-Dissolved	mg/L	-	<0.00010	<0.00010	nc	<0.00010	<0.00010	nc	<0.00050	<0.00050	nc	<0.00010	<0.00010	nc	<0.00010	<0.00010	<0.00010	<0.00010	-	-			
Titanium (Ti)-Dissolved	mg/L	-	<0.00030	<0.00030	nc	<0.00030	<0.00030	nc	<0.0015	<0.0015	nc	<0.00030	<0.00030	nc	<0.00030	<0.00030	<0.00030	<0.00030	-	-			
Uranium (U)-Dissolved	mg/L	0.015	0.00290	0.00287	1.04	0.00438	0.00437	0.23	0.00186	0.00189	1.60	0.00314	0.00331	5.27	<0.000010	<0.000010	<0.000010	<0.000010	-	-			
Vanadium (V)-Dissolved	mg/L	-	<0.00050	<0.00050	nc	<0.00050	<0.00050	nc	<0.0025	<0.0025	nc	<0.00050	<0.00050	nc	<0.00050	<0.00050	<0.00050	<0.00050	-	-			
Zinc (Zn)-Dissolved	mg/L	0.03	3.63	3.54	nc	0.0016	<0.0010	nc	0.0073	0.0068	nc	0.0024	0.0010	nc	<0.0010	<0.0010	<0.0010	<0.0010	-	-			
Zirconium (Zr)-Dissolved	mg/L	-	<0.00030	<0.00030	nc	<0.00030	<0.00030	nc	<0.0015	<0.0015	nc	<0.00030	<0.00030	nc	<0.00030	<0.00030	<0.00030	<0.00030	-	-			

Table B: QA/QC Analytical Data

Parameter	Units	Site Location	MW09-16				MP09-08				MP09-09				MW09-24				Field Blanks				Travel Blanks		
		Sample ID	Dup-1	MW09-16	RPD (%) ¹⁴	Dup-4	MP09-08	RPD (%) ¹⁴	Dup-3	MP09-09	RPD (%) ¹⁴	Dup-2	MW09-24	RPD (%) ¹⁴	FB-1 (MW09-16)	FB-2 (MW09-24)	FB-3 (MP09-08)	FB-4 (MP09-12)	TRAVEL_BLANK	TRAVEL_BLANK					
		Date Sampled	29/08/2016	29/08/2016		31/08/2016	31/08/2016		30/08/2016	30/08/2016		30/08/2016	30/08/2016		30/08/2016	30/08/2016	29/08/2016	30/08/2016	31/08/2016	01/09/2016	30/08/2016	01/09/2016			
		ALS Work Number	L1822156	L1822156		L1822156	L1822156		L1822156	L1822156		L1822156	L1822156		L1822156	L1822156	L1822156	L1822156	L1822156	L1822156	L1822156	L1822156	L1822156	L1822156	L1822156
		Station Status	Good	Good		Good	Good		Good	Good		Good	Good		Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
CCME-FAL ^{1,2,3,4}																									
Total Metals																									
Aluminum (Al)-Total	mg/L	Varies ⁸	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0030					
Aluminum CCME-FAL	mg/L	-	0.1	0.1	-	0.1	0.1	-	0.1	0.1	-	0.1	0.1	-	0.1	0.1	0.1	0.1	-	-					
Antimony (Sb)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010					
Arsenic (As)-Total	mg/L	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010					
Barium (Ba)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050					
Beryllium (Be)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000020					
Bismuth (Bi)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050					
Boron (B)-Total	mg/L	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.010					
Cadmium (Cd)-Total	mg/L	Varies ⁹	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0000050					
Cadmium CCME-FAL	mg/L	-	0.00037	0.00037	-	0.00037	0.00037	-	0	0	-	0.00037	0.00037	-	0.0004	0.0004	0.0004	0.0004	-	-					
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	Varies ¹⁰	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00050					
Copper CCME-FAL	mg/L	-	0.004	0.004	-	0.004	0.004	-	0.004	0.004	-	0.004	0.004	-	0.02	0.02	0.02	0.02	-	-					
Iron (Fe)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.010					
Lead (Pb)-Total	mg/L	Varies ¹¹	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050					
Lead CCME-FAL	mg/L	-	0.007	0.007	-	0.007	0.007	-	0.007	0.007	-	0.007	0.007	-	0.001	0.001	0.001	0.001	-	-					
Lithium (Li)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0010					
Magnesium (Mg)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.10					
Manganese (Mn)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010					
Mercury (Hg)-Total	mg/L	0.000026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0000050					
Molybdenum (Mo)-Total	mg/L	0.073	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050					
Nickel (Ni)-Total	mg/L	Varies ¹²	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00050					
Nickel CCME-FAL	mg/L	-	0.15	0.15	-	0.15	0.15	-	0.15	0.15	-	0.15	0.15	-	0.025	0.025	0.025	0.025	-	-					
Phosphorus (P)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050					
Potassium (K)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.10					
Selenium (Se)-Total	mg/L	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050					
Silicon (Si)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050					
Silver (Ag)-Total	mg/L	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000010					
Sodium (Na)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050					
Strontium (Sr)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00020					
Thallium (Tl)-Total	mg/L	0.0008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000010					
Tin (Sn)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010					
Titanium (Ti)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00030					
Uranium (U)-Total	mg/L	0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000010					
Vanadium (V)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00050					
Zinc (Zn)-Total	mg/L	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0030					
Zirconium (Zr)-Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00030					

Notes

- (1) CCME guideline exceedences shaded with dark grey. Light grey shading denotes reportable detection limit in exceedance of CCME Guidelin Where guideline value is dependent on hardness or pH, reported values have been compared against a guideline value calculated for each site based on the relevant value, and the guideline value has been noted as "varies".
- (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) Guideline note: Lowest acceptable dissolved oxygen concentration for cold-water biota, early life stages
- (7) 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. CCME values listed in the table are expressed as ammonia (N) When field pH is not available, lab pH is used. When field and lab pH are both not available, the most stringent guideline has been used. If field temperature is not available ammonia standards can not be calculated.
- (8) Aluminum varies with pH as follows for CCME FAL:
0.005 if pH<6.5
0.1 if pH>=6.5
when field pH is not available, lab pH is used. When field and lab pH are both not available, the most stringent guideline has been used.
- (9) Cadmium varies with Hardness in mg/L as follows for CCME FAL:
0.00 if H<17
0.00004 - 0.00037 if H>=17 and H<=280 as follows;
 $CWQG (\mu\text{g/L}) = 10\{0.83[\ln(\text{hardness})] - 2.46\}$
0.00 if H>280
- (10) Copper varies with Hardness in mg/L as follows for CCME FAL:
0.002 if H<82
0.002 - 0.004 if H>=82 and H<=180 as follows;
 $CWQG (\mu\text{g/L}) = 0.2 * e\{0.8545[\ln(\text{hardness})]-1.465\}$
0.004 if H>180
- (11) Lead varies with Hardness in mg/L as follows for CCME FAL:
0.001 if H<60
.001 - 0.00 if H>=60 and H<=180 as follows;
 $CWQG (\mu\text{g/L}) = e\{1.273[\ln(\text{hardness})]-4.705\}$
0.007 if H>180
- (12) Nickel varies with Hardness in mg/L as follows for CCME FAL:
0.025 if H<60
0.025 - 0.15 if H>=60 and H<=180 as follows;
 $CWQG (\mu\text{g/L}) = e\{0.76[\ln(\text{hardness})]+1.06\}$
0.15 if H>180
- (13) Due to slow recharge and low well volumes, samples were collected from GSI-HA-03A between August 29 - August 30, 2016. Thiocyanate, Ammonia, and TIC were collected on August 30, 2016. All other parameters were collected on August 29, 2016.
- (14) RPD = Relative Percent Difference. 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.
- (15) Due to slow recharge and low well volumes, samples were collected from GSI-PC-04B between August 31 - September 1, 2016. Dissolved metals, dissolved mercury, and general chemistry were collected on August 31, 2016. Cyanide was collected on September 1, 2016.
- (16) Due to slow recharge and low well volumes, samples were collected from MP09-03 between August 31 - September 1, 2016. Dissolved metals, dissolved mercury, and general chemistry were collected on August 31, 2016. Cyanide was collected on September 1, 2016.
- (17) Due to slow recharge and low well volumes, samples were collected from MP09-14 between August 29 - August 31, 2016. Dissolved metals was collected on August 29, 2016. Dissolved mercury and general chemistry was collected on August 31, 2016.
- (18) AU = Attenuation Units - an alternate unit of turbidity measurement used where turbidity is >500. AU is equivalent to NTU, but is measured using transmitted rather than scattered light.
- (19) Water for TKN analysis taken out of general chemistry bottle due to insufficient water volumes to collect a preserved ammonia sample. Variability in the TKN analysis may occur due to preservation holding time exceedence.
- (20) Ammonia standard could not be calculated as no pH data was available.
- and indicates values above RDL in Field Blank or Travel Blank
 and Indicates QAQC values exceed expected results (i.e. RDP values exceed 20%).

APPENDIX A
Site Photographs



Photo 1: View of drive point wells GSI-DC-01A and GSI-DC-01B. Photo taken on August 29, 2016.



Photo 2: View of drive point wells GSI-DC-02A and GSI-DC-02B. Photo taken on August 29, 2016.

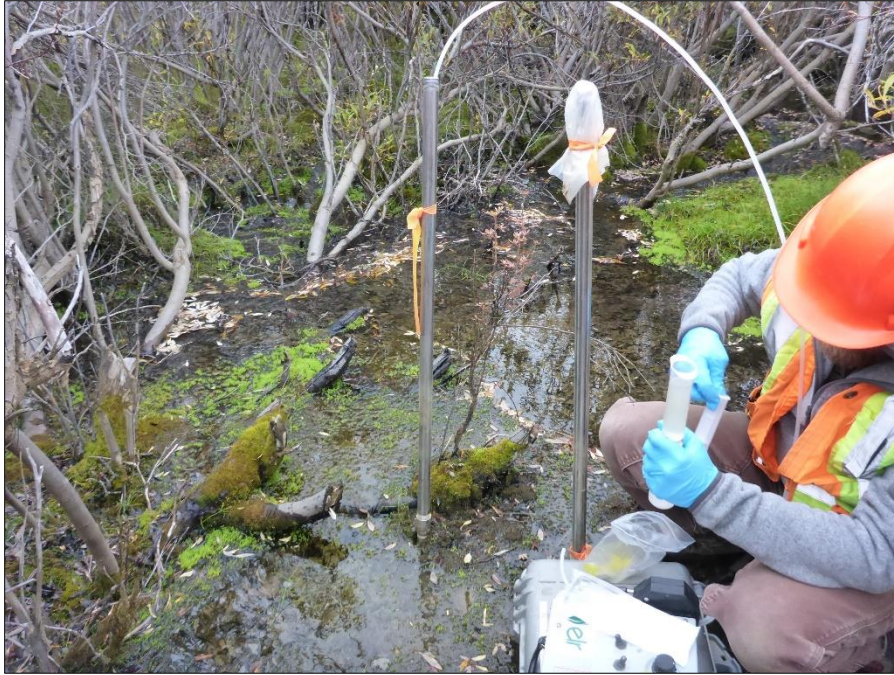


Photo 3: View of drive point wells GSI-DC-03A and GSI-DC-03B. Photo taken on August 29, 2016.



Photo 4: View of drive point wells GSI-DC-05A and GSI-DC-05B. Photo taken on August 29, 2016.



Photo 5: View of drive point wells GSI-DC-06A and GSI-DC-06B. Photo taken on August 31, 2016.

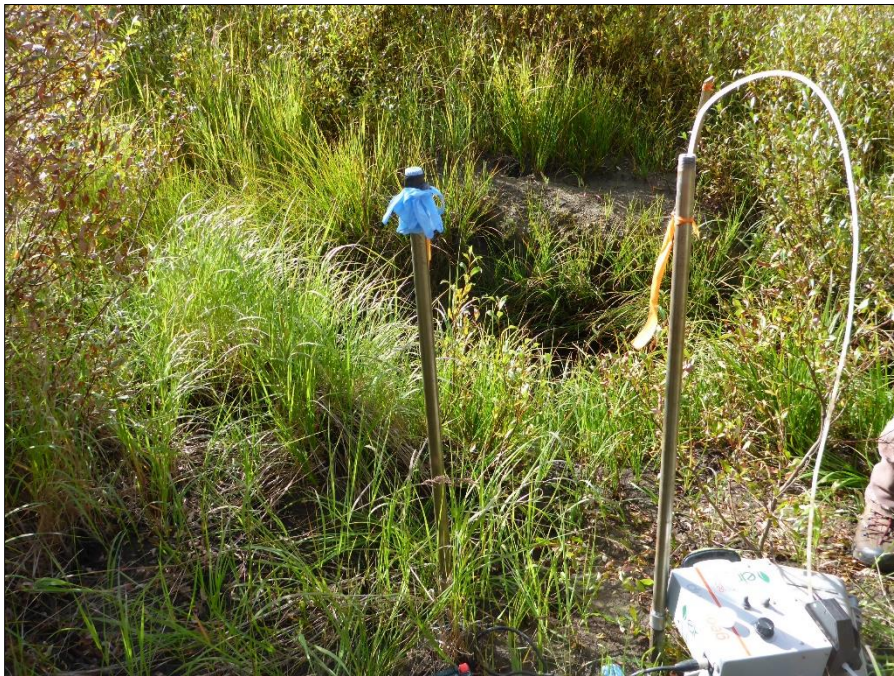


Photo 6: View of drive point wells GSI-DC-07A and GSI-DC-07B. Photo taken on August 31, 2016.



Photo 7: View of drive point wells GSI-DC-08A and GSI-DC-08B. Photo taken on August 31, 2016.

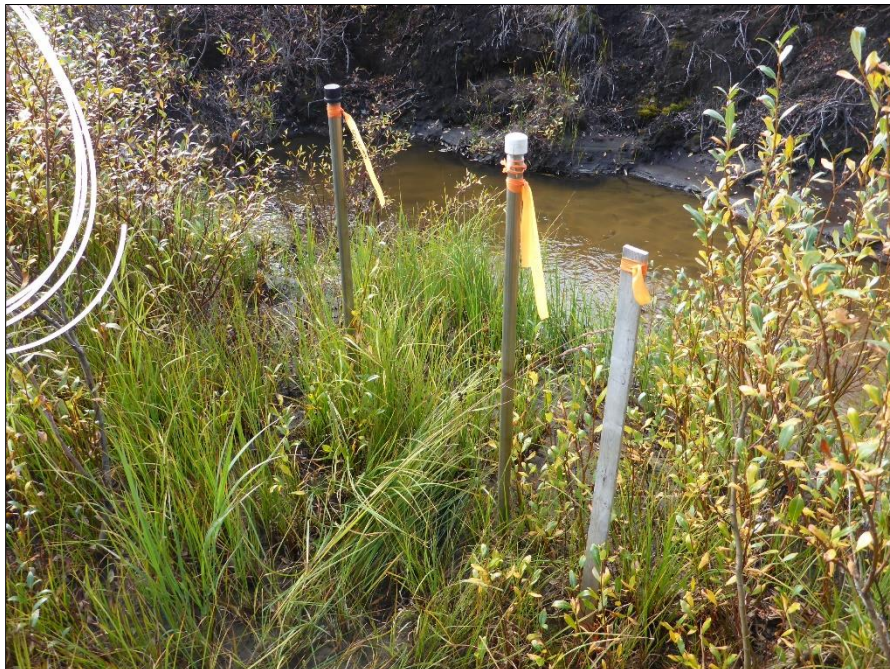


Photo 8: View of drive point wells GSI-DC-09A and GSI-DC-09B. Photo taken on August 31, 2016.

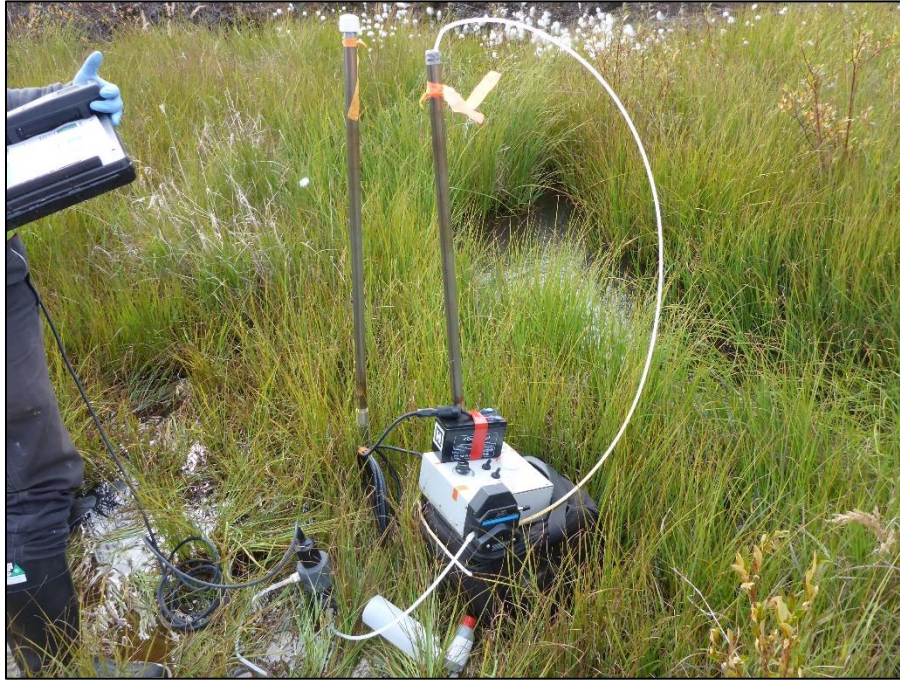


Photo 9: View of drive point wells GSI-DC-10A and GSI-DC-10B. Photo taken on August 31, 2016.



Photo 10: View of drive point well GSI-HA-01A. Photo taken on August 29, 2016.



Photo 11: View of drive point well GSI-HA-02A. Photo taken on August 29, 2016.



Photo 12: View of drive point well GSI-HA-03A. Photo taken on August 29, 2016.



Photo 13: View of drive point well GSI-HA-04A. Photo taken on August 29, 2016.

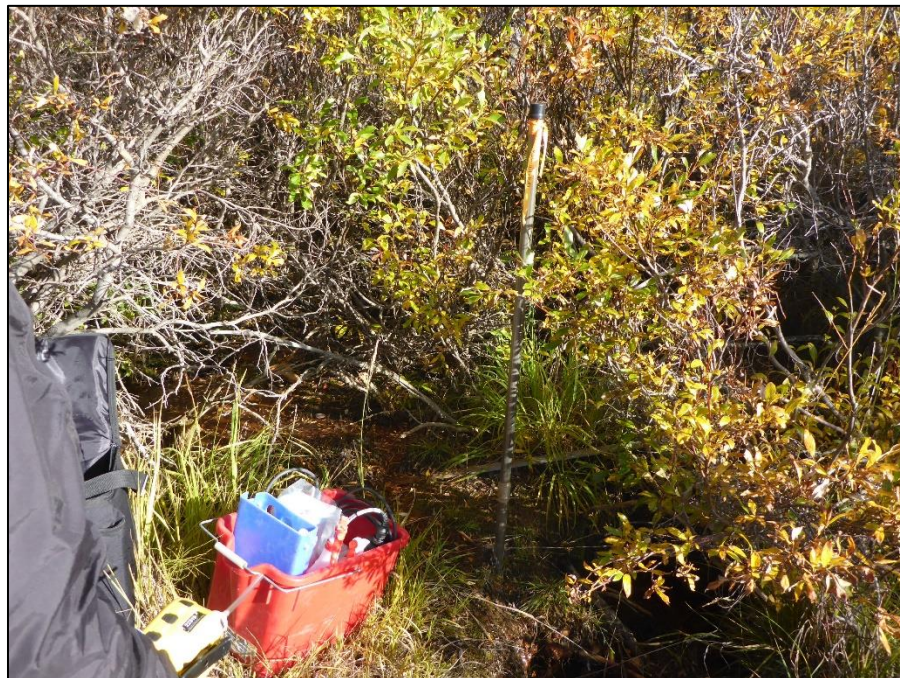


Photo 14: View of drive point well GSI-HA-05A. Photo taken on August 29, 2016.



Photo 15: View of well MW09-15. Photo taken on August 29, 2016.



Photo 16: View of well MW09-16. Photo taken on August 29, 2016.



Photo 17: View of well MW09-17. Photo taken on August 29, 2016.



Photo 18: View of well MW09-18. Photo taken on August 29, 2016.



Photo 19: View of well MW09-19. Photo taken on August 29, 2016.



Photo 20: View of well CH-P-13-01/10. Photo taken on August 29, 2016.



Photo 21: View of wells CH-P-13-03/50. Photo taken on August 29, 2016.



Photo 22: View of wells CH-P-13-04/10 and CH-P-13-04/35. Photo taken on August 29, 2016.



Photo 23: View of well GLL07-01. Photo taken on August 29, 2016.



Photo 24: View of well GLL07-02. Photo taken on August 31, 2016.



Photo 25: View of wells MW09-13 and MW09-14. Photo taken on August 29, 2016.



Photo 26: View of drive point wells GSI-PC-03A and GSI-PC-03B. Photo taken on August 31, 2016.



Photo 27: View of drive point wells GSI-PC-04A and GSI-PC-04B. Photo taken on August 31, 2016.



Photo 28: View of drive point wells GSI-PC-05A and GSI-PC-05B. Photo taken on August 31, 2016.



Photo 29: View of drive point well MP09-03. Photo taken on August 31, 2016.



Photo 30: View of drive point well MP09-08. Photo taken on August 31, 2016.



Photo 31: View of well W14103083BH01. Photo taken on August 30, 2016.



Photo 32: View of well W14103083BH02. Photo taken on August 30, 2016.



Photo 33: View of well W14103083BH04. Photo taken on August 30, 2016.



Photo 34: View of well MP09-04. Photo taken on August 30, 2016.

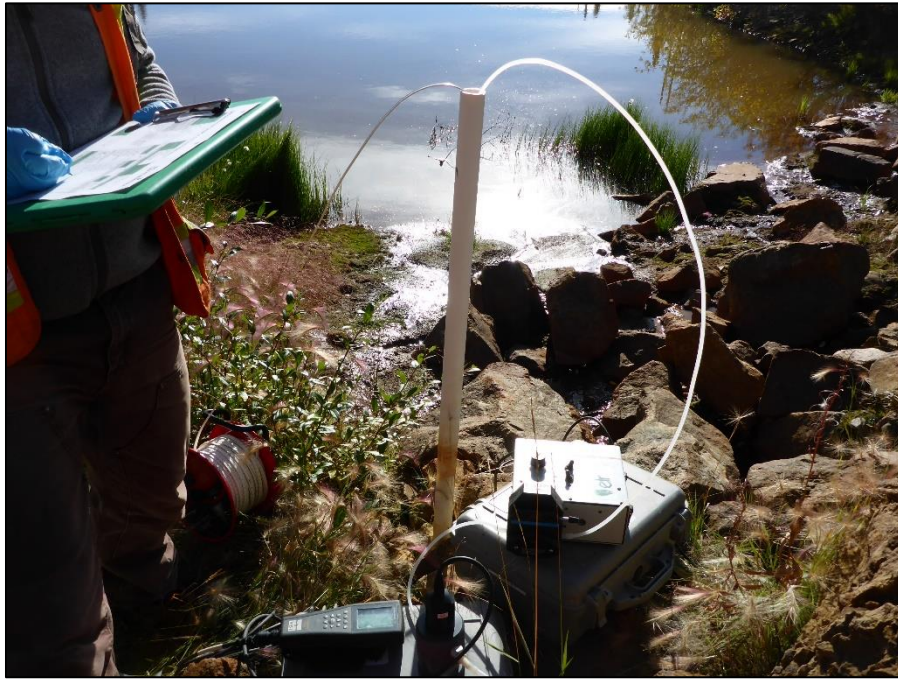


Photo 35: View of well MP09-05. Photo taken on August 30, 2016.



Photo 36: View of wells MP09-09 and MP09-10. Photo taken on August 30, 2016.



Photo 37: View of wells MP09-11 and MP09-12. Photo taken on August 30, 2016.



Photo 38: View of drive point well MP09-14. Photo taken on August 29, 2016.

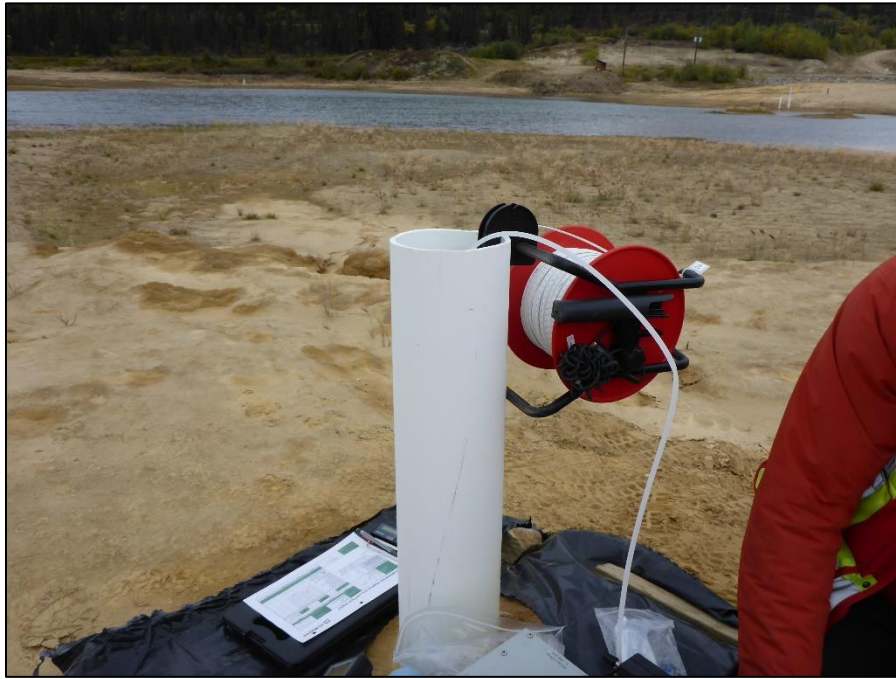


Photo 39: View of well MW09-02. Photo taken on August 30, 2016.



Photo 40: View of well MW09-03. Photo taken on August 30, 2016.



Photo 41: View of well MW09-04. Photo taken on August 30, 2016.



Photo 42: View of wells MW09-05 and MW09-06. Photo taken on August 30, 2016.



Photo 43: View of well MW09-07. Photo taken on August 29, 2016.



Photo 44: View of well MW09-08. Photo taken on August 30, 2016.



Photo 45: View of well MW09-11. Photo taken on August 29, 2016.



Photo 46: View of well MW09-20. Photo taken on August 30, 2016.



Photo 47: View of well MW09-21. Photo taken on August 30, 2016.



Photo 48: View of wells MW09-22. Photo taken on August 29, 2016.



Photo 49: View of well MW09-23. Photo taken on August 30, 2016.



Photo 50: View of well MW09-24. Photo taken on August 30, 2016.



Photo 51: View of well W14103083BH03. Photo taken on August 29, 2016.

APPENDIX B

Field Forms

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site		CH-P-B-01/10		Project Number		1343-005.28		Date		29-Aug-16			
Piezometer Diameter		1.5"		Client		GY - AAM		Samplers		AN/MU			
UTM Location		Z: 08, E: 0388653 N: 6881120		Project Name		Mount Nansen 2016 GW Sampling Program		Weather/Temperature		Sunny w. breeze 4°C			
Waypoint		GPS: AN Name: A. N/A						Recovery		<input type="checkbox"/> Good <input type="checkbox"/> Bad			
Photos		Cam: 1 Nos: 0439-0441		Purge Method									
Duplicate Collected		<input type="checkbox"/> Yes Name: _____		Waterra		Peristaltic		Disp. Bailer		Other			
Field Blank Collected		<input type="checkbox"/> Yes Name: _____											
Initial Depth to Water (m)		6.800 iced		Purge Start Time:		Purge End Time:		Pen or YSI:		<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit			
Depth to Bottom (m)		6.800 FROZEN		Purge Interval Time () min / Vol. () L									
Submerged Tubing Depth (m)		N/A		Depth to water (m)									
Well Stick-up Height (m)		0.480		Temperature (°C) 3%									
Estimated Water Volume (L)		N/A		pH (pH Units) ±0.1									
<p>Calculations:</p> <p>(DTB - DTW) x (πr²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume</p>				Cond. (µs/cm) 3%									
				Specific Cond. (µs/cm) 3%									
				Redox (mV) 10%									
				DO (mg/L) 10%									
				DO (%) 10%									
				Appearance & Odour (Clear, Silty, HC odours, etc.)									
				Only for final readings		Sulphide (mg/L)							
						Turbidity (NTU)							
						Interval Purge Volume (L)							
						Cumulative Purge Volume (L):							
YSI ID				Sample Method:									
Logged Field Parameters		<input type="checkbox"/> Yes <input type="checkbox"/> No		Waterra		Peristaltic		Disp. Bailer		Other			
Time logged on YSI (24hr)													
Sample Time (24hr)													

Sample Site (Con't): CH-P-13-01/10

Sample Date (Con't): 29-Aug-16

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: at 5:45 in PVC

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	500

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

- Frozen @ 6.800 m → depth should be 10 m → permafrost well?

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	CH-P-13-03/50	Project Number	1343-005.28	Date	Aug 29 2016	
Piezometer Diameter	1"	Client	GY - AAM	Samplers	SC NB	
UTM Location	Z: 08 E: 0389145 N: 6881108	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	11° Sunny	
Waypoint	GPS: ELR Name: N/A			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad	
Photos	Cam: ELR2 Nos: 0155 - 0157	Purge Method <i>No purge</i>				
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes Name: _____					
Initial Depth to Water (m)	46.921	Purge Start Time:	_____	Purge End Time:	_____	
				Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
Depth to Bottom (m)	30.2 50.528	Purge Interval Time () min / Vol. () L				
Submerged Tubing Depth (m)	N/A	Depth to water (m)				
Well Stick-up Height (m)	0.56	Temperature (°C) 3%				
Estimated Water Volume (L)	4.7	pH (pH Units) ±0.1				
(DTB - DTW) x (πr ²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume Calculations: 3.6 x 1.1 = 4.7	Cond. (µs/cm) 3%					
	Specific Cond. (µs/cm) 3%					
	Redox (mV) 10%					
	DO (mg/L) 10%					
	DO (%) 10%					
	Appearance & Odour (Clear, Silty, HC odours, etc.)					
	Only for final readings	Sulphide (mg/L)	0.09			
		Turbidity (NTU)	28.1			
	Interval Purge Volume (L)					
	Cumulative Purge Volume (L):					
YSI ID		Sample Method:				
Logged Field Parameters	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	_____					
Sample Time (24hr)	15:45					

Direct Sample

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

Sample Date (Con't): Aug 29 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	400

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	100	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	20	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	400	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	140	
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	100	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	

General Notes and Observations:

- depth of well was ~ 50m deep
 - pulled 1L of sample volume, water level decreasing
 - Able to collect full ~~and~~ sample set + Run sulphidate turbidity.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer 1
- 2" bailer _____
- other (describe) 50m Twine 50m

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	CH-P-13-04/10	Project Number	1343-005 28 28	Date	29-Aug-16	
Piezometer Diameter	# 1.75	Client	GY - AAM	Samplers	AN/MM	
UTM Location	Z: 083 E: 0329136 N: 6881471	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	windy 24°C	
Waypoint	GPS: AN Name: N/A			Recovery	<input type="checkbox"/> Good <input type="checkbox"/> Bad	
Photos	Cam: 1 Nos: 0435-0438	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes Name: _____					
Initial Depth to Water (m)	6.100 - ice	Purge Start Time:		Purge End Time:		
				Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
Depth to Bottom (m)	6.100 FROZEN	Purge Interval Time () min / Vol. () L				
Submerged Tubing Depth (m)		Depth to water (m)				
Well Stick-up Height (m)	0.675	Temperature (°C) 3%				
Estimated Water Volume (L)		pH (pH Units) ±0.1				
<p>(DTB – DTW) x (πr²) 1000 (for well diameter) = 1 well volume (DTB – DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB – DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume</p> <p>Calculations:</p>	Cond. (µs/cm) 3%					
	Specific Cond. (µs/cm) 3%					
	Redox (mV) 10%					
	DO (mg/L) 10%					
	DO (%) 10%					
	Appearance & Odour (Clear, Silty, HC odours, etc.)					
	Only for final readings	Sulphide (mg/L)				
		Turbidity (NTU)				
	Interval Purge Volume (L)					
	Cumulative Purge Volume (L):					
YSI ID		Sample Method:				
Logged Field Parameters	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)						
Sample Time (24hr)						

Sample Site (Con't): CH-D-13-0415¹⁰

Sample Date (Con't): 29-Aug-16

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: cap was loose.

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	80.22.3
Carbon Dioxide (CO2)	PPM	200

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

- ice @ 6.100m → ice found on the top of the water level. → possibly permafrost well?

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	CH-P-13-04/35	Project Number	1343-005.28	Date	29-Aug-16
Piezometer Diameter	1"	Client	GY - AAM	Samplers	AN/MM
UTM Location	Z: 08 E: 0389137 N: 6881472	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	windy sunny breaks 4°C
Waypoint	GPS: AN Name: N/A			Recovery	<input type="checkbox"/> Good <input type="checkbox"/> Bad
Photos	Cam: 1 Nos: 0435-0438	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name:				
Initial Depth to Water (m)	6.500 ^{ice} 6.500 (free)	Purge Start Time:		Purge End Time:	
Depth to Bottom (m)	N/A	Purge Interval Time () min / Vol. () L			
Submerged Tubing Depth (m)	N/A	Depth to water (m)			
Well Stick-up Height (m)	0.608	Temperature (°C) 3%			
Estimated Water Volume (L)	N/A	pH (pH Units) ±0.1			
<p>(DTB – DTW) x (πr²) 1000 (for well diameter) = 1 well volume (DTB – DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB – DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume</p> <p>Calculations:</p>	Cond. (µs/cm) 3%				
	Specific Cond. (µs/cm) 3%				
	Redox (mV) 10%				
	DO (mg/L) 10%				
	DO (%) 10%				
	Appearance & Odour (Clear, Silty, HC odours, etc.)				
	Only for final readings	Sulphide (mg/L)			
		Turbidity (NTU)			
	Interval Purge Volume (L)				
	Cumulative Purge Volume (L):				
YSI ID		Sample Method:			
Logged Field Parameters	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)					
Sample Time (24hr)					

CH-P-13-04/35

Sample Site (Con't): CH-P-13-02

Sample Date (Con't): 29-Aug-16

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: cap loose

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	21.6
Carbon Dioxide (CO2)	PPM	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

- obstruction @ 6.500m → white ice found on the tip of the water level → no drawing attempt → permeable well?

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	G1107-01	Project Number	1343-005 22 22	Date	Aug 29 2016
Piezometer Diameter	2"	Client	GY - AAM	Samplers	JC NB
UTM Location	Z: 08 E: 03 88852 N: 6881779	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	10° Sunny
Waypoint	GPS: ECR Name: NA			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad
Photos	Cam: ECR2 Nos: 0149-0151	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input checked="" type="checkbox"/> Yes Name:				
Initial Depth to Water ^{Ice} (m)	13.824	Purge Start Time:	Purge End Time:	Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input checked="" type="checkbox"/> Pen Unit
Depth to Bottom (m)	13.824 Frozen.	Purge Interval Time () min / Vol. () L			
Submerged Tubing Depth (m)	-	Depth to water (m)			
Well Stick-up Height (m)	0.75	Temperature (°C) 3%			
Estimated Water Volume (L)	-	pH (pH Units) ±0.1			
Calculations: $(DTB - DTW) \times (\pi r^2) \times 1000$ (for well diameter) = 1 well volume $(DTB - DTW) \times 8.1$ (for 4" well diameter) = 1 well volume $(DTB - DTW) \times 2$ (for 2" well diameter) = 1 well volume $(DTB - DTW) \times 1.1$ (for 1.5" diameter) = 1 well volume $(DTB - DTW) \times 0.5$ (for 1" diameter) = 1 well volume	Cond. (µs/cm) 3%				
	Specific Cond. (µs/cm) 3%				
	Redox (mV) 10%				
	DO (mg/L) 10%				
	DO (%) 10%				
	Appearance & Odour (Clear, Silty, HC odours, etc.)				
	<u>Only for final readings</u> Sulphide (mg/L)				
	Turbidity (NTU)				
	Interval Purge Volume (L)				
	Cumulative Purge Volume (L):				
YSI ID	-	Sample Method:			
Logged Field Parameters	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)	-				
Sample Time (24hr)	-				

Sample Site (Con't): GLL07-01

Sample Date (Con't): Aug 29 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH ₄)	%LEL	0
Oxygen (O ₂)	%	20.9
Carbon Dioxide (CO ₂)	PPM	200

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

→ Well is Frozen @ 13.824 m

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	GLL07-02	Project Number	1343-005.28	Date	Aug 31 2016
Piezometer Diameter	6"	Client	GY - AAM	Samplers	SC NB
UTM Location	Z:08 E: 038907 DN: 6881704	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	9° Sunny
Waypoint	GPS: ELR Name: _____			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad
Photos	Cam: FLR2 Nos: 0206 - 0208	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name: _____				
Initial Depth to Water (m)	Dry	Purge Start Time:		Purge End Time:	
Depth to Bottom (m)	7.257	Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit		
Submerged Tubing Depth (m)	—	Purge Interval Time () min / Vol. () L			
Well Stick-up Height (m)	1.272	Depth to water (m)			
Estimated Water Volume (L)	—	Temperature (°C) 3%			
Calculations: $(DTB - DTW) \times (\pi r^2) \times 1000$ (for well diameter) = 1 well volume $(DTB - DTW) \times 8.1$ (for 4" well diameter) = 1 well volume $(DTB - DTW) \times 2$ (for 2" well diameter) = 1 well volume $(DTB - DTW) \times 1.1$ (for 1.5" diameter) = 1 well volume $(DTB - DTW) \times 0.5$ (for 1" diameter) = 1 well volume	pH (pH Units) ±0.1				
	Cond. (µs/cm) 3%				
	Specific Cond. (µs/cm) 3%				
	Redox (mV) 10%				
	DO (mg/L) 10%				
	DO (%) 10%				
	Appearance & Odour (Clear, Silty, HC odours, etc.)				
	Only for final readings	Sulphide (mg/L)			
		Turbidity (NTU)			
	Interval Purge Volume (L)				
Cumulative Purge Volume (L):					
YSI ID		Sample Method:			
Logged Field Parameters	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)					
Sample Time (24hr)					

Sample Site (Con't): GLL07-02

Sample Date (Con't): Aug 31 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other Steel cap

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	19.5
Carbon Dioxide (CO2)	PPM	4600

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

Well is Dry

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

Return



GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	GSI-DC-013 / A	Project Number	1343-005.28	Date	Aug 24 2016
Piezometer Diameter	1.5" 1.0"	Client	GY - AAM	Samplers	SC NB
UTM Location	Z:08V E:0387666 N:6881121	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Sunny 30°C
Waypoint	GPS: ELR Name: N/A			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad
Photos	Cam: ELR/2 Nos: 103-0125-103-0127	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name: -	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name: -		✓		
Initial Depth to Water (m)	B: 1.347 / A: 0.857	Purge Start Time:		Purge End Time:	
Depth to Bottom (m)	B: 1.702 / A: 1.552	Purge Interval Time () min / Vol. () L		Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit
Submerged Tubing Depth (m)	1.702	Depth to water (m)			
Well Stick-up Height (m)	0.9605 (0.933 - A)	Temperature (°C) 3%			
Estimated Water Volume (L)	100ml (0.1L)	pH (pH Units) ±0.1			
<p>Calculations:</p> <p>(DTB - DTW) x (πr²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume</p>	Cond. (µs/cm) 3%				
	Specific Cond. (µs/cm) 3%				
	Redox (mV) 10%				
	DO (mg/L) 10%				
	DO (%) 10%				
	Appearance & Odour (Clear, Silty, HC odours, etc.)				
	Only for final readings	Sulphide (mg/L)			
		Turbidity (NTU)			
	Interval Purge Volume (L)				
	Cumulative Purge Volume (L):				
YSI ID	N/A	Sample Method:			
Logged Field Parameters	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)	N/A		✓		
Sample Time (24hr)	08:45				

DIRECT SAMPLE

Sample Site (Con't): GSI-DC-01BA

Sample Date (Con't): Aug 29 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	B: 0 / A: 0
Oxygen (O2)	%	B: 20.9 / A: 20.9
Carbon Dioxide (CO2)	PPM	B: 300 / A: 300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	100	16/08/2016 08:45
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

Limited sampling volume

Aug 30, 2016

-Returned @ 14:50 to attempt to fill more bottles.

~~DTB~~ DTB 1.705m → no water well has not

sample time recharged; unable to collect anymore samples at this time.

Second visit to well on Aug 31 @ 16:00. Measured DTW/DTB. well found DRY. No recharge.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	GSI-DC-02B/A		Project Number	1343-005.28	Date	29-Aug-16 / Aug. 30	
Piezometer Diameter	1" DP		Client	GY - AAM	Samplers	AN/MM	
UTM Location	Zone E: 0405247 N: 6806659		Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Sunny	
Waypoint	GPS: AN Name: 094				Recovery	<input type="checkbox"/> Good <input type="checkbox"/> Bad <input checked="" type="checkbox"/> okay	
Photos	Cam: 1 Nos: 0417-0419		Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name: _____		Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes Name: _____			X			
Initial Depth to Water (m)	B	A	Purge Start Time:	09:24 08:50	Purge End Time:		Pen or YSI:
	1.845	1.603					
Depth to Bottom (m)	3.80	1.861	Purge Interval Time () min / Vol. () L	Avg. 29 09:26			
	0.221						
Submerged Tubing Depth (m)	~3.80		Depth to water (m)				
Well Stick-up Height (m)	1.080 1.015		Temperature (°C) 3%	3.9			
Estimated Water Volume (L)	0.006 0.013		pH (pH Units) ±0.1	8.40			
	(DTB - DTW) x (πr ²) * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume		Cond. (µs/cm) 3%	597			
Calculations: $\frac{1.845}{0.221} \times 0.5 = 0.426$			Specific Cond. (µs/cm) 3%	1006			
			Redox (mV) 10%	-37.2			
			DO (mg/L) 10%	* 38.3			
			DO (%) 10%	* 5.85			
			Appearance & Odour (Clear, Silty, HC odours, etc.)	slightly turbid			
			Only for final readings	Sulphide (mg/L)	0.11		
				Turbidity (NTU)	46.5		
			Interval Purge Volume (L)				
			Cumulative Purge Volume (L):				
YSI ID	GSI-DC-02B		Sample Method:				
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	08:27 08:50						
Sample Time (24hr)	09:27 08:50			X			

Aug 29 Direct Sample
 re-sampled on Aug 30

Measured on Aug. 29/2016.
 During initial sample/purge.

Measured on Aug. 30/2016.
 During re-sample

Sample Site (Con't): GSI-DC-a2B/A

Sample Date (Con't): 29-Aug-16

Well Head Seal: J-Plug PVC Cap Not Sealed Other grommet cap

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values	
Methane (CH4)	%LEL	0	0
Oxygen (O2)	%	20.9	20.9
Carbon Dioxide (CO2)	PPM	500	500 500

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)		Comments
						Aug 29	Aug 30	
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	100	100	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	15	15	Min. Vol. collected
2	500 ml (plastic)	General Chemistry	100 ml	-	-	100	100	during both dates.
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)	100	100	
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	60	60	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	50	50	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	50	50	

General Notes and Observations:

~~Unable to get water depth again + water level @ 1.855m~~

- Difficulty getting the water level tape to the bottom of the well; able to put 33.80 m of peri tubing into the well.

- able to collect full minimum values; will purge water & return later to attempt second sample (not direct)

* Do not a reliable reading due to air bubbles, well dry after parameter reading.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 10.5 ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 1.0 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

⊗ 30 Aug-16 @ 6:55 DTW 1.855 → attempt resample.

→ Sample time

12:55

→ Full sample set collected (min. vol.)

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site		GSI-DC-03B/A		Project Number		1343-005.28		Date		29-Aug-16			
Piezometer Diameter		1" DP		Client		GY - AAM		Samplers		AN/MM			
UTM Location		Z: 081 E: 0388107 N: 6881079		Project Name		Mount Nansen 2016 GW Sampling Program		Weather/Temperature		windy/overcast			
Waypoint		GPS: AN Name: N/A						Recovery		<input type="checkbox"/> Good <input type="checkbox"/> Bad			
Photos		Cam: I Nos: 0422-0431		Purge Method									
Duplicate Collected		<input type="checkbox"/> Yes Name:		Waterra		Peristaltic		Disp. Bailer		Other			
Field Blank Collected		<input type="checkbox"/> Yes Name:				X							
Initial Depth to Water (m)		1.405 ^{13.1A} 1.248		Purge Start Time:		13:04		Purge End Time:		Pen or YSI:			
Depth to Bottom (m)		1.860 ^{13.1A} 1.855		Purge Interval Time () min / Vol. () L		13:05				<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit			
Submerged Tubing Depth (m)		~1.70		Depth to water (m)		12							
Well Stick-up Height (m)		0.964		Temperature (°C) 3%		4.2							
Estimated Water Volume (L)		0.23		pH (pH Units) ±0.1		7.30							
(DTB - DTW) x (πr ²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume Calculations: $\frac{8.1 \times 4.05}{0.455} \times 0.5$				Cond. (µs/cm) 3%		554							
				Specific Cond. (µs/cm) 3%		917							
				Redox (mV) 10%		173.1							
				DO (mg/L) 10%		5.2							
				DO (%) 10%		41.2							
				Appearance & Odour (Clear, Silty, HC odours, etc.)		turbid							
				Only for final readings		Sulphide (mg/L)		/		0.25			
						Turbidity (NTU)		/		580			
						Interval Purge Volume (L)		/					
						Cumulative Purge Volume (L):		/					
YSI ID		GSI-DC-06B		Sample Method:									
Logged Field Parameters		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Waterra		Peristaltic		Disp. Bailer		Other			
Time logged on YSI (24hr)		13:06				X							
Sample Time (24hr)		12:50 *											

* Sample time submitted to lab is 15:25 on 30-Aug-16

DIRECT * SEE SAMPLE NOTES OVER BACK

Sample Site (Con't): ~~20-Aug-16~~ 601-DC-0381A

Sample Date (Con't): ~~29-Aug-16~~ * 30-Aug-16 @ 15:25

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

↳ has plastic bag covering.

Head Space Gas Measurements

	Units	B Values	A
Methane (CH4)	%LEL	0	0
Oxygen (O2)	%	20.9	20.9
Carbon Dioxide (CO2)	PPM	300	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	100 * 2 min	<p>30-Aug-15 @ 15:25 10 sample time</p>
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	15 * 2 min	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	

General Notes and Observations:

- standing water surrounding both DPs
 - attempted direct sample.
 - well went dry after parameter measurement was taken; min sample vols collected.
 30-Aug-16 → returned to attempt a re-sample to get a more representative (not direct) samp.
 DTW → 1.554m
 Sample Time: 15:25 on 30-Aug-16 → dug out dry + re-logged to sample.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 0.5 ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 0.5 ft + 0.5 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

* Direct sample from 20-Aug-16 will not be submitted to the lab.

↳ able to collect full vols of gen & chem, cyanide, SCN, NH₃ + TIC
 ↳ only min vols of diss metals & mercury

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	951-DC-053/A	Project Number	1343-005.28	Date	29 Aug - 16 + 30 Aug - 16
Piezometer Diameter	1" DP	Client	GY - AAM	Samplers	AN / MM
UTM Location	Z: 08 E: 038835 N: 6880836	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	sunny to breeze
Waypoint	GPS: AN Name: N/A	Purge Method	<input type="checkbox"/> Waterra <input checked="" type="checkbox"/> Peristaltic <input type="checkbox"/> Disp. Bailer <input type="checkbox"/> Other		
Photos	Cam: 1 Nos: 0442 - 0444	Duplicate Collected	<input type="checkbox"/> Yes Name: _____		
Field Blank Collected	<input type="checkbox"/> Yes Name: _____	Field Blank Collected	<input type="checkbox"/> Yes Name: _____		
Initial Depth to Water (m)	0.930 (B/A) 1.334	Purge Start Time:		Purge End Time:	
Depth to Bottom (m)	2.855 (B/A) 1.940	Purge Interval Time () min / Vol. () L	16:37	Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit
Submerged Tubing Depth (m)	2.6	Depth to water (m)		* SEE NOTES ON BACK DIRECT SAMPLE	
Well Stick-up Height (m)	0.646 (B/A) 1.154	Temperature (°C) 3%	1.9		
Estimated Water Volume (L)	1.9	pH (pH Units) ±0.1	7.23		
Calculations: $(DTB - DTW) \times (\pi r^2) \times 1000$ (for well diameter) = 1 well volume $(DTB - DTW) \times 8.1$ (for 4" well diameter) = 1 well volume $(DTB - DTW) \times 2$ (for 2" well diameter) = 1 well volume $(DTB - DTW) \times 1.1$ (for 1.5" diameter) = 1 well volume $(DTB - DTW) \times 0.5$ (for 1" diameter) = 1 well volume	Cond. (µs/cm) 3%	770			
	Specific Cond. (µs/cm) 3%	380			
	Redox (mV) 10%	50.9			
	DO (mg/L) 10%	2.39			
	DO (%) 10%	* 15.1			
	Appearance & Odour (Clear, Silty, HC odours, etc.)	turbid			
	Only for final readings	Sulphide (mg/L)	/		
		Turbidity (NTU) Au	/	900 Au.	
	Interval Purge Volume (L)	/			
	Cumulative Purge Volume (L):	/			
YSI ID	951-DC-053.	Sample Method:			
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Waterra <input checked="" type="checkbox"/> Peristaltic <input type="checkbox"/> Disp. Bailer <input type="checkbox"/> Other			
Time logged on YSI (24hr)	16:38				
Sample Time (24hr)	16:30	X			

* 14:30 on 30-Aug-16

Sample Site (Con't): GSI-DC-~~00~~B/A

Sample Date (Con't): Aug-29/2016 * 30-Aug-16 @ 14:30 ^{Sample} ~~DATE~~
time (see notes)

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____
↳ A is sealed in plastic bag.

Head Space Gas Measurements

	Units	Values	
Methane (CH4)	%LEL	0	0
Oxygen (O2)	%	20.9	20.9
Carbon Dioxide (CO2)	PPM	500	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	100	} Sample Date: 30-Aug-16 @ 14:30
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	15	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	100	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	100	
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	60	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	50	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	50	

General Notes and Observations:

- DO reading may not be accurate due to air bubbles.
 - well dry after parameters taken.
 30-Aug-16 → attempt recanister to collect more representative samples (instead of direct sample).
 → DTW 0.795m 14:30.
 → Sample time ~~14:30~~ on 30 Aug-16
 * Sample will be used from 30-Aug-16; direct sample from 29-Aug-16 will not be submitted to the lab. (Aug 30 more representative, purged dry & sampled)

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 9 ft
- 3/8" HDPE (microwaterra tubing) ft
- 5/8" HDPE (waterra tubing) ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters
- D-25 (for 2" wells, use with 5/8") foot valves
- D-16 (for 1" wells, use with 5/8") foot valves
- SS-10 (for 5/8" wells, use with 3/8") foot valves
- 1" bailer
- 2" bailer
- other (describe)

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site		GSI-DC-06 B/A		Project Number		1343-005.22.28		Date		31-Aug-16			
Piezometer Diameter		1" DP		Client		GY - AAM		Samplers		AN/MM			
UTM Location		Z: 088 E: 0389787 N: 6880567		Project Name		Mount Nansen 2016 GW Sampling Program		Weather/Temperature		sun/cloud			
Waypoint		GPS: AN Name: N/A		Purge Method				Recovery		<input type="checkbox"/> Good <input type="checkbox"/> Bad			
Photos		Cam: 1 Nos: 0480-0482		Waterra				Peristaltic					
Duplicate Collected		<input type="checkbox"/> Yes Name:		Disp. Bailer				Other					
Field Blank Collected		<input type="checkbox"/> Yes Name:											
Initial Depth to Water (m)		0.720 B/A 1.816		Purge Start Time:		10:43		Purge End Time:		11:05			
Depth to Bottom (m)		2.910 B/A 2.001		Purge Interval Time (5) min / Vol. () L		10:45 10:50 10:55 11:00 11:05		Pen or YSI:		<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit			
Submerged Tubing Depth (m)		~2.0 AM		Depth to water (m)		/ / / / /							
Well Stick-up Height (m)		0.49 B/A 0.835		Temperature (°C) 3%		3.7 3.1 2.8 2.8 2.8							
Estimated Water Volume (L)		1.1		pH (pH Units) ±0.1		7.71 7.45 7.48 7.49 7.49							
(DTB - DTW) x (πr ²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume Calculations: $\frac{2.910 - 0.720}{2.190} \times 0.5 = 1.1$		Cond. (µs/cm) 3%		607 585 576 574 570									
		Specific Cond. (µs/cm) 3%		1630 1006 999 996 992									
		Redox (mV) 10%		-113.7 -135.9 -143.2 -146.9 -144.5									
		DO (mg/L) 10%		3.93 0.62 0.41 0.41 0.65									
		DO (%) 10%		286 4.6 2.9 3.0 4.9									
		Appearance & Odour (Clear, Silty, HC odours, etc.)		slightly turbid same same same same									
		Only for final readings		Sulphide (mg/L)		/ / / / 0.06							
				Turbidity (NTU)		/ / / / 42.7							
				Interval Purge Volume (L)		/ 0.6 0.6 0.6 0.6							
				Cumulative Purge Volume (L):		/ 1.61 2.21 2.81 2.9							
YSI ID		GSI-DC-06B		Sample Method:									
Logged Field Parameters		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		biphasic - the pen from same									
Time logged on YSI (24hr)		11:06		Waterra				Peristaltic					
Sample Time (24hr)		10:35 11:10						Disp. Bailer					
								Other					

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

Sample Date (Con't): 31-Aug-16 @ 11:10

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	B Values	A
Methane (CH4)	%LEL	0	0
Oxygen (O2)	%	20.9	20.9
Carbon Dioxide (CO2)	PPM	300	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	<p>Field 31 Aug @ 11:10</p>
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)	46	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	

General Notes and Observations:

- Attempt to direct sample; able to fill gen chem bottle (500ml)
 Will attempt to purge normally.
 ↳ attempt successful; sample collected as per purge protocol

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 11.5 ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	GSI-DC-07B/A.		Project Number	1343-00527.28		Date	Aug. 31/2016.			
Piezometer Diameter	1" DP		Client	GY - AAM		Samplers	AN, MM			
UTM Location	Z: 08W E: 0390064 N: 6800041		Project Name	Mount Nansen 2016 GW Sampling Program		Weather/Temperature	Sunny ~ 13°C			
Waypoint	GPS: AN Name: N/A					Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad			
Photos	Cam: / Nos: 080483-6485		Purge Method							
Duplicate Collected	<input type="checkbox"/> Yes Name:		Waterra	Peristaltic		Disp. Bailer		Other		
Field Blank Collected	<input type="checkbox"/> Yes Name:				X					
Initial Depth to Water (m)	A	B	Purge Start Time:	11:57		Purge End Time:	12:23		Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus
	1.845	1.370								<input type="checkbox"/> Pen Unit
Depth to Bottom (m)	1.853	3.770	Purge Interval Time (5) min / Vol. () L	11:58	10:03	12:08	12:13	12:18	12:23	
Submerged Tubing Depth (m)	/	2.3	Depth to water (m)	/	/	/	/	/	/	
Well Stick-up Height (m)	1.055	1.046	Temperature (°C) 3%	5.9	4.1	3.3	3.1	3.0	2.8	
Estimated Water Volume (L)	/	1.2	pH (pH Units) ±0.1	7.50	7.06	6.99	6.98	6.98	6.96	
<p>Calculations:</p> $\frac{3.770 - 1.370}{2.4} * 0.5 = 1.2$ <p>#3 = 3.6</p>	(DTB - DTW) x (πr ²) 1000 (for well diameter) = 1 well volume		Cond. (µs/cm) 3%	649	612	603	593	592	590	
	(DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume		Specific Cond. (µs/cm) 3%	1029	1021	1024	1023	1023	1022	
	(DTB - DTW) x 2 (for 2" well diameter) = 1 well volume		Redox (mV) 10%	-44.3	-54.4	-58.5	-60.9	-63.0	-64.2	
	(DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume		DO (mg/L) 10%	1.81	0.47	0.66	0.77	0.87	0.97	
	(DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume		DO (%) 10%	14.2	3.6	4.9	5.8	6.4	7.2	
	Appearance & Odour (Clear, Silty, HC odours, etc.)		Appearance & Odour (Clear, Silty, HC odours, etc.)	slightly turbid	same	same	same	clearer	same	
	Only for final readings		Sulphide (mg/L)	/	/	/	/	/	/	0.05
			Turbidity (NTU)	/	/	/	/	/	/	8.74
	Interval Purge Volume (L)		Interval Purge Volume (L)	/	0.7	0.7	0.7	0.7	0.7	
	Cumulative Purge Volume (L):		Cumulative Purge Volume (L):	0.5	1.2	1.9	2.6	3.3	4.0	
YSI ID	GSI-DC-07B		Sample Method: 4.0ml gen chem (500ml)							
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Waterra	Peristaltic		Disp. Bailer		Other		
Time logged on YSI (24hr)	12:23				X					
Sample Time (24hr)	11:55 12:23									

12:23

Sample Site (Con't): GSI-DC-0731A

Sample Date (Con't): 31-Aug-16 @ 12:25

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: Cap not tightened

could effect data quality. | well sealed w nitrile glove.

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0 0
Oxygen (O2)	%	20.9 20.9
Carbon Dioxide (CO2)	PPM	400 300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	} Aug 31 @ 12:25
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)	40	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	60	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	60	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	

General Notes and Observations:

- Attempt direct sample → able to fill entire gen chem / bottle (500ml)
 ∴ will attempt a purge
 ↳ able to purge & collect full samples as per purge protocol.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 0.5 ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	GSI - DL - 008 / A	Project Number	1343-005.28	Date	Aug 31 2016	
Piezometer Diameter	1" Drive point	Client	GY - AAM	Samplers	JL NB	
UTM Location	Z: 08 E: 0390312 N: 6880588	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	12° Sunny	
Waypoint	GPS: ECR Name: N/A			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad	
Photos	Cam: ECR Nos: 0224 - 0226	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes Name: _____		✓			
Initial Depth to Water (m)	B: 0.796 A: 7.309	Purge Start Time:	14:50	Purge End Time:	15:00	
				Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus YSI Pro Plus <input checked="" type="checkbox"/> Pen Unit	
Depth to Bottom (m)	B: 2.902 A: 2.008	Purge Interval Time () min / Vol. () L	15:34			
Submerged Tubing Depth (m)	0.796	Depth to water (m)	-			
Well Stick-up Height (m)	B: 0.46 A: 6.05	Temperature (°C) 3%	8.8			
Estimated Water Volume (L)	~ 1.1 L	pH (pH Units) ±0.1	6.59			
<p>Calculations:</p> <p>(DTB - DTW) x (πr²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume</p>	Cond. (µs/cm) 3%	823				
	Specific Cond. (µs/cm) 3%	1202				
	Redox (mV) 10%	-27.8				
	DO (mg/L) 10%	4.00				
	DO (%) 10%	32.4				
	Appearance & Odour (Clear, Silty, HC odours, etc.)	trans. & black.				
	Only for final readings	Sulphide (mg/L)	0.806 limit			
		Turbidity (NTU)	1549			
		Interval Purge Volume (L)	0.2			
		Cumulative Purge Volume (L):	0.2			
YSI ID	023981	Sample Method:				
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	15:36		✓			
Sample Time (24hr)	15:10					

Direct Sample

Sample Site (Con't): CFI-DC-08 B/A

Sample Date (Con't): Aug 31 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	B: 0 A: 0
Oxygen (O2)	%	B: 20.7 A: 20.7
Carbon Dioxide (CO2)	PPM	B: 200 A: 300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	100	— microvolume
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	20	— microvolume
2	500 ml (plastic)	General Chemistry	100 ml	-	-	350	—
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)	145	—
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)	100	—
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)	100	—
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	80	—

General Notes and Observations:

- Well has very slow recharge.
 - 1st parameter reading taken from sample.
 - 25 Filters used to filter.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 1 ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	L75L-06-09 B 1A		Project Number	1343-005.28		Date	Aug 31 2016				
Piezometer Diameter	1"		Client	GY - AAM		Samplers	3L NB				
UTM Location	Z: 08 E: 6390614 N: 6880490		Project Name	Mount Nansen 2016 GW Sampling Program		Weather/Temperature	9° Sunny				
Waypoint	GPS: ECR Name: N/A					Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad				
Photos	Cam: ECR Nos: 0221 - 0223		Purge Method								
Duplicate Collected	<input type="checkbox"/> Yes Name: _____		Waterra	Peristaltic		Disp. Bailer		Other			
Field Blank Collected	<input type="checkbox"/> Yes Name: _____										
Initial Depth to Water (m)	B: 1.125 A: 1.136		Purge Start Time:	13:50		Purge End Time:	14:10		Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
Depth to Bottom (m)	B: 3.852 A: 2.000		Purge Interval Time (4) min / Vol. (0.5) L	13:50	14:01	14:04	14:07	14:10			
Submerged Tubing Depth (m)	3.852		Depth to water (m)	1.375	Same	Same	Same	Same			
Well Stick-up Height (m)	B: 0.910 A: 0.94		Temperature (°C) 3%	3.7	3.2	2.9	2.8	2.7			
Estimated Water Volume (L)	1.36L		pH (pH Units) ±0.1	7.10	7.10	7.11	7.12	7.13			
Calculations: (DTB - DTW) x (πr ²) * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume	Cond. (µs/cm) 3%		243.1	234.0	224.2	221.2	219.1				
	Specific Cond. (µs/cm) 3%		40.	400.9	388.3	384.1	381.5				
	Redox (mV) 10%		-55.0	-55.0	-60.3	-64.6	-65.5				
	DO (mg/L) 10%		Under Range	Same	Same	Same	Same				
	DO (%) 10%		Under Range	Same	Same	Same	Same				
	Appearance & Odour (Clear, Silty, HC odours, etc.)		Slightly turbid	clearly up	same	same	clear				
	Only for final readings		Sulphide (mg/L)	-	-	-	0.06				
			Turbidity (NTU)	-	-	-	8.44				
			Interval Purge Volume (L)	1.0	0.5	0.5	0.5	0.5			
			Cumulative Purge Volume (L):	1.0	1.5	2.0	2.5	3.0			
YSI ID	02281 Pine.		Sample Method:								
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Waterra	Peristaltic		Disp. Bailer		Other			
Time logged on YSI (24hr)	14:10										
Sample Time (24hr)	14:15										

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

Sample Date (Con't): Aug 31 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH ₄)	%LEL	B: 0 A: 0
Oxygen (O ₂)	%	B: 20.7 A: 20.7
Carbon Dioxide (CO ₂)	PPM	B: 300 A: 300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	—
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	—
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	—
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	—
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	—
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	—
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	—

General Notes and Observations:

- DO during parameter stabilization was under Range
ie >0.00 / >0% DO. Marked as under range.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 1 ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	GSI-DC-10B / A	Project Number	1343-005.28	Date	Aug 31 2016	
Piezometer Diameter	1" Drive Point	Client	GY - AAM	Samplers	SC NB	
UTM Location	Z: 08 E: 0390859 N: 6880448	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	100° Sunny	
Waypoint	GPS: ECR Name: N/A			Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad	
Photos	Cam: ECR Nos: 0218 - 0220	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes Name:		<input checked="" type="checkbox"/>			
Initial Depth to Water (m)	B: 1.121 A: 1.060	Purge Start Time:	12:45	Purge End Time:	13:10	
				Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
Depth to Bottom (m)	B: 3.794 A: 2.009	Purge Interval Time (4) min / Vol. (0.5) L	12:56	13:00	13:02	
Submerged Tubing Depth (m)	3.794	Depth to water (m)	2.095	Same	Same	
Well Stick-up Height (m)	B: 1.022 A: 1.29	Temperature (°C) 3%	2.1	2.0	1.9	
Estimated Water Volume (L)	1.3L	pH (pH Units) ±0.1	6.81	6.69	6.67	
Calculations: (DTB - DTW) x (πr ²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume	Cond. (µs/cm) 3%	700	699	698	696	
	Specific Cond. (µs/cm) 3%	1248	1248	1249	1251	
	Redox (mV) 10%	-30.8	-38.3	-41.3	-43.5	
	DO (mg/L) 10%	0.98	0.47	0.22	0.29	
	DO (%) 10%	6.7	2.2	2.3	2.0	
	Appearance & Odour (Clear, Silty, HC odours, etc.)	Clear	Clear	Clear	Clear	
	Only for final readings	Sulphide (mg/L)	-	-	-	0.02
		Turbidity (NTU)	-	-	-	6.56
		Interval Purge Volume (L)	0.0	0.5	0.5	0.5
		Cumulative Purge Volume (L):	1.0	1.5	2.0	2.5
YSI ID	023981	Sample Method:				
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	13:09		<input checked="" type="checkbox"/>			
Sample Time (24hr)	13:00					



Sample Site (Con't): GSI-DC-103 1A

Sample Date (Con't): Aug 31 2016.

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	B: 0 A: 0
Oxygen (O2)	%	B: 20.7 A: 20.7
Carbon Dioxide (CO2)	PPM	B: 300 A: 300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	—
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	—
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	—
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	✓
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	—
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	—
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	—

General Notes and Observations:

Well has good recharge, full sample set + parameters acquired

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 1 ft
- 3/8" HDPE (microwaterra tubing) — ft
- 5/8" HDPE (waterra tubing) — ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters —
- D-25 (for 2" wells, use with 5/8") foot valves —
- D-16 (for 1" wells, use with 5/8") foot valves —
- SS-10 (for 5/8" wells, use with 3/8") foot valves —
- 1" bailer —
- 2" bailer —
- other (describe) —

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	GSI-HA-01A	Project Number	1343-005.2 ^B	Date	29-Aug-16 / Aug.30	
Piezometer Diameter	1" DP	Client	GY - AAM	Samplers	AN/MR	
UTM Location	Z: 210 ⁰⁸¹ E: 0387835 N: 6881127	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Sunny	
Waypoint	GPS: AN Name: 095			Recovery	<input type="checkbox"/> Good <input type="checkbox"/> Bad	
Photos	Cam: 1 Nos: 0400-0402	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input checked="" type="checkbox"/> Yes Name: _____		X			
Initial Depth to Water (m)	2.065	Purge Start Time:	09:50 09:45	Purge End Time:		
Depth to Bottom (m)	3.130	Purge Interval Time () min / Vol. () L	09:52 09:54	Pen or YSI:	<input type="checkbox"/> YSI Pro-Plus <input type="checkbox"/> Pen Unit	
Submerged Tubing Depth (m)	NS	Depth to water (m)	/			
Well Stick-up Height (m)	1.231	Temperature (°C) 3%	5.0 4.2			
Estimated Water Volume (L)	0.53	pH (pH Units) ±0.1	7.48 7.10			
(DTB - DTW) x (πr ²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume Calculations: $\frac{3.130 - 1.231}{1.065} \times 0.5 = 0.53$	Cond. (µs/cm) 3%	672 662				
	Specific Cond. (µs/cm) 3%	1095 1098				
	Redox (mV) 10%	4.9 -17.3				
	DO (mg/L) 10%	4.61 4.3				
	DO (%) 10%	33.8 31.9				
	Appearance & Odour (Clear, Silty, HC odours, etc.)	Turbid same				
	Only for final readings	Sulphide (mg/L)	/	/		
		Turbidity (NTU)	/	/		
		Interval Purge Volume (L)	/	/		
		Cumulative Purge Volume (L):	/	/		
YSI ID	GSI-HA-01A	Sample Method:				
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	09:55		X			
Sample Time (24hr)	09:40					

Note: 5 measurements collected on Aug. 29.
 DIRECT SAMPLE
 re-sampled on Aug. 30

Sample Site (Con't): GSD-HA-01A

Sample Date (Con't): 29-Aug-16 @ 09:40

Well Head Seal: J-Plug PVC Cap Not Sealed Other slotted cap

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	400

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)		Comments
						Aug-29	Aug-30	
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	100	100	full set of min. vol. collected on each date.
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	15	15	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	100	100	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	100	100	
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	60	60	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	50	50	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	50	50	

General Notes and Observations:

- Direct sample attempted.
- able to get full min. vol.
- well went dry after parameter collection.

Re-visit well to replace/resample to improve sample quality.
 Sample Date: Aug. 30/2016 @
 DTW: 2.055m (well fully re-charged). not enough vol. for sulphide or turbid.
 Sample Time: 13:10
 full sample set (min. vol.s collected)

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 6.0 ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 1.0 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

Return



GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	GSI - HA - 03A	Project Number	1343-005.278	Date	Aug 29 2016 / Avg. 30	
Piezometer Diameter	1.5" 1.0"	Client	GY - AAM	Samplers	SL NB	
UTM Location	Z: 08V E: 0387876 N: 6881122	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	5° Sunny	
Waypoint	GPS: ELR Name: N/A			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad	
Photos	Cam: ELR Nos: 103-D128 103-D130	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name: -	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes Name: -					
Initial Depth to Water (m)	1.141	Purge Start Time:		Purge End Time:		
Depth to Bottom (m)	2.190	Purge Interval Time () min / Vol. () L		Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
Submerged Tubing Depth (m)	2.187	Depth to water (m)				
Well Stick-up Height (m)	1.00	Temperature (°C) 3%				
Estimated Water Volume (L)	~400 ul	pH (pH Units) ±0.1				
<p>(DTB - DTW) x (πr²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume</p> <p>Calculations:</p>	Cond. (µs/cm) 3%					
	Specific Cond. (µs/cm) 3%					
	Redox (mV) 10%					
	DO (mg/L) 10%					
	DO (%) 10%					
	Appearance & Odour (Clear, Silty, HC odours, etc.)					
	Only for final readings	Sulphide (mg/L)				
		Turbidity (NTU)				
	Interval Purge Volume (L)					
	Cumulative Purge Volume (L):					
YSI ID	N/A	Sample Method:				
Logged Field Parameters	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	N/A					
Sample Time (24hr)	09:20					

DIRECT SAMPLING

Sample Site (Con't): GSI - HA - 03A

Sample Date (Con't): Aug 29 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	100 ✓	16/08/29
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	15 ✓	16/08/29
2	500 ml (plastic)	General Chemistry	100 ml	-	-	100 ✓	16/08/29
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	120 ✓	16/08/29
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	60 ✓	16/08/30 14:00
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	50 ✓	16/08/30 14:00
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	50 ✓	16/08/30 14:00

General Notes and Observations:

Limited volume (Aug 29 (16))

Aug 30, 2016 → DTW 1.602 m → returned to address attempt to complete sampling @ 13:57 → Sample Time on Aug 31 14:00.

↳ able to collect min vols of NH₃, SCN + TIC.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 6 ft
- 3/8" HDPE (microwaterra tubing) — ft
- 5/8" HDPE (waterra tubing) — ft
- 1/4" Silicon tubing 6" ft (0.5')
- High Capacity .45 micron filters —
- D-25 (for 2" wells, use with 5/8") foot valves —
- D-16 (for 1" wells, use with 5/8") foot valves —
- SS-10 (for 5/8" wells, use with 3/8") foot valves —
- 1" bailer —
- 2" bailer —
- other (describe) —

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	GSI - HA - 04A	Project Number	1343-005.2728	Date	Aug 29 2016	
Piezometer Diameter	1"	Client	GY - AAM	Samplers	SC NB	
UTM Location	Z: 08 E: 0387914 N: 6881132	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	4° Sunny.	
Waypoint	GPS: FLR Name: N/A			Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad	
Photos	Cam: FLR2 Nos: 10134-0136	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes Name:		<input checked="" type="checkbox"/>			
Initial Depth to Water (m)	1.015	Purge Start Time:	10:32	Purge End Time:	10:47	
				Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
Depth to Bottom (m)	2.194	Purge Interval Time (min) / Vol. (L)	10:36	10:40	10:43	10:46
Submerged Tubing Depth (m)	2.194	Depth to water (m)	1.201	1.80	2.00	1.994
Well Stick-up Height (m)	0.677	Temperature (°C) 3%	4.2	4.1	4.0	4.0
Estimated Water Volume (L)	1.6	pH (pH Units) ±0.1	6.74	6.74	6.69	6.66
Calculations: (DTB - DTW) x (πr ²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume	Cond. (µs/cm) 3%	517	511	525	525	
	Specific Cond. (µs/cm) 3%	857	853	878	877	
	Redox (mV) 10%	404	-36.4	-274	-26.6	
	DO (mg/L) 10%	0.33	0.77	1.08	0.98	
	DO (%) 10%	23	5.8	7.1	7.7	
	Appearance & Odour (Clear, Silty, HC odours, etc.)	turbid Brown	clearing up	clear	clear	
	Only for final readings	Sulphide (mg/L)	0.06	→		
		Turbidity (NTU)	2.80	→		
		Interval Purge Volume (L)	0.5	0.5	0.5	0.5
		Cumulative Purge Volume (L):	0.5	1.0	1.5	2.0
YSI ID		Sample Method:				
Logged Field Parameters	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	used field stick parameters		<input checked="" type="checkbox"/>			
Sample Time (24hr)	10:30					

Sample Site (Con't): GSI-11A-04A

Sample Date (Con't): Aug 29 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: Slit in cap.

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	165	
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	

General Notes and Observations:

- Full parameters and Full sample set collected.
- Recharge OK.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	GSI-HA-05A	Project Number	1343-005.288	Date	29 Aug 2016 ^{30-Aug-16}	
Piezometer Diameter	1.0"	Client	GY - AAM	Samplers	JC & NB	
UTM Location	Z:08V E: 0538195 N: 6879488	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	W4E Sunny	
Waypoint	GPS: 08V Name: VA			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad	
Photos	Cam: ELR 2 Nos: 103-0131/103-0133	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name: -	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes Name: -					
Initial Depth to Water (m)	1.340	Purge Start Time:	10:11	Purge End Time:		
Depth to Bottom (m)	2.189	Purge Interval Time () min / Vol. () L		Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
Submerged Tubing Depth (m)	2.189	Depth to water (m)	0			
Well Stick-up Height (m)	1.140	Temperature (°C) 3%	6.8			
Estimated Water Volume (L)	1.1	pH (pH Units) ±0.1	6.62			
Calculations: $(DTB - DTW) \times (\pi r^2) \times 1000$ (for well diameter) = 1 well volume $(DTB - DTW) \times 8.1$ (for 4" well diameter) = 1 well volume $(DTB - DTW) \times 2$ (for 2" well diameter) = 1 well volume $(DTB - DTW) \times 1.1$ (for 1.5" diameter) = 1 well volume $(DTB - DTW) \times 0.5$ (for 1" diameter) = 1 well volume	Cond. (µs/cm) 3%	182	Measurements collected on Aug 29 Direct Sampled on Aug 29 Re-sampled on Aug 30.			
	Specific Cond. (µs/cm) 3%	1002				
	Redox (mV) 10%	-91.9				
	DO (mg/L) 10%	7.07				
	DO (%) 10%	57.9				
	Appearance & Odour (Clear, Silty, HC odours, etc.)	Slightly turbid.				
	Only for final readings	Sulphide (mg/L)		0.15		
		Turbidity (NTU)		42.1		
		Interval Purge Volume (L)		250ml		
		Cumulative Purge Volume (L):		250ml		
YSI ID	Pine 02 3981	Sample Method:				
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	10:13					
Sample Time (24hr)	09:50					

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

Sample Date (Con't): 29 Aug 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: Slit in cap

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0.0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	110 100	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40 15	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500 100	full sample
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145 100	set (min. vol.)
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120 60	collected on both dates
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120 50	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120 50	

General Notes and Observations:

- Full sample set collected.
- very slow recharge
- direct sampled well from historical information, was able to get a parameter reading with YSI.

30-Aug-16 → ~~attempt~~ returned to attempt to re-sample entire set to collect better quality sample → DTW → 1.0m

Sample time 14:00

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 0.6 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8" foot valves) _____
- D-16 (for 1" wells, use with 5/8" foot valves) _____
- SS-10 (for 5/8" wells, use with 3/8" foot valves) _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	GSI-PL-03B 1A	Project Number	1343-005.28	Date	Aug 31 2016	
Piezometer Diameter	7/4 Drive point	Client	GY - AAM	Samplers	JL NB	
UTM Location	Z: 08 E: 0389259 N: 6881710	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	8° Sunny	
Waypoint	GPS: CLR Name: N/A			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad	
Photos	Cam: CLR Nos: 30209-0211	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name: A0212-0214	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes Name:					
Initial Depth to Water (m)	B: 1.972 A: 1.016	Purge Start Time:		Purge End Time:		
Depth to Bottom (m)	B: 2.834 A: 2.002	Purge Interval Time () min / Vol. () L				
Submerged Tubing Depth (m)	2.834	Depth to water (m)				
Well Stick-up Height (m)	B: 0.955 A: 0.970	Temperature (°C) 3%				
Estimated Water Volume (L)	~ 300ml	pH (pH Units) ±0.1				
<p>(DTB - DTW) x (πr²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume</p> <p>Calculations:</p>	Cond. (µs/cm) 3%					
	Specific Cond. (µs/cm) 3%					
	Redox (mV) 10%					
	DO (mg/L) 10%					
	DO (%) 10%					
	Appearance & Odour (Clear, Silty, HC odours, etc.)					
	Only for final readings	Sulphide (mg/L)				
		Turbidity (NTU)				
	Interval Purge Volume (L)					
	Cumulative Purge Volume (L):					
YSI ID		Sample Method:				
Logged Field Parameters	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)						
Sample Time (24hr)	10:00					

Sample Site (Con't): GSI-PC-03B1A

 Sample Date (Con't): Aug 31 2016.

 Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

 Seal Replaced: J-Plug PVC Cap Not required Other _____

 Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values	
Methane (CH4)	%LEL	B: 0	A: 0
Oxygen (O2)	%	B: 20.9	A: 20.9
Carbon Dioxide (CO2)	PPM	B: 300	A: 300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	100	Aug 31
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	15	Aug 31
2	500 ml (plastic)	General Chemistry	100 ml	-	-	100	Aug 31
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

- Well has very low recharge rate. ~ 200 ml of water
 - Returned Sept 1 @ 9:00 well was dry.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 1 ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	1150 68-PC-04B/A	Project Number	1343-005.28	Date	31-Aug-16
Piezometer Diameter	1" OP	Client	GY - AAM	Samplers	AN/MM
UTM Location	Z: 088 E: 0389584 N: 6881656	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Clear/21°C
Waypoint	GPS: AN Name: N/A			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad
Photos	Cam: 1 Nos: 074-076	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name:				
Initial Depth to Water (m)	1.850 ^B 1.342 ^A	Purge Start Time:		Purge End Time:	
Depth to Bottom (m)	2.900 ^B ^A or dry frozen	Purge Interval Time () min / Vol. () L			
Submerged Tubing Depth (m)		Depth to water (m)			
Well Stick-up Height (m)	1.05 ^B 0.98 ^A	Temperature (°C) 3%			
Estimated Water Volume (L)	0.53	pH (pH Units) ±0.1			
<p>(DTB - DTW) x (πr²*1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume</p> <p>Calculations: $\frac{2.900 - 1.850}{1.050} \times 0.5$</p>	Cond. (µs/cm) 3%				
	Specific Cond. (µs/cm) 3%				
	Redox (mV) 10%				
	DO (mg/L) 10%				
	DO (%) 10%				
	Appearance & Odour (Clear, Silty, HC odours, etc.)				
	Only for final readings	Sulphide (mg/L)			
		Turbidity (NTU)			
	Interval Purge Volume (L)				
	Cumulative Purge Volume (L):				
YSI ID		Sample Method:			
Logged Field Parameters	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)					
Sample Time (24hr)	09:00		X		

Sample Site (Con't): GSI-PC-CHB/A

Sample Date (Con't): 31-Aug-16

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	B Values	A
Methane (CH4)	%LEL	0	0
Oxygen (O2)	%	20.9	20.9
Carbon Dioxide (CO2)	PPM	300	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	100 ✓	Aug 31 @ 09:00
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	15 ✓	Aug 31 @ 09:00
2	500 ml (plastic)	General Chemistry	100 ml	-	-	100 ✓	Aug 31 @ 09:00
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	20 ml insufficient	Sept 1 @ 8:40
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

A- either frozen on dry @ 1.342m - most likely frozen due to ice found on tubing from stick-up B

B- ice found in stick-up B; attempt to clear out w/ existing per tubing; attempt successful; feels as though top layer is slush - ice in tubing ∴ tubing replaced.

- attempt direct sample ~~is~~ able to collect min vol of diss metals + Hg + gen chem.

NOTE: samples water could potentially be ice melt due to presence of slush, ~~no~~ ^{previously} only DTB records says 43m so assume @ bottom (measured 2.9m)

* Revisited Sept 1 collected 20ml for Cyanide

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 11.5 ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site		GSI-PC-0501A		Project Number	1343-005.28	Date	31-Aug-16.	
Piezometer Diameter		1" DP		Client	GY - AAM	Samplers	AN/MP	
UTM Location		Z: 8 E: 6389712 N: 6881661		Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature		
Waypoint		GPS: AN Name: N/A				cloudy		
Photos		Cam: 1 Nos: 477-479.		Purge Method				
Duplicate Collected		<input type="checkbox"/> Yes Name:		Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected		<input checked="" type="checkbox"/> Yes Name:		Not Sampled.				
Initial Depth to Water (m)		A	B	Purge Start Time:	Purge End Time:	Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
		DRY	DRY					
Depth to Bottom (m)		2.0	3.715	Purge Interval Time () min / Vol. () L				
Submerged Tubing Depth (m)		N/A	N/A	Depth to water (m)				
Well Stick-up Height (m)		0.892	0.890	Temperature (°C) 3%				
Estimated Water Volume (L)		0	0	pH (pH Units) ±0.1				
<p>(DTB - DTW) x (πr²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume</p> <p>Calculations:</p>		<div style="border: 1px solid black; border-radius: 50%; width: 100px; height: 100px; display: flex; align-items: center; justify-content: center; margin: auto;"> DRY </div>				Cond. (µs/cm) 3%		
						Specific Cond. (µs/cm) 3%		
						Redox (mV) 10%		
						DO (mg/L) 10%		
						DO (%) 10%		
						Appearance & Odour (Clear, Silty, HC odours, etc.)		
						Only for final readings	Sulphide (mg/L)	
							Turbidity (NTU)	
						Interval Purge Volume (L)		
						Cumulative Purge Volume (L):		
YSI ID		Sample Method:						
Logged Field Parameters		<input type="checkbox"/> Yes <input type="checkbox"/> No						
Time logged on YSI (24hr)		Waterra	Peristaltic	Disp. Bailer	Other			
Sample Time (24hr)		Not		Sampled.				



* unit automatically switched to % vol. units, likely due to high concentrations of CO2

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

Sample Date (Con't): Not Sampled (visited on Aug. 31/2016)

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	A	Values	B
Methane (CH4)	%LEL	0		0
Oxygen (O2)	%	20.6		9.0
Carbon Dioxide (CO2)	PPM	1000		6500

or *1.93% vol.

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

Sediment found on the tip of WL meter while measuring DTB of A well. Confirmation that well was DRY not FROZEN.

Sediment also observed on WL tip while dipping B well.

Both wells found DRY during time of sampling.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MP09-03	Project Number	1343-005.27	Date	Aug 31 2016
Piezometer Diameter	1/2" Drive point	Client	GY - AAM	Samplers	JZ / NB
UTM Location	Z08V E: 0388964 N: 6881754	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	70 Sunny
Waypoint	GPS: Name:			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad
Photos	Cam: FLK2-Nos: 0202-0205	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name: _____				
Initial Depth to Water (m)	1.058	Purge Start Time:		Purge End Time:	
				Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit
Depth to Bottom (m)	1.980	Purge Interval Time () min / Vol. () L			
Submerged Tubing Depth (m)	1.980	Depth to water (m)			
Well Stick-up Height (m)		Temperature (°C) 3%			
Estimated Water Volume (L)	~100ml	pH (pH Units) ±0.1			
<p>Calculations:</p> <p>(DTB - DTW) x (πr²) * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume</p>	Cond. (µs/cm) 3%				
	Specific Cond. (µs/cm) 3%				
	Redox (mV) 10%				
	DO (mg/L) 10%				
	DO (%) 10%				
	Appearance & Odour (Clear, Silty, HC odours, etc.)				
	Only for final readings	Sulphide (mg/L)			
		Turbidity (NTU)			
	Interval Purge Volume (L)				
	Cumulative Purge Volume (L):				
YSI ID		Sample Method:			
Logged Field Parameters	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)					
Sample Time (24hr)	8:45				

Direct Sample

Sample Site (Con't): MPO9-03

Sample Date (Con't): Aug 31 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other well is cast iron with

Well properly sealed for gas monitoring: Yes No Details: no proper cap

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	200

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	100	Aug 31 8:45
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	15	Aug 31 8:45
2	500 ml (plastic)	General Chemistry	100 ml	-	-	100	Aug 31 8:45
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	100	Sept 1 8:08
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

- well opening was covered in mud with tubing sticking out
- no cover on cap
- Able to collect Diss metals (mercury) (mlb Filters)
- water very turbid.
- water will recharge but very slow and very low water column.
- Plaster miners working up gradient of sampling point
- Returned Sept 1st collected cyanide bottle @ 8:08

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 8 ft
- 3/8" HDPE (microwaterra tubing) — ft
- 5/8" HDPE (waterra tubing) — ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters —
- D-25 (for 2" wells, use with 5/8") foot valves —
- D-16 (for 1" wells, use with 5/8") foot valves —
- SS-10 (for 5/8" wells, use with 3/8") foot valves —
- 1" bailer —
- 2" bailer —
- other (describe) —

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MPO9-04	Project Number	1343-005-27228	Date	30-Aug-16	
Piezometer Diameter	1.5"	Client	GY - AAM	Samplers	AN/MU	
UTM Location	Z080 E: 0380576 N: 6080610	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Sunny & Dreeze.	
Waypoint	GPS: AN Name: N/A			Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad	
Photos	Cam: 1 Nos: 460-463	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes Name:		X			
Initial Depth to Water (m)	2.070	Purge Start Time:	09:40	Purge End Time:	10:01	
				Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
Depth to Bottom (m)	3.080	Purge Interval Time (S) min / Vol. (L)	09:41	09:46	09:51	
Submerged Tubing Depth (m)	~2.8	Depth to water (m)	2.150	2.106	2.153	
Well Stick-up Height (m)	1.195	Temperature (°C) 3%	2.9	2.9	2.8	
Estimated Water Volume (L)	1.1	pH (pH Units) ±0.1	6.97	6.98	6.99	
(DTB - DTW) x (πr ²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume Calculations: $\frac{3.080 - 2.070}{1.010} \times 1.1 = 1.111$	Cond. (µs/cm) 3%	666	645	655	657	
	Specific Cond. (µs/cm) 3%	1133	1112	1133	1139	
	Redox (mV) 10%	51.3	65.1	74.0	80.7	
	DO (mg/L) 10%	4.7	2.19	1.99	1.99	
	DO (%) 10%	32.0	65.1	14.8	14.7	
	Appearance & Odour (Clear, Silty, HC odours, etc.)	slightly turbid	same	clear	same	
	Only for final readings	Sulphide (mg/L)	/	/	/	0.01
	Turbidity (NTU)	/	/	/	/	2.43
	Interval Purge Volume (L)	/	1.0	1.25	1.0	1.3
	Cumulative Purge Volume (L):	/	1.0	2.25	3.25	4.55
YSI ID	MPO9-04	Sample Method:				
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	10:01		X			
Sample Time (24hr)	10:05		X			



Sample Site (Con't): MD09-04

Sample Date (Con't): 30 Aug-16

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	500

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	

General Notes and Observations:

- water ^{level} in seepage pond low
 - good recovery; purged 3 well volumes.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 3.5 ft
- 3/8" HDPE (microwaterra tubing) ft
- 5/8" HDPE (waterra tubing) ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters
- D-25 (for 2" wells, use with 5/8") foot valves
- D-16 (for 1" wells, use with 5/8") foot valves
- SS-10 (for 5/8" wells, use with 3/8") foot valves
- 1" bailer
- 2" bailer
- other (describe)

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MP09-05	Project Number	1343-005.28	Date	30 Aug-16					
Piezometer Diameter	1.5"	Client	GY - AAM	Samplers	AN, min.					
UTM Location	Z:08 E:0389547 N:6880590	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Sunny ~12°C					
Waypoint	GPS: AN Name: N/A			Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad					
Photos	Cam: ELR 1 Nos: 467-469	Purge Method								
Duplicate Collected	<input type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other					
Field Blank Collected	<input type="checkbox"/> Yes Name:									
Initial Depth to Water (m)	1.386	Purge Start Time:	10:34	Purge End Time:	10:56					
				Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit					
Depth to Bottom (m)	1.838	Purge Interval Time (S) min / Vol. () L	10:37	10:39	10:44	10:49	10:54			
Submerged Tubing Depth (m)	~1.6	Depth to water (m)	1.455	1.450	1.450	1.460	1.460			
Well Stick-up Height (m)	1.16	Temperature (°C) 3%	6.9	6.6	6.7	6.7	6.4			
Estimated Water Volume (L)	~0.5	pH (pH Units) ±0.1	6.79	6.71	6.69	6.70	6.68			
Calculations: (DTB - DTW) x (πr ²) * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume	Cond. (µs/cm) 3%	1171	1192	1218	1233	1218				
	Specific Cond. (µs/cm) 3%	1796	1835	1875	1895	1896				
	Redox (mV) 10%	31.8	28.6	26.2	28.2	24.0				
	DO (mg/L) 10%	1.66	0.64	0.91	1.22	1.53				
	DO (%) 10%	12.7	5.1	7.6	10.1	12.4				
	Appearance & Odour (Clear, Silty, HC odours, etc.)	Rusty, Suspend Solids	Same	Reduced TSS	Same	same				
	Only for final readings	Sulphide (mg/L)	—	—	—	—	0.03			
		Turbidity (NTU)	—	—	—	—	5.44			
		Interval Purge Volume (L)	—	0.5	0.55	0.65	0.65			
		Cumulative Purge Volume (L):	—	0.5	1.05	1.7				
YSI ID	MP09-05	Sample Method:								
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other					
Time logged on YSI (24hr)	10:55									
Sample Time (24hr)	10:55		X							



Sample Site (Con't): MP09-05

Sample Date (Con't): 30 Aug-16 @ 10:55

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	<u>0</u>
Oxygen (O2)	%	<u>20.9</u>
Carbon Dioxide (CO2)	PPM	<u>1400</u>

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	<u>120</u>	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	<u>40</u>	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	<u>500</u>	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	<u>145</u>	
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	<u>120</u>	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	<u>120</u>	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	<u>120</u>	

General Notes and Observations:

- slow purging, able to sample fully

did use →

Consumables Used:

- ~~1/4" HDPE (peristaltic pump tubing)~~ 0.5 ft 0.5 HDPE
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MP09-08	Project Number	1343-005.28	Date	Aug 31 2016.	
Piezometer Diameter	5/8 (water inside)	Client	GY - AAM	Samplers	SC NBS	
UTM Location	Z: 08 E: 0389160 N: 6881726	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	70 Sunny	
Waypoint	GPS: ELR Name: N/A			Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad	
Photos	Cam: ELR. Nos: 0215-0217	Purge Method				
Duplicate Collected	<input checked="" type="checkbox"/> Yes Name: DUP-4	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input checked="" type="checkbox"/> Yes Name: FB- 4 3		<input checked="" type="checkbox"/>			
Initial Depth to Water (m)	0.450 <small>with log 252016</small>	Purge Start Time:	10:30	Purge End Time:	10:59	
				Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
Depth to Bottom (m)	1.974	Purge Interval Time (4) min / Vol. (0.5) L	10:40	10:44	10:47	
			10:51	10:54	10:57	
Submerged Tubing Depth (m)	1.974	Depth to water (m)	-	-	-	
Well Stick-up Height (m)	0.570	Temperature (°C) 3%	1.4	1.1	1.2	
			1.1	1.2	1.1	
Estimated Water Volume (L)	~ 750 ml	pH (pH Units) ±0.1	7.53	7.29	7.21	
			7.16	7.15	7.14	
Calculations: (DTB - DTW) x (πr ²) * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume	Cond. (µs/cm) 3%	462.4	450.4	458.6	457.8	
			459.7	458.1		
	Specific Cond. (µs/cm) 3%	842.9	843.6	842.0	841.5	841.0
			841.7			
	Redox (mV) 10%	65.4	16.9	6.0	-3.5	-10.8
			-16.0			
	DO (mg/L) 10%	1.00	0.43	0.30	0.22	0.21
			0.23			
	DO (%) 10%	7.0	2.9	2.1	1.8	1.5
			1.5			
Appearance & Odour (Clear, Silty, HC odours, etc.)	Silty Blank	clear up	clear	clear	clear	
		clear				
Only for final readings	Sulphide (mg/L)	-	-	-	-	
		0.05				
	Turbidity (NTU)	-	-	-	-	
		2.63				
Interval Purge Volume (L)	1.0	0.5	0.5	0.5	0.5	
		0.5				
Cumulative Purge Volume (L):	1.0	1.5	2.0	2.5	3.0	
		3.5				
YSI ID	023981	Sample Method:				
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	10:58		<input checked="" type="checkbox"/>			
Sample Time (24hr)	11:00					

Sample Site (Con't): MPO9-08

Sample Date (Con't): Aug 31 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: Well is cast iron and no cap will fit.

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.3
Carbon Dioxide (CO2)	PPM	500

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	—
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	—
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	—
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)	145	—
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	—
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)	120	—
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	—

General Notes and Observations:

- well has very good recharge.
 - Dup-4 taken @ location + FB-3

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 1 ft
- 3/8" HDPE (microwaterra tubing) — ft
- 5/8" HDPE (waterra tubing) — ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters 1
- D-25 (for 2" wells, use with 5/8") foot valves —
- D-16 (for 1" wells, use with 5/8") foot valves —
- SS-10 (for 5/8" wells, use with 3/8") foot valves —
- 1" bailer —
- 2" bailer —
- other (describe) —

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MP09-09	Project Number	1343-005.28	Date	Aug 30 2016				
Piezometer Diameter	1 1/2"	Client	GY - AAM	Samplers	SC NB				
UTM Location	Z: 08 E: 0389239 N: 6880681	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	80 Overcast				
Waypoint	GPS: EUR Name: NA			Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad				
Photos	Cam: ECR Nos: 0199-0201	Purge Method							
Duplicate Collected	<input checked="" type="checkbox"/> Yes Name: DUP-3	Waterra	Peristaltic	Disp. Bailer	Other				
Field Blank Collected	<input type="checkbox"/> Yes Name: _____		<input checked="" type="checkbox"/>						
Initial Depth to Water (m)	3.782	Purge Start Time:	16:28	Purge End Time:	17:07				
				Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit				
Depth to Bottom (m)	5.653	Purge Interval Time () min / Vol. (0.5) L	16:33	16:38	16:44	16:50	16:56	17:01	17:06
Submerged Tubing Depth (m)	5.500	Depth to water (m)	4.444	4.77	4.622	4.677	4.709	4.734	4.737
Well Stick-up Height (m)	2.59	Temperature (°C) 3%	6.2	6.7	6.3	6.2	6.2	6.0	6.2
Estimated Water Volume (L)	3.7 L	pH (pH Units) ±0.1	9.49	9.49	8.52	9.48	9.52	9.53	9.52
Calculations: (DTB - DTW) x (πr ²) * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume	Cond. (µs/cm) 3%	344.0	349.0	346.1	348.8	343.4	341.6	344.1	
	Specific Cond. (µs/cm) 3%	536.9	536.4	537	537.3	537.2	536.2	537.3	
	Redox (mV) 10%	2.4	-6.3	-4.0	-17.7	-12.2	-23.4	-25.0	
	DO (mg/L) 10%	0.21	0.22	0.16	0.17	0.18	0.17	0.10	
	DO (%) 10%	1.7	1.9	1.2	1.4	1.3	1.2	0.9	
	Appearance & Odour (Clear, Silty, HC odours, etc.)	milky turbid orange	same	clearly up	clearly up	same	same	same	
	<u>Only for final readings</u>	Sulphide (mg/L)	-	✓	-	-	-	✓	0.31
		Turbidity (NTU)	-	✓	✓	-	-	-	98.2
		Interval Purge Volume (L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
		Cumulative Purge Volume (L):	0.5	1.0	1.5	2.0	2.5	3.0	3.5
YSI ID	Rhe 023981	Sample Method:							
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other				
Time logged on YSI (24hr)	17:06		<input checked="" type="checkbox"/>						
Sample Time (24hr)	17:00								

Sample Site (Con't): MP09-09

Sample Date (Con't): Aug 30 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.7
Carbon Dioxide (CO2)	PPM	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	-
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	-
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	-
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	-
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	-
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	-
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	-

General Notes and Observations:

Good productivity well
collected Dup -3

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 26 ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters 1
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MP09-10	Project Number	1343-005.28	Date	30 Aug 2016
Piezometer Diameter	1 1/2"	Client	GY - AAM	Samplers	JC & NB
UTM Location	Z: 08 E: 0389237 N: 6880683	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Overcast / windy etc
Waypoint	GPS: ECR Name: N/A.			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad
Photos	Cam: Nos: 0196 / 0198	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name: _____	_____	_____	_____	_____
Initial Depth to Water (m)	3.446	Purge Start Time:	_____	Purge End Time:	_____
Depth to Bottom (m)	3.952 Frozen	Pen or YSI:	<input type="checkbox"/> YSI Pro Plus	<input type="checkbox"/> Pen Unit	
Submerged Tubing Depth (m)	_____	Purge Interval Time () min / Vol. () L			
Well Stick-up Height (m)	2310	Depth to water (m)			
Estimated Water Volume (L)	_____	Temperature (°C) 3%			
<p>Calculations:</p> <p>(DTB - DTW) x (πr²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume</p>	pH (pH Units) ±0.1				
	Cond. (µs/cm) 3%				
	Specific Cond. (µs/cm) 3%				
	Redox (mV) 10%				
	DO (mg/L) 10%				
	DO (%) 10%				
	Appearance & Odour (Clear, Silty, HC odours, etc.)				
	Only for final readings	Sulphide (mg/L)			
		Turbidity (NTU)			
		Interval Purge Volume (L)			
	Cumulative Purge Volume (L):				
YSI ID		Sample Method:			
Logged Field Parameters	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)	_____	_____	_____	_____	_____
Sample Time (24hr)	_____	_____	_____	_____	_____

Sample Site (Con't): 30 Aug 2016

Sample Date (Con't): MP09-10

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.7
Carbon Dioxide (CO2)	PPM	200

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)	_____	_____
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)	_____	_____
2	500 ml (plastic)	General Chemistry	100 ml	-	-	_____	_____
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)	_____	_____
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)	_____	_____
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)	_____	_____
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	_____	_____

General Notes and Observations:

- Depth to water was 3.446 and the bottom of the well was 3.952, from historical data, Actual DTB for MP09-10 was ~5.3m deep.
 - ~0.5m of water on top of Frozen Ice, did not sample standing water

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MP09-11	Project Number	1343-005-27: 28	Date	30-Aug-16	
Piezometer Diameter	1.5	Client	GY - AAM	Samplers	AN/MM	
UTM Location	Z: 09 E: 6389213 N: 6880618	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	windy + overcast	
Waypoint	GPS: AN Name: N/A			Recovery	<input type="checkbox"/> Good <input type="checkbox"/> Bad Okay	
Photos	Cam: 1 Nos: 0470 - 0473	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes Name:		X			
Initial Depth to Water (m)	2.115	Purge Start Time:	18:07	Purge End Time:	18:34	
Depth to Bottom (m)	4.959	Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit			
Submerged Tubing Depth (m)	~3.9	Purge Interval Time (5) min / Vol. () L	18:09	18:14	18:19	
Well Stick-up Height (m)	2.1	Depth to water (m)	/	2.585	2.690	
Estimated Water Volume (L)	433.1	Temperature (°C) 3%	8.6	8.0	7.4	
(DTB - DTW) x (πr ² *1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume Calculations: $\frac{4.959 \times 1.1}{2.115} \times 1.5 = 2.844$ $\frac{2.690 \times 1.1}{2.115} = 0.575$	pH (pH Units) ±0.1	7.93	7.76	7.80	7.83	
	Cond. (µs/cm) 3%	438.7	446.7	458.4	462.8	470.5
	Specific Cond. (µs/cm) 3%	649.1	661.3	691.0	699.5	708.0
	Redox (mV) 10%	-60.6	-85.8	-110.5	-122.4	-128.5
	DO (mg/L) 10%	*30.3	0.51	0.25	0.32	0.59
	DO (%) 10%	*3.54	4.3	2.1	2.7	5.0
	Appearance & Odour (Clear, Silty, HC odours, etc.)	Very turbid, rusty color	same	same	same	same
	Only for final readings	Sulphide (mg/L)	/	/	/	/
	Turbidity (NTU)	/	/	/	/	83.1
	Interval Purge Volume (L)	/	0.4	0.6	0.4	0.5
Cumulative Purge Volume (L):	/	0.4	1.0	1.4	1.9	
YSI ID	MP09-11	Sample Method:				
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	18:35		X			
Sample Time (24hr)	18:35		X			

Sample Site (Con't): MP09-11

Sample Date (Con't): 30-14 Aug-16 @ 18:35

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	14
Oxygen (O2)	%	19.9
Carbon Dioxide (CO2)	PPM	3000

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	

General Notes and Observations:

@ 18:09 purging stopped due to hole in tubing; DO readings at this time not accurate.
 - purge was very slow; still ~~waiting~~ recharging; able to purge & collect sample.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 0.5 ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8" foot valves) _____
- D-16 (for 1" wells, use with 5/8" foot valves) _____
- SS-10 (for 5/8" wells, use with 3/8" foot valves) _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MP09-12	Project Number	1343-005 27 28.	Date	30-Aug-16 / Aug 31	
Piezometer Diameter	1.5	Client	GY - AAM	Samplers	AN/MM	
UTM Location	Z082 E: 03889013 N: 6880618	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	windy	
Waypoint	GPS: AN Name: N/A	Purge Method	<input type="checkbox"/> Waterra <input checked="" type="checkbox"/> Peristaltic <input type="checkbox"/> Disp. Bailer <input type="checkbox"/> Other			
Photos	Cam: 1 Nos: 0470-0473	Duplicate Collected	<input type="checkbox"/> Yes Name: / <input checked="" type="checkbox"/> Yes Name: FB-4 @ 9:35			
Field Blank Collected		Purge Start Time:	18:00	Purge End Time:		
Initial Depth to Water (m)	2.170 <i>Batch Aug 25 2016</i>	Purge Interval Time (5) min / Vol. () L	18:01	Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
Depth to Bottom (m)	4.240	Depth to water (m)	✓			
Submerged Tubing Depth (m)	~ 3.5	Temperature (°C) 3%	8.4			
Well Stick-up Height (m)	2.01	pH (pH Units) ±0.1	8.04			
Estimated Water Volume (L)	3.1	Cond. (µs/cm) 3%	4598			
Calculations: $\frac{4.240 - 2.170}{2.170} \times 1.5 = 3.105$	(DTB - DTW) x (πr ²)1000 (for well diameter) = 1 well volume	Specific Cond. (µs/cm) 3%	6902			
	(DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume	Redox (mV) 10%	756			
	(DTB - DTW) x 2 (for 2" well diameter) = 1 well volume	DO (mg/L) 10%	11.3			
	(DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume	DO (%) 10%	11.3			
	(DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume	Appearance & Odour (Clear, Silty, HC odours, etc.)	Very turbid			
		Only for final readings	Sulphide (mg/L)	0.80		
			Turbidity (NTU) AV	3050 (AV)		
		Interval Purge Volume (L)		0.2		
		Cumulative Purge Volume (L):		0.2		
	YSI ID		Sample Method:	<input type="checkbox"/> Waterra <input type="checkbox"/> Peristaltic <input type="checkbox"/> Disp. Bailer <input type="checkbox"/> Other		
Logged Field Parameters	<input type="checkbox"/> Yes <input type="checkbox"/> No					
Time logged on YSI (24hr)						
Sample Time (24hr)	13:20					

* YSI not logged.

Measurements taken on Aug. 30, during initial visit.

Sulphide meter flashing "Limit". Sample too turbid for accurate reading.

Measurements taken on Aug. 31 during sample collection.

Sample Site (Con't): MP09-12.

Sample Date (Con't): 31 - Aug - 16 @ 13:20

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	400

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	<p>Sample collected * direct sample on Aug. 31 full set. (Discarded) * Samples recollected Sept 1 @ 9:35</p>
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	

General Notes and Observations:

Aug 30
- Notes from Sept. 2015 state that well was direct sample; other years well was good. Attempted to purge well normally, water level was dropping very consistently, so stopped purging.
- will return tomorrow to direct sample due to holding times of the samples

Aug 31
- Attempt direct sample -
- Full sample set collected, including sulphide + turbidity in situ.

Sept 1 - Recollected Full sample set for MP09-12 -
- Collected FB-4 @ 9:35
- No winds on turbidity, anticipate good FB

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 1.0 ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 1.5 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

Return



GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MPO9-14	Project Number	1343-005.2B	Date	29 Aug-16 / Aug-31
Piezometer Diameter	1" DP	Client	GY - AAM	Samplers	AN/MM
UTM Location	Z: 08, E: 0389140 N: 680030	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Rainy / Windy
Waypoint	GPS: AN Name: N/A			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad
Photos	Cam: Nos: 0445-0447	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name:				
Initial Depth to Water (m)	0.752	Purge Start Time:		Purge End Time:	
				Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit
Depth to Bottom (m)	1.610	Purge Interval Time () min / Vol. () L			
Submerged Tubing Depth (m)	~1.5	Depth to water (m)			
Well Stick-up Height (m)	0.731 from H ₂ O surface	Temperature (°C) 3%			
Estimated Water Volume (L)	0.489	pH (pH Units) ±0.1			
<p>(DTB - DTW) x (πr²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume</p> <p>Calculations: $\frac{0.752 \times 1.610}{0.858} \approx 0.5$</p>	Cond. (µs/cm) 3%				
	Specific Cond. (µs/cm) 3%				
	Redox (mV) 10%				
	DO (mg/L) 10%				
	DO (%) 10%				
	Appearance & Odour (Clear, Silty, HC odours, etc.)				
	Only for final readings	Sulphide (mg/L)			
		Turbidity (NTU)			
	Interval Purge Volume (L)				
	Cumulative Purge Volume (L):				
YSI ID		Sample Method:			
Logged Field Parameters	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)	no insitu collected				
Sample Time (24hr)	no		X		

DIRECT SAMPLE

Sample Site (Con't): MP09-14

Sample Date (Con't): 29 Aug-16

Well Head Seal: J-Plug PVC Cap Not Sealed Other plastic bag

Seal Replaced: J-Plug PVC Cap Not required Other cap did not fit

Well properly sealed for gas monitoring: Yes No Details: plastic bag

Head Space Gas Measurements

	Units	Values
Methane (CH ₄)	%LEL	0
Oxygen (O ₂)	%	20.9
Carbon Dioxide (CO ₂)	PPM	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	100	← collected Aug-29 17:30
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	- 15	← collected Aug-31 14:05
2	500 ml (plastic)	General Chemistry	100 ml	-	-	- 60ml	← collected Aug 31 14:05
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)	-	
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)	-	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)	-	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	-	

General Notes and Observations:

- standing water around well; rainbow sheer on water surface;
 - attempt direct sample sampling
 * lots of organics in the water being pumped out; not a representative GW sample → stick up for 1000 + more.
 - well is as thick as water tubing that is in the DP
 - second visit to well on Aug. 31 @ 14:05. DTW @ time of sample was 0.801m. Collected Dis. Mercury (15 mL). Well went DRY.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft 2m
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 6.5 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-02	Project Number	1343-005.28	Date	Aug 30 2016
Piezometer Diameter	2"	Client	GY - AAM	Samplers	SL NB
UTM Location	Z: 08 E: 0389394 N: 6880561	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	7° cloudy
Waypoint	GPS: ECR Name: N/A	Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad		
Photos	Cam: ECR Nos: 0185-0188	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name:		✓		
Initial Depth to Water (m)	2.888	Purge Start Time:	13:13	Purge End Time:	13:36
		Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit		
Depth to Bottom (m)	4.737	Purge Interval Time (3) min / Vol. (0.5) L	13:17	13:21	13:26
Submerged Tubing Depth (m)	4.600	Depth to water (m)	3.17	3.94	3.49
Well Stick-up Height (m)	0.729	Temperature (°C) 3%	4.3	4.3	4.2
Estimated Water Volume (L)	3.6	pH (pH Units) ±0.1	7.54	7.38	7.25
(DTB - DTW) x (πr ² × 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume Calculations:	Cond. (µs/cm) 3%	1499	1497	1501	1493
	Specific Cond. (µs/cm) 3%	2473	2475	2487	2473
	Redox (mV) 10%	-87.3	-86.2	-84.0	-80.3
	DO (mg/L) 10%	0.13	0.07	0.06	0.03
	DO (%) 10%	1.0	0.6	0.2	0.3
	Appearance & Odour (Clear, Silty, HC odours, etc.)	Slightly turbid	Same	Same	Clearly up
	Only for final readings	Sulphide (mg/L)			0.02
		Turbidity (NTU)			6.51
	Interval Purge Volume (L)	0.5	0.5	0.5	0.5
	Cumulative Purge Volume (L):	0.5	1.0	1.5	2.0
YSI ID	023981	Sample Method:			
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)	13:34		✓		
Sample Time (24hr)	13:40				

Sample Site (Con't): MW 09-02

Sample Date (Con't): Aug 30 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.7
Carbon Dioxide (CO2)	PPM	500

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120 ml	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40 ml	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	100 500 ml	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145 ml	
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120 ml	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120 ml	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120 ml	

General Notes and Observations:

- well has slow recharge but full parameters + and stabilization

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

~10m



GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	11W09-03	Project Number	1343-005.28	Date	30 Aug 2016	
Piezometer Diameter	2"	Client	GY - AAM	Samplers	JC & NB	
UTM Location	Z: 08V E: 0389420 N: 6880557	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Sunny 10°C	
Waypoint	GPS: ELR Name: N/A	Purge Method				
Photos	Cam: ELR2 Nos: 0179 / 0181	Watera	Peristaltic	Disp. Bailer	Other	
Duplicate Collected	<input type="checkbox"/> Yes Name: _____					
Field Blank Collected	<input type="checkbox"/> Yes Name: _____					
Initial Depth to Water (m)	6.356	Purge Start Time:	11:12	Purge End Time:	11:33	
Depth to Bottom (m)	9.962	Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit			
Submerged Tubing Depth (m)	0.3	Purge Interval Time (5) min / Vol. (0.5) L	11:17	11:22	11:28	
Well Stick-up Height (m)	0.38	Depth to water (m)	6.507	6.515	6.514	
Estimated Water Volume (L)	7.2	Temperature (°C) 3%	3.4	3.4	3.5	
(DTB - DTW) x (πr ²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume Calculations: $\frac{9.962 - 6.356}{2} \times 2 = 7.2$	pH (pH Units) ±0.1	8.43	8.45	8.40	8.30	
	Cond. (µs/cm) 3%	1544	1548	1550	1547	
	Specific Cond. (µs/cm) 3%	2616	2633	2631	2639	
	Redox (mV) 10%	-64.3	-73.7	-76.8	-74.8	
	DO (mg/L) 10%	0.13	0.10	0.10	0.09	
	DO (%) 10%	1.1	0.7	0.6	0.5	
	Appearance & Odour (Clear, Silty, HC odours, etc.)	Clear	Same	Same	Same	
	Only for final readings	Sulphide (mg/L)				0.00
	Turbidity (NTU)					10.80
	Interval Purge Volume (L)	0.5	0.5	0.5	0.5	
Cumulative Purge Volume (L):	0.5	1.0	1.5	2.0		
YSI ID	023981 (Pine)	Sample Method:				
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Watera	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	11:33					
Sample Time (24hr)	11:20					

Sample Site (Con't): rw09-03

Sample Date (Con't): 30 Aug 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	

General Notes and Observations:

Average recharge

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	FW09-04	Project Number	1343-005.28	Date	30 Aug 2016
Piezometer Diameter		Client	GY - AAM	Samplers	JC / NB
UTM Location	Z: 08V E: 0289420 N: 6880557	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Sunny / un/hazy 20°C
Waypoint	GPS: EBR Name: N/A			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad
Photos	Cam: Nos: 0182 / 0184	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic <input checked="" type="checkbox"/>	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name: _____				
Initial Depth to Water (m)	3.926	Purge Start Time:	11:52	Purge End Time:	
Depth to Bottom (m)	7.694	Purge Interval Time () min / Vol. (0.5) L	11:56	12:00	12:04
Submerged Tubing Depth (m)	7.100	Depth to water (m)	4.231	4.462	4.594
Well Stick-up Height (m)	0.24	Temperature (°C) 3%	3.7	4.0	4.3
Estimated Water Volume (L)	7.5	pH (pH Units) ±0.1	8.26	8.27	8.34
(DTB - DTW) x (πr ²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume Calculations: 3.768 x 2 = 7.536	Cond. (µs/cm) 3%	1549	1558	1595	1602
	Specific Cond. (µs/cm) 3%	2607	2593	2621	2627
	Redox (mV) 10%	-25.0	-32.9	41.7	-48.7
	DO (mg/L) 10%	0.18	0.06	0.06	0.08
	DO (%) 10%	1.4	0.5	0.6	0.6
	Appearance & Odour (Clear, Silty, HC odours, etc.)	Clear	Same	Same	Sump
	Only for final readings	Sulphide (mg/L)			
		Turbidity (NTU)			0.45
	Interval Purge Volume (L)	0.5	0.5	0.5	0.5
	Cumulative Purge Volume (L):	0.5	1.0	1.5	2.0
YSI ID	023981 023981 (PINE)	Sample Method:			
Logged Field Parameters	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic <input checked="" type="checkbox"/>	Disp. Bailer	Other
Time logged on YSI (24hr)	Sample not logged; use field sheet data				
Sample Time (24hr)	11:50				



Sample Site (Con't): MW 09-04

Sample Date (Con't): 30 Aug 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.7
Carbon Dioxide (CO2)	PPM	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCl (Hydrochloric)	40	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	

General Notes and Observations:

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) ft
- 3/8" HDPE (microwaterra tubing) ft
- 5/8" HDPE (waterra tubing) ft
- 1/4" Silicon tubing ft
- High Capacity .45 micron filters
- D-25 (for 2" wells, use with 5/8") foot valves
- D-16 (for 1" wells, use with 5/8") foot valves
- SS-10 (for 5/8" wells, use with 3/8") foot valves
- 1" bailer
- 2" bailer
- other (describe)

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-05	Project Number	1343-005.28	Date	30 Aug 2016
Piezometer Diameter	2"	Client	GY - AAM	Samplers	JC dMB
UTM Location	Z: 08V E: 0389410 N: 6880653	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Overcast / windy 5°C
Waypoint	GPS: ER Name: N/A			Recovery	<input type="checkbox"/> Good <input type="checkbox"/> Bad
Photos	Cam: 2 Nos: 0192 / 0194	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name: _____				
Initial Depth to Water (m)	— DRY	Purge Start Time:		Purge End Time:	
Depth to Bottom (m)	7.572	Purge Interval Time () min / Vol. () L			
Submerged Tubing Depth (m)	—	Depth to water (m)			
Well Stick-up Height (m)	1.45	Temperature (°C) 3%			
Estimated Water Volume (L)	—	pH (pH Units) ±0.1			
<p>Calculations:</p> <p>(DTB – DTW) x (πr²) 1000 (for well diameter) = 1 well volume (DTB – DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB – DTW) x 2 (for 2" well diameter) = 1 well volume (DTB – DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB – DTW) x 0.5 (for 1" diameter) = 1 well volume</p>	Cond. (µs/cm) 3%				
	Specific Cond. (µs/cm) 3%				
	Redox (mV) 10%				
	DO (mg/L) 10%				
	DO (%) 10%				
	Appearance & Odour (Clear, Silty, HC odours, etc.)				
	Only for final readings	Sulphide (mg/L)			
		Turbidity (NTU)			
		Interval Purge Volume (L)			
		Cumulative Purge Volume (L):			
YSI ID		Sample Method:			
Logged Field Parameters	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)					
Sample Time (24hr)					



Sample Site (Con't): MW09-05

Sample Date (Con't): 30 Aug 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	10.8
Carbon Dioxide (CO2)	PPM	7900

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

Slit cap
Well dry

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-06	Project Number	1343-005.2 8	Date	30 Aug 2016					
Piezometer Diameter	2"	Client	GY - AAM	Samplers	JC of NB					
UTM Location	Z:08V E: 0389411 N:6880652	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	overcast 5°C					
Waypoint	GPS: ELR Name: N/A			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad <i>ok</i>					
Photos	Cam: 2 Nos: 0189/0191	Purge Method								
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other					
Field Blank Collected	<input type="checkbox"/> Yes Name: _____		✓							
Initial Depth to Water (m)	3.809	Purge Start Time:	14:30	Purge End Time:	15:11					
				Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit					
Depth to Bottom (m)	6.055	Purge Interval Time (5) min / Vol. (0.5) L	14:35	14:39	14:43	14:47	14:51	14:55	15:00	15:10
Submerged Tubing Depth (m)	5.5m	Depth to water (m)	⊗	⊗	⊗	⊗	⊗	⊗	⊗	4.013
Well Stick-up Height (m)	2.37m ags	Temperature (°C) 3%	7.7	7.9	8.1	8.2	8.3	8.4	8.5	8.5
Estimated Water Volume (L)	4.5	pH (pH Units) ±0.1	7.31	7.30	7.30	7.30	7.30	7.30	7.30	7.32
Calculations: $(DTB - DTW) \times (\pi r^2) \times 1000$ (for well diameter) = 1 well volume $(DTB - DTW) \times 8.1$ (for 4" well diameter) = 1 well volume $(DTB - DTW) \times 2$ (for 2" well diameter) = 1 well volume $(DTB - DTW) \times 1.1$ (for 1.5" diameter) = 1 well volume $(DTB - DTW) \times 0.5$ (for 1" diameter) = 1 well volume $\frac{2.246 \times 2}{4.492 L}$ ⊗ PVC sticking too high to safely measure D _{btw}	Cond. (µs/cm) 3%	1097	1095	1102	1104	1103	1099	1083	1031	
	Specific Cond. (µs/cm) 3%	1639	1627	1625	1624	1621	1614	1576	1504	
	Redox (mV) 10%	-2.5	1.6	6.5	9.9	13.7	16.5	18.8	24.8	
	DO (mg/L) 10%	0.19	0.13	0.11	0.14	0.16	0.22	0.35	1.10	
	DO (%) 10%	1.6	1.2	1.1	1.2	1.6	1.9	3.2	9.5	
	Appearance & Odour (Clear, Silty, HC odours, etc.)	clear	same	same	same	same	same	same	same	same
	Only for final readings	Sulphide (mg/L)	-	-	-	-	-	-	-	0.01
		Turbidity (NTU)	-	-	-	-	-	-	-	7.06
	Interval Purge Volume (L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.0
	Cumulative Purge Volume (L):	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.5	
YSI ID	023981 (PINE)	Sample Method:								
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other					
Time logged on YSI (24hr)	15:15		✓							
Sample Time (24hr)	14:45									

Sample Site (Con't): MW09-06

Sample Date (Con't): Aug 30 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.6
Carbon Dioxide (CO2)	PPM	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	

General Notes and Observations:

- PVC cap slit
- ORP and conductivity not stabilizing after 7 readings.
 - Full well volume removed and water level is stable ~ well has ok Recharge.
 - sampled after 7 readings
 - well must use barrel to stand on to sample.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-07	Project Number	1343-005.27 28	Date	Aug 29 2016
Piezometer Diameter	8"	Client	GY - AAM	Samplers	JL NB
UTM Location	Z: 08 E: 0389322 N: 6880699	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	9° Cloudy
Waypoint	GPS: ELR Name: N/A			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad
Photos	Cam: ELR2 Nos: 0161 - 0163	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name: _____				
Initial Depth to Water (m)	Dry	Purge Start Time:		Purge End Time:	
Depth to Bottom (m)	3.399	Purge Interval Time () min / Vol. () L		Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit
Submerged Tubing Depth (m)	—	Depth to water (m)			
Well Stick-up Height (m)	1.260	Temperature (°C) 3%			
Estimated Water Volume (L)	—	pH (pH Units) ±0.1			
<p>Calculations:</p> <p>(DTB - DTW) x (πr² * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume</p>	Cond. (µs/cm) 3%				
	Specific Cond. (µs/cm) 3%				
	Redox (mV) 10%				
	DO (mg/L) 10%				
	DO (%) 10%				
	Appearance & Odour (Clear, Silty, HC odours, etc.)				
	Only for final readings	Sulphide (mg/L)			
		Turbidity (NTU)			
	Interval Purge Volume (L)				
	Cumulative Purge Volume (L):				
YSI ID		Sample Method:			
Logged Field Parameters	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)					
Sample Time (24hr)					

Sample Site (Con't): MW09-07

Sample Date (Con't): Aug 29 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	900

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

- Well is Dry

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-08	Project Number	1343-005.28	Date	30 Aug-16					
Piezometer Diameter	2"	Client	GY - AAM	Samplers	AN/MM					
UTM Location	Z: 09 E: 0389609 N: 6880587	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	sunny					
Waypoint	GPS: AN Name: N/A			Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad					
Photos	Cam: 1 Nos: 0434-0456	Purge Method								
Duplicate Collected	<input type="checkbox"/> Yes Name: /	Waterra	Peristaltic	Disp. Bailer	Other					
Field Blank Collected	<input checked="" type="checkbox"/> Yes Name: /		X							
Initial Depth to Water (m)	1.167	Purge Start Time:	8:43	Purge End Time:	09:09					
				Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit					
Depth to Bottom (m)	3.900	Purge Interval Time (5) min / Vol. () L	8:44	08:49	08:54	08:59	09:04	09:09		
Submerged Tubing Depth (m)	~ 3.2	Depth to water (m)	/	1.275	1.260	1.259	1.260	1.260		
Well Stick-up Height (m)	1.14	Temperature (°C) 3%	5.7	4.7	4.8	4.7	4.7	4.7		
Estimated Water Volume (L)	5.5	pH (pH Units) ±0.1	7.27	6.79	6.72	6.72	6.72	6.72		
(DTB - DTW) x (πr ²) * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume Calculations: $\begin{array}{r} 3.900 \\ - 1.167 \\ \hline 2.733 \end{array} \times 2 = 5.466$	Cond. (µs/cm) 3%	218.2	184.9	175.6	167.9	162.4	160.7			
	Specific Cond. (µs/cm) 3%	344.1	322.4	285.8	273.9	266.2	262.7			
	Redox (mV) 10%	-82.9	-86.3	-90.2	-92.3	-95.6	-98.0			
	DO (mg/L) 10%	1.48	0.41	0.84	1.75	1.98	2.00			
	DO (%) 10%	11.0	3.3	6.6	13.6	15.5	15.4			
	Appearance & Odour (Clear, Silty, HC odours, etc.)		Turbid, no silty, no HC odours	silty	same	same	same	same		
	Only for final readings	Sulphide (mg/L)	/	/	/	/	/	0.04		
		Turbidity (NTU)	/	/	/	/	/	4.17		
		Interval Purge Volume (L)	/	1.4	1.3	1.0	1.2	1.3		
		Cumulative Purge Volume (L):	/	1.4	2.7	3.7	4.9	6.2		
YSI ID	MW09-08	Sample Method:								
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other					
Time logged on YSI (24hr)	09:10		X							
Sample Time (24hr)	08:40 09:10									

Sample Site (Con't): MW09-08

Sample Date (Con't): 30 Aug-16 @ 09:10

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: electrical tape around slits

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	19
Oxygen (O2)	%	20.1
Carbon Dioxide (CO2)	PPM	4900 5

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	

General Notes and Observations:

-ground spongy + saturated around well.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 0.5 ft
- 3/8" HDPE (microwaterra tubing) — ft
- 5/8" HDPE (waterra tubing) — ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters —
- D-25 (for 2" wells, use with 5/8") foot valves —
- D-16 (for 1" wells, use with 5/8") foot valves —
- SS-10 (for 5/8" wells, use with 3/8") foot valves —
- 1" bailer —
- 2" bailer —
- other (describe) —

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-11	Project Number	1343-005.28	Date	29-Aug-16	
Piezometer Diameter	2"	Client	GY - AAM	Samplers	ANIMM	
UTM Location	Z: 08, E: 0289039 N: 6880711	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Rainy / overcast	
Waypoint	GPS: AN Name: N/A			Recovery	<input type="checkbox"/> Good <input type="checkbox"/> Bad	
Photos	Cam: 1 Nos: 0451-0453	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name: /	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes Name: /					
Initial Depth to Water (m)	DRY	Purge Start Time:		Purge End Time:		
				Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
Depth to Bottom (m)	4.930	Purge Interval Time () min / Vol. () L				
Submerged Tubing Depth (m)	/	Depth to water (m)				
Well Stick-up Height (m)	0.85	Temperature (°C) 3%				
Estimated Water Volume (L)		pH (pH Units) ±0.1				
<p>(DTB - DTW) x (πr²) * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume</p> <p>Calculations:</p>		Cond. (µs/cm) 3%				
			Specific Cond. (µs/cm) 3%			
			Redox (mV) 10%			
			DO (mg/L) 10%			
			DO (%) 10%			
			Appearance & Odour (Clear, Silty, HC odours, etc.)			
			Only for final readings	Sulphide (mg/L)		
				Turbidity (NTU)		
			Interval Purge Volume (L)			
			Cumulative Purge Volume (L):			
YSI ID		Sample Method:				
Logged Field Parameters	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	/					
Sample Time (24hr)	/					

Sample Site (Con't): MW09-11

Sample Date (Con't): 29 Aug-16

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: slight PVC cap is covering slits.

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	1000

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)	}	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

- Dry @ 4.930 → sand found on the tip of water level tape → normally dry

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8" foot valves) _____
- D-16 (for 1" wells, use with 5/8" foot valves) _____
- SS-10 (for 5/8" wells, use with 3/8" foot valves) _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MN09-13	Project Number	1343-005.28	Date	29-Aug-16	
Piezometer Diameter	2"	Client	GY - AAM	Samplers	AN/MM	
UTM Location	Z: 0389006 N: 6881664	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Sunny, 17°C, breezy	
Waypoint	GPS: AN Name: 099			Recovery	<input type="checkbox"/> Good <input type="checkbox"/> Bad	
Photos	Cam: 1 Nos: 0432-0434	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input checked="" type="checkbox"/> Yes Name:					
Initial Depth to Water (m)	8.710 ^{ice} 8.710	Purge Start Time:		Purge End Time:		
				Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
Depth to Bottom (m)	N/A	Purge Interval Time () min / Vol. () L				
Submerged Tubing Depth (m)	N/A	Depth to water (m)				
Well Stick-up Height (m)	0.764	Temperature (°C) 3%				
Estimated Water Volume (L)	N/A	pH (pH Units) ±0.1				
<p>(DTB – DTW) x (πr²)1000 (for well diameter) = 1 well volume (DTB – DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB – DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume</p> <p>Calculations:</p>		Cond. (µs/cm) 3%				
			Specific Cond. (µs/cm) 3%			
			Redox (mV) 10%			
			DO (mg/L) 10%			
			DO (%) 10%			
			Appearance & Odour (Clear, Silty, HC odours, etc.)			
			Only for final readings	Sulphide (mg/L)		
				Turbidity (NTU)		
			Interval Purge Volume (L)			
			Cumulative Purge Volume (L):			
YSI ID		Sample Method:				
Logged Field Parameters	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)						
Sample Time (24hr)						

Sample Site (Con't): MN09-13

Sample Date (Con't): 29 Aug - 15

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: slits below cap in PVC

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.3
Carbon Dioxide (CO2)	PPM	3500

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

~~possible obs~~
 - frozen → ice @ 8.710 m → ice found on tip of water level tape. → no thawing attempt was made ~~due to possibly permafrost well~~ due to gas present thought that there may be water present under ice; unable to break through ice plug → possible permafrost well?

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8" foot valves) _____
- D-16 (for 1" wells, use with 5/8" foot valves) _____
- SS-10 (for 5/8" wells, use with 3/8" foot valves) _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-14	Project Number	1343-005.28	Date	29-Aug-16
Piezometer Diameter	2"	Client	GY - AAM	Samplers	AN / JM
UTM Location	Z: 08v E: 6389067 N: 6581663.	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	~4°C, Sunny / Dried
Waypoint	GPS: AN Name: 100			Recovery	<input type="checkbox"/> Good <input type="checkbox"/> Bad
Photos	Cam: 1 Nos: 0432-0434	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name:				
Initial Depth to Water (m)	6.835 ice	Purge Start Time:		Purge End Time:	
Depth to Bottom (m)	N/A	Purge Interval Time () min / Vol. () L			
Submerged Tubing Depth (m)	N/A	Depth to water (m)			
Well Stick-up Height (m)	0.744	Temperature (°C) 3%			
Estimated Water Volume (L)	N/A	pH (pH Units) ±0.1			
<p>Calculations:</p> <p>(DTB - DTW) x (πr²) * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume</p>	Cond. (µs/cm) 3%				
	Specific Cond. (µs/cm) 3%				
	Redox (mV) 10%				
	DO (mg/L) 10%				
	DO (%) 10%				
	Appearance & Odour (Clear, Silty, HC odours, etc.)				
	Only for final readings	Sulphide (mg/L)			
		Turbidity (NTU)			
	Interval Purge Volume (L)				
	Cumulative Purge Volume (L):				
YSI ID		Sample Method:			
Logged Field Parameters	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)					
Sample Time (24hr)					

Sample Site (Con't): MW09-14

Sample Date (Con't): 29-Aug-16

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	26.7
Carbon Dioxide (CO2)	PPM	500

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

- existing tubing frozen in well; ice @ 6.835m. → no drawing was attempted → possibly a permafrost well?

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-15	Project Number	1343-005. 27 28	Date	Aug 29 2016
Piezometer Diameter	2"	Client	GY - AAM	Samplers	JC
UTM Location	Z: 08 E: 0388920 N: 6881724	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	10° Sunny
Waypoint	GPS: ELR Name: N/A			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad
Photos	Cam: ELR Nos: 0152-0154	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name: _____	_____	_____	_____	_____
Initial Depth to Water ^{Ice} (m)	14.161	Purge Start Time:	_____	Purge End Time:	_____
		Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input checked="" type="checkbox"/> Pen Unit		
Depth to Bottom (m)	14.161 Frozen	Purge Interval Time () min / Vol. () L			
Submerged Tubing Depth (m)	_____	Depth to water (m)			
Well Stick-up Height (m)		Temperature (°C) 3%			
Estimated Water Volume (L)	_____	pH (pH Units) ±0.1			
Calculations: $(DTB - DTW) \times (\pi r^2) \times 1000$ (for well diameter) = 1 well volume $(DTB - DTW) \times 8.1$ (for 4" well diameter) = 1 well volume $(DTB - DTW) \times 2$ (for 2" well diameter) = 1 well volume $(DTB - DTW) \times 1.1$ (for 1.5" diameter) = 1 well volume $(DTB - DTW) \times 0.5$ (for 1" diameter) = 1 well volume		Cond. (µs/cm) 3%			
		Specific Cond. (µs/cm) 3%			
		Redox (mV) 10%			
		DO (mg/L) 10%			
		DO (%) 10%			
		Appearance & Odour (Clear, Silty, HC odours, etc.)			
		Only for final readings	Sulphide (mg/L)		
			Turbidity (NTU)		
		Interval Purge Volume (L)			
		Cumulative Purge Volume (L):			
YSI ID		Sample Method:			
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)	_____	_____	_____	_____	_____
Sample Time (24hr)		_____	_____	_____	_____

Sample Site (Con't): MW09-15

Sample Date (Con't): Aug 29 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.7
Carbon Dioxide (CO2)	PPM	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

- well has 10cm of water above frozen ice
 - did not sample standing water.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-16	Project Number	1343-005.20	Date	29-Aug-16	
Piezometer Diameter	2"	Client	GY - AAM	Samplers	AN/MM	
UTM Location	Z08v E: 0387991 N: 6081095	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Sunny	
Waypoint	GPS: AN Name: 097			Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad	
Photos	Cam: 1 Nos: 0424-0426	Purge Method				
Duplicate Collected	<input checked="" type="checkbox"/> Yes Name: Dup-1	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input checked="" type="checkbox"/> Yes Name: FB-1		X			
Initial Depth to Water (m)	1.922	Purge Start Time:	11:07	Purge End Time:		
Depth to Bottom (m)	2.730	Purge Interval Time (5) min / Vol. () L	11:09	11:14	11:19	
Submerged Tubing Depth (m)	~2.5	Depth to water (m)	1.922	1.922	1.922	
Well Stick-up Height (m)	1.389	Temperature (°C) 3%	6.9	6.5	6.6	
Estimated Water Volume (L)	1.6	pH (pH Units) ±0.1	6.77	6.65	6.63	
<p>(DTB - DTW) x (πr²) * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume</p> <p>Calculations: $\frac{2.530 - 1.922}{0.808} \times 2 = 1.616$</p>	Cond. (µs/cm) 3%	1089	1079	1084	1086	
	Specific Cond. (µs/cm) 3%	1664	1670	1673	1674	
	Redox (mV) 10%	163.6	144.2	160.1	169.4	
	DO (mg/L) 10%	3.96	2.82	2.56	2.30	
	DO (%) 10%	31.7	23.0	21.0	18.8	
	Appearance & Odour (Clear, Silty, HC odours, etc.)	Clear	same	same	same	
	Only for final readings	Sulphide (mg/L)	/	/	/	0.01
	Turbidity (NTU)	/	/	/	0.17	
	Interval Purge Volume (L)	/	1.65	1.65	1.65	
	Cumulative Purge Volume (L):	/	1.65	2.3	3.95	
YSI ID	MW09-16	Sample Method:				
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	11:05		X			
Sample Time (24hr)	11:25					

Sample Site (Con't): MW09-16

Sample Date (Con't): 29-Aug-16

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: slits, cap was covering slits.

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	24.77
Carbon Dioxide (CO2)	PPM	1900

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	

General Notes and Observations:

- very good recharge.
- slight breeze while taking ~~5~~ FB.
- no obvious signs of contamination.
- used DI water provided by ALS. Batch: 25 AUG 2016.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 2.5 ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 25 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-17	Project Number	1343-005 27 28	Date	Aug 29 2016
Piezometer Diameter	2"	Client	GY - AAM	Samplers	SC/NB
UTM Location	Z: 08 E: 0388073 N: 6880972	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	9° Sunny
Waypoint	GPS: ECR Name: MIA			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad
Photos	Cam: ECR Nos: 0137-0140	Purge Method			
Duplicate Collected	<input checked="" type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name:				
Initial Depth to Water (m)	5.75	Purge Start Time:		Purge End Time:	
				Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit
Depth to Bottom (m)	5.725 bentonite	Purge Interval Time () min / Vol. () L			
Submerged Tubing Depth (m)	-	Depth to water (m)			
Well Stick-up Height (m)	-	Temperature (°C) 3%			
Estimated Water Volume (L)	-	pH (pH Units) ±0.1			
<p>(DTB - DTW) x (πr²) * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume</p> <p>Calculations:</p>	Cond. (µs/cm) 3%				
	Specific Cond. (µs/cm) 3%				
	Redox (mV) 10%				
	DO (mg/L) 10%				
	DO (%) 10%				
	Appearance & Odour (Clear, Silty, HC odours, etc.)				
	Only for final readings	Sulphide (mg/L)			
		Turbidity (NTU)			
	Interval Purge Volume (L)				
	Cumulative Purge Volume (L):				
YSI ID		Sample Method:			
Logged Field Parameters	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)					
Sample Time (24hr)					

Well clogged w/ Bentonite. Cannot sample.

Sample Site (Con't): MWD9 - 17

Sample Date (Con't): Aug 29 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	4.2
Carbon Dioxide (CO2)	PPM	427

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

- Well clogged w/ Bentonite (Pic 0141-0142) @ 5.725 m cannot be sampled.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-18	Project Number	1343-005 28 28	Date	Aug 29 2016	
Piezometer Diameter	2"	Client	GY - AAM	Samplers	Sc NB	
UTM Location	Z: 08 E: 6788054 N: 6880984	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	100 Overcast	
Waypoint	GPS: ELR Name: N/A			Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad	
Photos	Cam: ECR Nos: 0143-0145	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes Name:		✓			
Initial Depth to Water (m)	3.4 4.48 4.460	Purge Start Time:	12:29	Purge End Time:	12:42	
Depth to Bottom (m)	7.803 7.794	Purge Interval Time (3) min / Vol. (0.5) L	12:31	12:34	12:37	
Submerged Tubing Depth (m)	7.550	Depth to water (m)	4.465	same	same	
Well Stick-up Height (m)	0.88	Temperature (°C) 3%	2.0	1.7	1.7	
Estimated Water Volume (L)	6.6L	pH (pH Units) ±0.1	6.91	6.88	6.89	
Calculations: (DTB - DTW) x (πr ² * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume	Cond. (µs/cm) 3%	1556	1579	1590	1590	
	Specific Cond. (µs/cm) 3%	2773	2849	2861	2874	
	Redox (mV) 10%	35.9	39.3	40.1	38.7	
	DO (mg/L) 10%	0.43	0.15	0.13	0.15	
	DO (%) 10%	2.8	1.0	0.9	1.0	
	Appearance & Odour (Clear, Silty, HC odours, etc.)	Brown Reddish	clear	clear	clear	
	Only for final readings	Sulphide (mg/L)	-	-	-	0.01
		Turbidity (NTU)	-	-	-	7.07
	Interval Purge Volume (L)	0.5	0.5	0.5	0.5	
	Cumulative Purge Volume (L):	0.5	1.00	1.5	2.0	
YSI ID	02491 Pine	Sample Method:				
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	12:43		✓			
Sample Time (24hr)	12:35					

Sample Site (Con't): MW09-18

Sample Date (Con't): Aug 29 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	800

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	-
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	-
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	-
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	-
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	-
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	-
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	-

General Notes and Observations:

- Full parameters + Full sample set

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-19	Project Number	1343-005 22 28	Date	Aug 29 2016				
Piezometer Diameter	2"	Client	GY - AAM	Samplers	SC NB				
UTM Location	Z: 08 E: 6388048 N: 6881019	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	80 at Mount Overcast				
Waypoint	GPS: ELR Name: NA			Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad				
Photos	Cam: ELR Nos: 0146 - 0148	Purge Method							
Duplicate Collected	<input checked="" type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other				
Field Blank Collected	<input checked="" type="checkbox"/> Yes Name:		✓						
Initial Depth to Water (m)	2.400	Purge Start Time:	13:28	Purge End Time:	13:50				
				Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit				
Depth to Bottom (m)	5.900	Purge Interval Time (3) min / Vol. (0.5) L	13:31	13:34	13:37	13:40	13:43	13:46	13:49
Submerged Tubing Depth (m)	5.750	Depth to water (m)	2.726	2.778	2.837	2.874	2.896	2.902	2.912
Well Stick-up Height (m)	0.99	Temperature (°C) 3%	3.9	4.4	4.3	4.1	4.2	4.2	4.1
Estimated Water Volume (L)	7.00L	pH (pH Units) ±0.1	6.84	6.79	6.75	6.76	6.76	6.76	6.75
Calculations: (DTB - DTW) x (πr ²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume	Cond. (µs/cm) 3%	1323	1343	1341	1347	1357	1359	1360	
	Specific Cond. (µs/cm) 3%	2218	2214	2220	2239	2255	2261	2268	
	Redox (mV) 10%	7.2	-3.2	-15.2	-214	24.5	-27.1	-29.0	
	DO (mg/L) 10%	0.14	0.13	0.16	0.16	0.25	0.36	0.28	
	DO (%) 10%	1.0	1.0	1.0	1.2	1.9	2.7	2.0	
	Appearance & Odour (Clear, Silty, HC odours, etc.)	Clear	Slightly turbid	clear	clear	clear	clear	clear	
	Only for final readings	Sulphide (mg/L)	-	-	-	-	-	-	0.15
		Turbidity (NTU)	-	-	-	-	-	-	2.57
	Interval Purge Volume (L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	Cumulative Purge Volume (L):	0.5	1.0	1.5	2.0	2.5	3.0	3.5	
YSI ID	028981 Pine	Sample Method:							
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other				
Time logged on YSI (24hr)	13:49		✓						
Sample Time (24hr)	13:45		✓						

Sample Site (Con't): MWD9-19

Sample Date (Con't): Aug 29 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	—
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	—
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	—
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	—
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	—
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	—
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	—

General Notes and Observations:

Full parameters + full sample set

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 22 ft
- 3/8" HDPE (microwaterra tubing) — ft
- 5/8" HDPE (waterra tubing) — ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters —
- D-25 (for 2" wells, use with 5/8") foot valves —
- D-16 (for 1" wells, use with 5/8") foot valves —
- SS-10 (for 5/8" wells, use with 3/8") foot valves —
- 1" bailer —
- 2" bailer —
- other (describe) —

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-20	Project Number	1343-005.28	Date	29-Aug-16
Piezometer Diameter	2"	Client	GY - AAM	Samplers	AN/MM
UTM Location	Z: 08J E: 0389571 N: 6880587	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Sunny
Waypoint	GPS: 4N Name: N/A			Recovery	<input type="checkbox"/> Good <input type="checkbox"/> Bad
Photos	Cam: 1 Nos: 0457-0459.	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name:				
Initial Depth to Water (m)	3.690 twice	Purge Start Time:		Purge End Time:	
Depth to Bottom (m)	FROZEN	Pen or YSI:	<input type="checkbox"/> YSI Pro Plus	<input type="checkbox"/> Pen Unit	
Submerged Tubing Depth (m)		Purge Interval Time () min / Vol. () L			
Well Stick-up Height (m)	6.925	Depth to water (m)			
Estimated Water Volume (L)		Temperature (°C) 3%			
<p>Calculations:</p> <p>(DTB - DTW) x (πr²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume</p>		pH (pH Units) ±0.1			
		Cond. (µs/cm) 3%			
		Specific Cond. (µs/cm) 3%			
		Redox (mV) 10%			
		DO (mg/L) 10%			
		DO (%) 10%			
		Appearance & Odour (Clear, Silty, HC odours, etc.)			
		Only for final readings	Sulphide (mg/L)		
			Turbidity (NTU)		
		Interval Purge Volume (L)			
	Cumulative Purge Volume (L):				
YSI ID		Sample Method:			
Logged Field Parameters	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)					
Sample Time (24hr)					

Sample Site (Con't): MW09-20

Sample Date (Con't): 09-Aug-16

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: electrical tape covering SHS.

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	1400

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

Ice @ 3.690 m → well historically frozen → permafrost well?

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site		MNO9-21		Project Number		1343-00527.28		Date		30-Aug-16			
Piezometer Diameter		2"		Client		GY - AAM		Samplers		AN/MM			
UTM Location		Z: 080 E: 0389536 N: 6880578		Project Name		Mount Nansen 2016 GW Sampling Program		Weather/Temperature		sunny			
Waypoint		GPS: AN Name: N/A		Purge Method				Recovery		<input type="checkbox"/> Good <input type="checkbox"/> Bad			
Photos		Cam: 1 Nos: 0464-0466		Waterra				Peristaltic					
Duplicate Collected		<input type="checkbox"/> Yes Name:		Disp. Bailer				Other					
Field Blank Collected		<input type="checkbox"/> Yes Name:											
Initial Depth to Water (m)		1.704		Purge Start Time:		11:17		Purge End Time:		11:53			
Depth to Bottom (m)		3.603		Pen or YSI:		<input checked="" type="checkbox"/> YSI Pro Plus		<input type="checkbox"/> Pen Unit					
Submerged Tubing Depth (m)		~3.0		Purge Interval Time (5) min / Vol. () L		11:18		11:23		11:28			
Well Stick-up Height (m)		0.740		Depth to water (m)		/		1.785		1.760			
Estimated Water Volume (L)		3.6		Temperature (°C) 3%		4.6		4.9		5.0			
<p>(DTB - DTW) x (πr²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume</p> <p>Calculations: $\begin{array}{r} 2.15 \\ 3.403 \\ 1.704 \\ \hline 1.809 \end{array} \times 2 = 3.618$</p>		pH (pH Units) ±0.1		7.03		6.80		6.79		6.79			
		Cond. (µs/cm) 3%		903		955		987		1039		1066	
		Specific Cond. (µs/cm) 3%		1480		1551		1598		1695		1738	
		Redox (mV) 10%		21.6		19.8		8.7		-8.4		-16.4	
		DO (mg/L) 10%		1.95		0.39		0.30		0.40		0.75	
		DO (%) 10%		14.4		3.0		0.3		3.2		5.9	
		Appearance & Odour (Clear, Silty, HC odours, etc.)		weird purple/blue tinge		same		same		same		same	
		Only for final readings		Sulphide (mg/L)		/		/		/		/	
				Turbidity (NTU)		/		/		/		/	
				Interval Purge Volume (L)		/		0.8		1.0		0.7	
		Cumulative Purge Volume (L):		/		1.0		1.8		2.5			
YSI ID		MNO9-21		Sample Method:									
Logged Field Parameters		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Waterra				Peristaltic					
Time logged on YSI (24hr)		11:54		Disp. Bailer				Other					
Sample Time (24hr)		11:55											

okay

Sample Site (Con't): MW09-21

Sample Date (Con't): 30-Aug-16

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: transducer preventing cap from sitting properly.

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.7
Carbon Dioxide (CO2)	PPM	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

~~the~~ a ~~trans~~ transducer is present in ^{the} well; it was left in during sample.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 3.5 ft
- 3/8" HDPE (microwaterra tubing) ft
- 5/8" HDPE (waterra tubing) ft
- 1/4" Silicon tubing 0.5 ft
- High Capacity .45 micron filters
- D-25 (for 2" wells, use with 5/8" foot valves)
- D-16 (for 1" wells, use with 5/8" foot valves)
- SS-10 (for 5/8" wells, use with 3/8" foot valves)
- 1" bailer
- 2" bailer
- other (describe)

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-22	Project Number	1343-005.28	Date	Aug 29 2016	
Piezometer Diameter	2"	Client	GY - AAM	Samplers	3C / NB	
UTM Location	Z:08 E:0389496 N:6880549	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	8° Cloudy	
Waypoint	GPS: ELR Name: NA			Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad	
Photos	Cam: ELR2 Nos: 0158 - 0160	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes - Name: _____	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes - Name: _____		✓			
Initial Depth to Water (m)	4.224	Purge Start Time:	16:54	Purge End Time:	17:00	
				Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
Depth to Bottom (m)	5.299	Purge Interval Time (3) min / Vol. () L	17:01	17:04	17:08	
Submerged Tubing Depth (m)	5.1	Depth to water (m)	4.544	4.586	4.628	
Well Stick-up Height (m)	0.87	Temperature (°C) 3%	4.4	4.7	4.5	
Estimated Water Volume (L)	2 L	pH (pH Units) ±0.1	6.61	6.52	6.47	
Calculations: (DTB - DTW) x (πr ²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume	Cond. (µs/cm) 3%	402.8	398.0	397.0	395.6	
	Specific Cond. (µs/cm) 3%	660.0	656.4	652.5	654.1	
	Redox (mV) 10%	6.1	8.1	9.7	9.9	
	DO (mg/L) 10%	0.60	0.62	0.56	0.55	
	DO (%) 10%	4.8	4.6	4.4	4.2	
	Appearance & Odour (Clear, Silty, HC odours, etc.)	Clear Red.	Silty Red	Silty Red	Same	
	Only for final readings	Sulphide (mg/L)	-	-	-	0.08
		Turbidity (NTU)	-	-	-	21.3
	Interval Purge Volume (L)	0.3	0.1	0.3	0.4	
	Cumulative Purge Volume (L):	0.3	0.4	0.7	1.1	
YSI ID	Pine 023981	Sample Method:				
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)	17:19		✓			
Sample Time (24hr)	17:20					

Sample Site (Con't): MW09-22

Sample Date (Con't): Aug 29 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH ₄)	%LEL	0
Oxygen (O ₂)	%	20.9
Carbon Dioxide (CO ₂)	PPM	400

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	

General Notes and Observations:

Well has slow recharge but is able to produce for full parameters + full sample set

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 2 ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-23	Project Number	1343-005.28	Date	Aug 30 2016					
Piezometer Diameter	3"	Client	GY - AAM	Samplers	JC NB					
UTM Location	Z: 08 E: 0389457 N: 6880557	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	6° Sunny					
Waypoint	GPS: ELR Name: MIA			Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad					
Photos	Cam: ELR Nos: 0176 / 0178	Purge Method								
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other					
Field Blank Collected	<input type="checkbox"/> Yes Name: _____	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>							
Initial Depth to Water (m)	12.614	Purge Start Time:	10:12	Purge End Time:	10:41					
				Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit					
Depth to Bottom (m)	15.842	Purge Interval Time () min / Vol. (L)	10:15	10:19	10:24	10:29	10:34	10:40		
Submerged Tubing Depth (m)	15.842	Depth to water (m)	12.58	same	same	same	same	same		
Well Stick-up Height (m)	0.18	Temperature (°C) 3%	1.2	1.2	1.0	1.1	1.2	1.1		
Estimated Water Volume (L)	6.456	pH (pH Units) ±0.1	7.29	7.23	7.18	7.18	7.21	7.08		
Calculations: (DTB - DTW) x (πr ²) * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume	Cond. (µs/cm) 3%	741	792	780	814	827	776			
	Specific Cond. (µs/cm) 3%	1359	1454	1408	1499	1512	1427			
	Redox (mV) 10%	12.8	-55.8	-59.2	-64.2	-71.5	-67.1			
	DO (mg/L) 10%	3.10	2.92	1.67	2.57	2.69	2.24			
	DO (%) 10%	22.1	21.0	11.8	17.8	19.1	16.0			
	Appearance & Odour (Clear, Silty, HC odours, etc.)	Slightly turbid	same	same	Clear	same	same			
	Only for final readings	Sulphide (mg/L)	-	-	-	-	-	0.05		
		Turbidity (NTU)	-	-	-	-	-	11.7		
		Interval Purge Volume (L)	10	10	10	10	10	10		
		Cumulative Purge Volume (L):	10	20	30	40	50	60		
YSI ID	023981 Pine.	Sample Method:								
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other					
Time logged on YSI (24hr)	10:41	<input checked="" type="checkbox"/>								
Sample Time (24hr)	10:30	<input checked="" type="checkbox"/>								

Sample Site (Con't): MW09-23

Sample Date (Con't): Aug 30 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145	
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120	

General Notes and Observations:

Good producing well

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	MW09-24	Project Number	1343-005.2B	Date	Aug 30 2016					
Piezometer Diameter	2"	Client	GY - AAM	Samplers	JC NB					
UTM Location	Z: 08 E: 0389558 N: 6880624	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	7 th Sunny					
Waypoint	GPS: CLR Name: N/A			Recovery	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad					
Photos	Cam: FLN Nos: 0173 - 0175	Purge Method								
Duplicate Collected	<input checked="" type="checkbox"/> Yes Name: DUP-2	Waterra	Peristaltic	Disp. Bailer	Other					
Field Blank Collected	<input checked="" type="checkbox"/> Yes Name: FB-2	✓								
Initial Depth to Water (m)	9.628	Purge Start Time:	09:00	Purge End Time:	9:31					
				Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit					
Depth to Bottom (m)	11.945	Purge Interval Time (—) min / Vol. (L) L	9:06	9:11	9:15	9:19	9:23	9:28	9:29	
Submerged Tubing Depth (m)	11.945	Depth to water (m)	9.6	Same	Same	Same	Same	Same	Same	
Well Stick-up Height (m)	0.67	Temperature (°C) 3%	1.0	0.8	0.7	0.7	0.6	0.5	0.6	
Estimated Water Volume (L)	4.634L	pH (pH Units) ±0.1	7.59	7.30	7.22	7.21	7.23	7.23	7.24	
Calculations: (DTB - DTW) x (πr ²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume	Cond. (µs/cm) 3%	481.9	469.8	406.8	419.1	450.3	462.8	454.5		
	Specific Cond. (µs/cm) 3%	889.0	875.0	759.9	782.2	845.0	859.0	899.8		
	Redox (mV) 10%	222.0	213.0	208.5	204.4	201.4	199.6	197.2		
	DO (mg/L) 10%	13.14	7.13	5.22	4.86	4.90	5.51	5.01		
	DO (%) 10%	87.0	50.0	36.4	34.0	34.1	38.1	35.6		
	Appearance & Odour (Clear, Silty, HC odours, etc.)	slightly turbid	Same	Same	Same	Same	Same	Same	Clear	
	Only for final readings	Sulphide (mg/L)	—	—	—	—	—	—	0.09	
	Turbidity (NTU)	—	—	—	—	—	—	—	28.4	
	Interval Purge Volume (L)	10	10	10	10	10	10	10		
	Cumulative Purge Volume (L):	10	20	30	40	50	60	70		
YSI ID	023981	Sample Method:								
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other					
Time logged on YSI (24hr)	9:30	✓								
Sample Time (24hr)	9:35									

Sample Site (Con't): MW09-24

Sample Date (Con't): Aug 30 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	1400

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	100 ml	—
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	40 ml	—
2	500 ml (plastic)	General Chemistry	100 ml	-	-	500 ml	—
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	145 ml	—
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	120 ml	—
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	120 ml	—
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	120 ml	—

General Notes and Observations:

- parameters collected in purge bucket

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra-tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters 1
- D-25 (for 2" wells; use with 5/8") foot valves _____
- D-16 (for 1" wells; use with 5/8") foot valves _____
- SS-10 (for 5/8" wells; use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	W14103083 B401	Project Number	1343-005.28	Date	Aug 30 2016
Piezometer Diameter	2"	Client	GY - AAM	Samplers	SC NB
UTM Location	Z: 08 E: 0389521 N: 6880666	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	70 Sunny
Waypoint	GPS: ELR Name: N/A			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad
Photos	Cam: ELR Nos: 0170 - 0177	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name: _____				
Initial Depth to ^{ICE}Water (m)	6.496	Purge Start Time:	Purge End Time:	Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input checked="" type="checkbox"/> Pen Unit
Depth to Bottom (m)	6.496 Frozen.	Purge Interval Time () min / Vol. () L			
Submerged Tubing Depth (m)		Depth to water (m)			
Well Stick-up Height (m)	0.65	Temperature (°C) 3%			
Estimated Water Volume (L)		pH (pH Units) ±0.1			
<p>Calculations:</p> <p>(DTB - DTW) x (πr²) * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB - DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB - DTW) x 0.5 (for 1" diameter) = 1 well volume</p>	Cond. (µs/cm) 3%				
	Specific Cond. (µs/cm) 3%				
	Redox (mV) 10%				
	DO (mg/L) 10%				
	DO (%) 10%				
	Appearance & Odour (Clear, Silty, HC odours, etc.)				
	Only for final readings	Sulphide (mg/L)			
		Turbidity (NTU)			
		Interval Purge Volume (L)			
		Cumulative Purge Volume (L):			
YSI ID		Sample Method:			
Logged Field Parameters	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)					
Sample Time (24hr)					

Sample Site (Con't): W14103083 BH01

Sample Date (Con't): Aug 30 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: well has instruments down well.

Head Space Gas Measurements

	Units	Values
Methane (CH ₄)	%LEL	0
Oxygen (O ₂)	%	20.9
Carbon Dioxide (CO ₂)	PPM	500

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH ₃)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

Well is Frozen

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	W14103083BH02	Project Number	1343-005.28	Date	Aug 30 2016	
Piezometer Diameter	2"	Client	GY - AAM	Samplers	SC NB	
UTM Location	Z: 08 E: 0389563 N: 6880667	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	7° Sunny	
Waypoint	GPS: ELR Name: N/A			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad	
Photos	Cam: FLR Nos: 0167-0169	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes Name: _____					
Initial Depth to ^{ICE}Water (m)	6.705	Purge Start Time:		Purge End Time:		
				Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
Depth to Bottom (m)	6.705 Frozen	Purge Interval Time () min / Vol. () L				
Submerged Tubing Depth (m)	_____	Depth to water (m)				
Well Stick-up Height (m)	0.78	Temperature (°C) 3%				
Estimated Water Volume (L)	_____	pH (pH Units) ±0.1				
<p>(DTB - DTW) x (πr²)1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well-volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume</p> <p>Calculations:</p>		Cond. (µs/cm) 3%				
			Specific Cond. (µs/cm) 3%			
			Redox (mV) 10%			
			DO (mg/L) 10%			
			DO (%) 10%			
			Appearance & Odour (Clear, Silty, HC odours, etc.)			
			Only for final readings	Sulphide (mg/L)		
				Turbidity (NTU)		
			Interval Purge Volume (L)			
			Cumulative Purge Volume (L):			
YSI ID		Sample Method:				
Logged Field Parameters	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)						
Sample Time (24hr)						

FROZEN

Sample Site (Con't): W14103 083 B402

Sample Date (Con't): Aug 30 2016

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: Well has instruments down well.

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

15cm of water on top of Ice
did not sample standing water

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	W141030838H03	Project Number	1343-005.2 3	Date	29-Aug-16	
Piezometer Diameter	2"	Client	GY - AAM	Samplers	AN/MM.	
UTM Location	Z: 08, E: 0389131 N: 6880730	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	Rainy	
Waypoint	GPS: AN Name: N/A			Recovery	<input type="checkbox"/> Good <input type="checkbox"/> Bad	
Photos	Cam: Nos: 448-450	Purge Method				
Duplicate Collected	<input type="checkbox"/> Yes Name:	Waterra	Peristaltic	Disp. Bailer	Other	
Field Blank Collected	<input type="checkbox"/> Yes Name:					
Initial Depth to Water (m)	1.865 to 4.560 / 4.560 m ice	Purge Start Time:	Purge End Time:	Pen or YSI:	<input type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit	
Depth to Bottom (m)	FROZEN	Purge Interval Time () min / Vol. () L				
Submerged Tubing Depth (m)	N/A	Depth to water (m)				
Well Stick-up Height (m)	6.795	Temperature (°C) 3%				
Estimated Water Volume (L)	N/A	pH (pH Units) ±0.1				
<p>(DTB - DTW) x (πr²) 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume</p> <p>Calculations:</p>	Cond. (µs/cm) 3%					
	Specific Cond. (µs/cm) 3%					
	Redox (mV) 10%					
	DO (mg/L) 10%					
	DO (%) 10%					
	Appearance & Odour (Clear, Silty, HC odours, etc.)					
	Only for final readings	Sulphide (mg/L)				
		Turbidity (NTU)				
	Interval Purge Volume (L)					
	Cumulative Purge Volume (L):					
YSI ID		Sample Method:				
Logged Field Parameters	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other	
Time logged on YSI (24hr)						
Sample Time (24hr)						

Sample Site (Con't): W1410 30 R38H03

Sample Date (Con't): 29-Aug-16

Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: not cap not on properly

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	500

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

- water found @ 1.85m sitting above ice @ which was found @ 4.560; historical DTB is 10m
 - well classified as frozen + permafrost well?

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	W14103083BH04	Project Number	1343-005.28	Date	Aug 30 2016
Piezometer Diameter	2"	Client	GY - AAM	Samplers	JC NB
UTM Location	Z: 08 E: 0389544 N: 6880665	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	70 Sunny
Waypoint	GPS: FLR Name: N/A			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad
Photos	Cam: EUR Nos: 0164-0166	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name: _____				
Initial Depth to ^{ICE}Water (m)	6.570	Purge Start Time:		Purge End Time:	
				Pen or YSI:	<input type="checkbox"/> YSI Pro.Plus <input type="checkbox"/> Pen Unit
Depth to Bottom (m)	6.570 Frozen	Purge Interval Time () min / Vol. () L			
Submerged Tubing Depth (m)	—	Depth to water (m)			
Well Stick-up Height (m)	0.77	Temperature (°C) 3%			
Estimated Water Volume (L)	—	pH (pH Units) ±0.1			
<p>(DTB – DTW) x (πr²) * 1000 (for well diameter) = 1 well volume (DTB – DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB – DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume</p> <p>Calculations: _____</p>	Cond. (µs/cm) 3%				
	Specific Cond. (µs/cm) 3%				
	Redox (mV) 10%				
	DO (mg/L) 10%				
	DO (%) 10%				
	Appearance & Odour (Clear, Silty, HC odours, etc.)				
	Only for final readings	Sulphide (mg/L)			
		Turbidity (NTU)			
	Interval Purge Volume (L)				
	Cumulative Purge Volume (L):				
YSI ID	_____	Sample Method:			
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)	_____				
Sample Time (24hr)	_____				

Sample Site (Con't): W 14103083 B104

Sample Date (Con't): Aug 30 2016

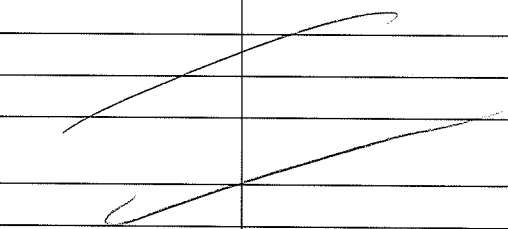
Well Head Seal: J-Plug PVC Cap Not Sealed Other _____

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: Wells have instruments installed down well

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	300

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HNO ₃ (Nitric)		
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input type="checkbox"/> Field Filtered	<input type="checkbox"/> HCL (Hydrochloric)		
2	500 ml (plastic)	General Chemistry	100 ml	-	-		
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input type="checkbox"/> NaOH (Sodium Hydroxide)		
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input type="checkbox"/> H ₂ SO ₄ (Sulfuric)		
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input type="checkbox"/> HNO ₃ (Nitric)		
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-		

General Notes and Observations:

- 4cm of water over ice, did not sample standing water

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) _____ ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing _____ ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

GROUNDWATER SAMPLE COLLECTION SHEET

Sample Site	GSI-HA-02A	Project Number	1343-005.2B	Date	29-Aug-16. / Avg.30
Piezometer Diameter	1" DP	Client	GY - AAM	Samplers	AN/MM
UTM Location	Z: 081 E: 0387861 N: 6881129	Project Name	Mount Nansen 2016 GW Sampling Program	Weather/Temperature	sunny
Waypoint	GPS: AN Name: 096			Recovery	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad
Photos	Cam: 1 Nos: 0423-0425	Purge Method			
Duplicate Collected	<input type="checkbox"/> Yes Name: _____	Waterra	Peristaltic	Disp. Bailer	Other
Field Blank Collected	<input type="checkbox"/> Yes Name: _____		X		
Initial Depth to Water (m)	1.828	Purge Start Time:	10:29	Purge End Time:	
				Pen or YSI:	<input checked="" type="checkbox"/> YSI Pro Plus <input type="checkbox"/> Pen Unit
Depth to Bottom (m)	2.785	Purge Interval Time () min / Vol. () L	10:29		
Submerged Tubing Depth (m)	2.225	Depth to water (m)	/		
Well Stick-up Height (m)	1.544	Temperature (°C) 3%	6.6		
Estimated Water Volume (L)	0.480	pH (pH Units) ±0.1	7.01		
(DTB - DTW) x (πr ²) * 1000 (for well diameter) = 1 well volume (DTB - DTW) x 8.1 (for 4" well diameter) = 1 well volume (DTB - DTW) x 2 (for 2" well diameter) = 1 well volume (DTB-DTW) x 1.1 (for 1.5" diameter) = 1 well volume (DTB-DTW) x 0.5 (for 1" diameter) = 1 well volume Calculations: $\frac{2.785 - 1.828}{0.5} = 1.957$	Cond. (µs/cm) 3%	689			
	Specific Cond. (µs/cm) 3%	1073			
	Redox (mV) 10%	-34.0			
	DO (mg/L) 10%	1.37			
	DO (%) 10%	10.7			
	Appearance & Odour (Clear, Silty, HC odours, etc.)	slightly turbid			
	Only for final readings	Sulphide (mg/L)	/		
		Turbidity (NTU)	/		
	Interval Purge Volume (L)				
	Cumulative Purge Volume (L):	/			
YSI ID	GSI-HA-02A	Sample Method:			
Logged Field Parameters	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Waterra	Peristaltic	Disp. Bailer	Other
Time logged on YSI (24hr)	10:30		X		
Sample Time (24hr)	10:15				

DIRECT SAMPLED

Re-sampled on Aug. 30.

Sample Site (Con't): GSI-HA-02A

Sample Date (Con't): 29 Aug-16 @ 10:15

Well Head Seal: J-Plug PVC Cap Not Sealed Other SCF

Seal Replaced: J-Plug PVC Cap Not required Other _____

Well properly sealed for gas monitoring: Yes No Details: _____

Head Space Gas Measurements

	Units	Values
Methane (CH4)	%LEL	0
Oxygen (O2)	%	20.9
Carbon Dioxide (CO2)	PPM	360

Priority	Bottle Type	Parameters Analyzed	Min. Volume	Treatment <input checked="" type="checkbox"/>	Preservative Added <input checked="" type="checkbox"/>	Vol. Collected (ml)	Comments
1a	120 ml (plastic)	Dissolved Metals	100 ml	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	100 100	
1b	40 ml (glass)	Dissolved Mercury	15 mL	<input checked="" type="checkbox"/> Field Filtered	<input checked="" type="checkbox"/> HCL (Hydrochloric)	15 15	
2	500 ml (plastic)	General Chemistry	100 ml	-	-	100 100	
3	145 ml (plastic)	Cyanide (total, free, weak acid dissociable)	100 ml	-	<input checked="" type="checkbox"/> NaOH (Sodium Hydroxide)	100 100	
4	120 ml (glass)	Ammonia (NH3)	60 ml	-	<input checked="" type="checkbox"/> H ₂ SO ₄ (Sulfuric)	60 60	
5	120 ml (plastic)	Thiocyanate (SCN)	50 ml	-	<input checked="" type="checkbox"/> HNO ₃ (Nitric)	50 50	
6	120 ml (glass amber)	Total Inorganic Carbon (TIC)	50 ml	-	-	50 50	

General Notes and Observations:

- Attempted direct sample → full min vols collected.
- Dry after parameters were taken

Returned to re-sample on Aug. 30/2016. In order to improve sample quality.
 Sample Date: Aug. 30/2016.
 DTW: 1.807 (well has fully recharged).
 Sample time: 13:45
 Full sample set collected (min. vol.)

not enough vol. to complete sulphide and turbidity measurements.

Consumables Used:

- 1/4" HDPE (peristaltic pump tubing) 20 ft
- 3/8" HDPE (microwaterra tubing) _____ ft
- 5/8" HDPE (waterra tubing) _____ ft
- 1/4" Silicon tubing 1.6 ft
- High Capacity .45 micron filters _____
- D-25 (for 2" wells, use with 5/8") foot valves _____
- D-16 (for 1" wells, use with 5/8") foot valves _____
- SS-10 (for 5/8" wells, use with 3/8") foot valves _____
- 1" bailer _____
- 2" bailer _____
- other (describe) _____

APPENDIX C
Laboratory Reports



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

Date Received: 02-SEP-16
Report Date: 19-SEP-16 15:06 (MT)
Version: FINAL

Client Phone: 867-456-4865

Certificate of Analysis

Lab Work Order #: L1823304
Project P.O. #: NOT SUBMITTED
Job Reference: 1343-005.28
C of C Numbers: 1, 2
Legal Site Desc:

Comments: ADDITIONAL 15-SEP-16 16:03

Brent Mack, B.Sc.
Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1823304-1	L1823304-2	L1823304-3	L1823304-4	L1823304-5
		Water 31-AUG-16 11:10 GSI-DC-06B	Water 31-AUG-16 12:25 GSI-DC-07B	Water 31-AUG-16 15:10 GSI-DC-08B	Water 31-AUG-16 14:15 GSI-DC-09B	Water 31-AUG-16 13:00 GSI-DC-10B
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	960	995	892	363	1070
	Hardness (as CaCO3) (mg/L)	578	572	429	174	568
	pH (pH)	8.07	7.78	7.21	7.68	6.79
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	595	201	406	95.3	113
	Ammonia, Total (as N) (mg/L)	3.39	2.38	11.6	1.51	1.54
	Chloride (Cl) (mg/L)	8.1	<2.5 ^{DLDS}	3.2	<0.50	<2.5 ^{DLDS}
	Fluoride (F) (mg/L)	0.35	<0.10 ^{DLDS}	0.16	0.086	<0.10 ^{DLDS}
	Nitrate (as N) (mg/L)	<0.025 ^{DLDS}	<0.025 ^{DLDS}	0.049	0.0196	<0.025 ^{DLDS}
	Nitrite (as N) (mg/L)	<0.0050 ^{DLDS}	<0.0050 ^{DLDS}	0.0168	0.0017	<0.0050 ^{DLDS}
	Total Kjeldahl Nitrogen (mg/L)	5.20	3.00	32.0	2.4	2.56
	Sulfate (SO4) (mg/L)	1.9	388	105	94.7	508
	Anion Sum (meq/L)	12.2	12.1	10.4	3.88	12.8
	Cation Sum (meq/L)	14.0	13.4	17.4	4.48	16.8
	Cation - Anion Balance (%)	6.9	5.3	25.1	7.1	13.4
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)	0.54	<0.50	2.93	<0.50	0.61
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	142	59.3	128	29.3	38.4
	Total Organic Carbon (mg/L)	52.6	15.9	451	23.3	35.0
Total Metals	Mercury (Hg)-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)	0.0139	0.0084	0.589	0.0642	0.140
	Antimony (Sb)-Dissolved (mg/L)	0.00027	0.00016	0.00217	0.00018	0.00028
	Arsenic (As)-Dissolved (mg/L)	0.444	0.140	0.106	0.0696	0.132
	Barium (Ba)-Dissolved (mg/L)	0.0812	0.175	0.305	0.0356	0.389
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	0.000109	0.000024	<0.000040 ^{DLA}
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.00010 ^{DLA}
	Boron (B)-Dissolved (mg/L)	<0.010	0.021	<0.010	0.013	<0.020 ^{DLA}
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	0.0000295	<0.0000050	<0.000010 ^{DLA}
	Calcium (Ca)-Dissolved (mg/L)	142	159	128	36.8	153
	Chromium (Cr)-Dissolved (mg/L)	0.00144	0.00032	0.0140	0.00100	0.00211
	Cobalt (Co)-Dissolved (mg/L)	0.00108	0.00162	0.00829	0.00065	0.0183
	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	0.00152	<0.00020	<0.00040 ^{DLA}
	Iron (Fe)-Dissolved (mg/L)	19.5	19.2	134	8.75	67.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1823304-6	L1823304-7	L1823304-8	L1823304-9	L1823304-10
		Water 31-AUG-16 11:00 MP09-08	Water 01-SEP-16 09:35 MP09-12	Water TRIP BLANK	Water 31-AUG-16 11:00 DUP-4	Water 31-AUG-16 11:00 FB-3
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	814	925	<2.0	814	<2.0
	Hardness (as CaCO3) (mg/L)	482	524		484	<0.50
	pH (pH)	8.11	8.10	5.35	8.15	5.37
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	270	386	<1.0	273	<1.0
	Ammonia, Total (as N) (mg/L)	0.0222	5.96	<0.0050	0.0231	<0.0050
	Chloride (Cl) (mg/L)	<2.5 ^{DLDS}	<2.5 ^{DLDS}	<0.50	<2.5 ^{DLDS}	<0.50
	Fluoride (F) (mg/L)	<0.10 ^{DLDS}	0.30	<0.020	<0.10 ^{DLDS}	<0.020
	Nitrate (as N) (mg/L)	<0.025 ^{DLDS}	<0.025 ^{DLDS}	<0.0050	<0.025 ^{DLDS}	<0.0050
	Nitrite (as N) (mg/L)	<0.0050 ^{DLDS}	<0.0050 ^{DLDS}	<0.0010	<0.0050 ^{DLDS}	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.753	6.12	<0.050	0.528	<0.050
	Sulfate (SO4) (mg/L)	213	178	<0.30	216	<0.30
	Anion Sum (meq/L)	9.84	11.4		9.95	<0.10
	Cation Sum (meq/L)	10.1	11.7		10.1	<0.10
	Cation - Anion Balance (%)	1.1	1.3		0.9	0.0
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	0.422	<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)	67.3	98.2	<0.50	67.1	<0.50
	Total Organic Carbon (mg/L)	12.8	18.6	<0.50	10.4	<0.50
Total Metals	Mercury (Hg)-Total (mg/L)			<0.0000050		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD		FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD		FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0037	0.0074		0.0036	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	0.00050	0.0215		0.00035	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.0140	7.40		0.0133	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0518	0.0458		0.0522	<0.000050
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020		<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050		<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	0.104		<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	0.000103		<0.0000050	0.0000200
	Calcium (Ca)-Dissolved (mg/L)	133	144		134	<0.050
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00032		<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00069	0.00288		0.00069	<0.00010
	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.00073		<0.00020	<0.00020
	Iron (Fe)-Dissolved (mg/L)	0.862	6.32		0.846	<0.010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1823304-11 Water 31-AUG-16 08:45 MP09-03	L1823304-12 Water 31-AUG-16 10:00 GSI-PC-03B	L1823304-13 Water 31-AUG-16 09:00 GSI-PC-04B	L1823304-14 Water 29-AUG-16 08:45 GSI-DC-01B	L1823304-15 Water 29-AUG-16 17:30 MP09-14
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	675	2600	825		
	Hardness (as CaCO3) (mg/L)	380	1710	457	119	535
	pH (pH)	8.02	8.22	7.30		
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	196	610	201		
	Ammonia, Total (as N) (mg/L)					
	Chloride (Cl) (mg/L)	<small>DLDS</small> <2.5	<small>DLDS</small> <10	<small>DLDS</small> <2.5		
	Fluoride (F) (mg/L)	<small>DLDS</small> <0.10	<small>DLDS</small> <0.40	<small>DLDS</small> <0.10		
	Nitrate (as N) (mg/L)	<small>DLDS</small> <0.025	0.21	<small>DLDS</small> <0.025		
	Nitrite (as N) (mg/L)	0.0059	0.055	<small>DLDS</small> <0.0050		
	Total Kjeldahl Nitrogen (mg/L)	<small>PEHT</small> 5.66	3.9	<small>PEHT</small> 1.24		
	Sulfate (SO4) (mg/L)	193	1300	272		
	Anion Sum (meq/L)	7.95	39.2	9.67		
	Cation Sum (meq/L)	8.18	38.6	10.1		
	Cation - Anion Balance (%)	1.4	-0.8	2.2		
	Cyanides	Cyanide, Weak Acid Diss (mg/L)				
Cyanide, Total (mg/L)						
Thiocyanate (SCN) (mg/L)						
Cyanide, Free (mg/L)						
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)					
	Total Organic Carbon (mg/L)					
Total Metals	Mercury (Hg)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0400	0.0512	0.0532	0.0057	0.0057
	Antimony (Sb)-Dissolved (mg/L)	0.00183	0.00607	0.00095	0.00374	0.00198
	Arsenic (As)-Dissolved (mg/L)	0.0342	0.0458	0.0115	0.00314	0.502
	Barium (Ba)-Dissolved (mg/L)	0.147	0.102	0.102	0.0110	0.0917
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<small>DLA</small> <0.000040	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<small>DLA</small> <0.00010	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	0.039	<0.010	0.022	0.050
	Cadmium (Cd)-Dissolved (mg/L)	0.0000578	0.000030	0.0000475	0.0000640	0.0000670
	Calcium (Ca)-Dissolved (mg/L)	103	98.5	111	39.1	149
	Chromium (Cr)-Dissolved (mg/L)	0.00043	0.0262	0.0133	0.00334	0.00022
	Cobalt (Co)-Dissolved (mg/L)	0.00313	0.00420	0.00325	0.00083	0.00076
	Copper (Cu)-Dissolved (mg/L)	0.00096	0.00390	0.00301	0.0276	<0.00020
	Iron (Fe)-Dissolved (mg/L)	2.15	15.7	4.59	0.058	0.767

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1823304-16 Water 31-AUG-16 14:05 MP09-14	L1823304-17 Water 01-SEP-16 08:08 MP09-03	L1823304-18 Water 01-SEP-16 08:40 GSI-PC-04B	L1823304-19 Water 01-SEP-16 09:35 FB-4
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (uS/cm)	1470			<2.0
	Hardness (as CaCO3) (mg/L)				<0.50
	pH (pH)	8.27			5.01
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	295			<1.0
	Ammonia, Total (as N) (mg/L)				<0.0050
	Chloride (Cl) (mg/L)	<2.5 ^{DLDS}			<0.50
	Fluoride (F) (mg/L)	0.24			<0.020
	Nitrate (as N) (mg/L)	<0.025 ^{DLDS}			<0.0050
	Nitrite (as N) (mg/L)	<0.0050 ^{DLDS}			<0.0010
	Total Kjeldahl Nitrogen (mg/L)	10.5 ^{PEHT}			<0.050
	Sulfate (SO4) (mg/L)	620			<0.30
	Anion Sum (meq/L)				<0.10
	Cation Sum (meq/L)				<0.10
	Cation - Anion Balance (%)				0.0
Cyanides	Cyanide, Weak Acid Diss (mg/L)		<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)		<0.0050	<0.0050	<0.0050
	Thiocyanate (SCN) (mg/L)				<0.50
	Cyanide, Free (mg/L)		<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)				<0.50
	Total Organic Carbon (mg/L)				<0.50
Total Metals	Mercury (Hg)-Total (mg/L)				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD			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)				<0.000020
	Bismuth (Bi)-Dissolved (mg/L)				<0.000050
	Boron (B)-Dissolved (mg/L)				<0.010
	Cadmium (Cd)-Dissolved (mg/L)				<0.0000050
	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

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1823304-1 Water 31-AUG-16 11:10 GSI-DC-06B	L1823304-2 Water 31-AUG-16 12:25 GSI-DC-07B	L1823304-3 Water 31-AUG-16 15:10 GSI-DC-08B	L1823304-4 Water 31-AUG-16 14:15 GSI-DC-09B	L1823304-5 Water 31-AUG-16 13:00 GSI-DC-10B
Grouping	Analyte					
WATER						
Dissolved Metals	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	0.00178	0.000064	<0.00010 ^{DLA}
	Lithium (Li)-Dissolved (mg/L)	<0.0010	0.0012	<0.0010	<0.0010	<0.0020 ^{DLA}
	Magnesium (Mg)-Dissolved (mg/L)	54.1	42.6	26.4	20.0	44.8
	Manganese (Mn)-Dissolved (mg/L)	2.25	1.50	2.34	0.591	14.5
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.00211	0.000356	0.00254	0.000240	0.00061
	Nickel (Ni)-Dissolved (mg/L)	0.00275	0.00062	0.0149	0.00083	0.0039
	Phosphorus (P)-Dissolved (mg/L)	0.271	0.098	0.320	0.156	<0.050
	Potassium (K)-Dissolved (mg/L)	2.95	3.60	3.18	1.91	2.01
	Selenium (Se)-Dissolved (mg/L)	0.000472	0.000134	0.00155	0.000121	0.00027
	Silicon (Si)-Dissolved (mg/L)	8.87	8.09	9.31	7.58	7.97
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	0.000030	<0.000010	<0.000020 ^{DLA}
	Sodium (Na)-Dissolved (mg/L)	22.6	15.3	12.1	7.73	25.8
	Strontium (Sr)-Dissolved (mg/L)	0.768	0.498	0.515	0.119	0.574
	Sulfur (S)-Dissolved (mg/L)	2.04	127	34.0	31.1	167
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000020 ^{DLA}
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020 ^{DLA}
	Titanium (Ti)-Dissolved (mg/L)	0.00325	0.00059	0.0387	0.00390	0.00221
	Uranium (U)-Dissolved (mg/L)	0.000082	0.000040	0.000552	0.000142	0.000235
	Vanadium (V)-Dissolved (mg/L)	0.00759	0.00129	0.0766	0.00503	0.0108
	Zinc (Zn)-Dissolved (mg/L)	0.0010	0.0011	0.0085	0.0025	0.0051
	Zirconium (Zr)-Dissolved (mg/L)	0.00199	0.00035	0.00540	0.00061	0.00127

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1823304-6	L1823304-7	L1823304-8	L1823304-9	L1823304-10
		Description	Water	Water	Water	Water	Water
		Sampled Date	31-AUG-16	01-SEP-16		31-AUG-16	31-AUG-16
		Sampled Time	11:00	09:35		11:00	11:00
		Client ID	MP09-08	MP09-12	TRIP BLANK	DUP-4	FB-3
Grouping	Analyte						
WATER							
Dissolved Metals	Lead (Pb)-Dissolved (mg/L)		<0.000050	0.00443		<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)		0.0049	0.0046		0.0048	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)		36.1	39.7		36.4	<0.10
	Manganese (Mn)-Dissolved (mg/L)		1.04	4.61		1.05	<0.00010
	Mercury (Hg)-Dissolved (mg/L)		<0.0000050	<0.0000050		<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)		0.00141	0.00485		0.00103	<0.000050
	Nickel (Ni)-Dissolved (mg/L)		<0.00050	0.00643		<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)		<0.050	0.089		<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)		1.21	6.93		1.21	<0.10
	Selenium (Se)-Dissolved (mg/L)		0.000123	0.000090		0.000076	<0.000050
	Silicon (Si)-Dissolved (mg/L)		8.01	12.5		8.03	<0.050
	Silver (Ag)-Dissolved (mg/L)		<0.000010	0.000014		<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)		7.39	3.35		7.42	<0.050
	Strontium (Sr)-Dissolved (mg/L)		1.41	0.536		1.41	<0.00020
	Sulfur (S)-Dissolved (mg/L)		70.7	52.2		70.6	<0.50
	Thallium (Tl)-Dissolved (mg/L)		<0.000010	0.000042		<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)		<0.00010	<0.00010		<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)		<0.00030	<0.00030		<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)		0.00437	0.00116		0.00438	<0.000010
	Vanadium (V)-Dissolved (mg/L)		<0.00050	0.00059		<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)		<0.0010	0.0397		0.0016	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)		<0.00030	0.00031		<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	Description	Sampled Date	Sampled Time	Client ID	L1823304-11	L1823304-12	L1823304-13	L1823304-14	L1823304-15
					Water	Water	Water	Water	Water
		31-AUG-16	08:45	MP09-03	31-AUG-16	31-AUG-16	31-AUG-16	29-AUG-16	29-AUG-16
					08:45	10:00	09:00	08:45	17:30
					MP09-03	GSI-PC-03B	GSI-PC-04B	GSI-DC-01B	MP09-14
Grouping	Analyte								
WATER									
Dissolved Metals	Lead (Pb)-Dissolved (mg/L)	0.000801	0.00071	0.000920	0.00115	0.000246			
	Lithium (Li)-Dissolved (mg/L)	<0.0010	0.0339	0.0029	<0.0010	0.0096			
	Magnesium (Mg)-Dissolved (mg/L)	30.0	356	43.8	5.13	39.7			
	Manganese (Mn)-Dissolved (mg/L)	2.27	2.21	2.24	0.369	0.113			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050					
	Molybdenum (Mo)-Dissolved (mg/L)	0.00182	0.0116	0.00665	0.00628	0.000892			
	Nickel (Ni)-Dissolved (mg/L)	0.00465	0.0681	0.0480	0.0138	0.00324			
	Phosphorus (P)-Dissolved (mg/L)	<0.050	0.066	<0.050	0.090	<0.050			
	Potassium (K)-Dissolved (mg/L)	3.54	13.5	3.41	1.26	34.6			
	Selenium (Se)-Dissolved (mg/L)	0.000093	0.00023	0.000079	0.000075	0.000377			
	Silicon (Si)-Dissolved (mg/L)	6.17	9.68	6.11	2.07	4.80			
	Silver (Ag)-Dissolved (mg/L)	0.000018	<0.000020 ^{DLA}	<0.000010	0.000042	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	6.56	73.0	12.7	2.26	19.7			
	Strontium (Sr)-Dissolved (mg/L)	0.567	1.45	0.650	0.0854	0.772			
	Sulfur (S)-Dissolved (mg/L)	73.7	384	89.6	11.2	142			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000020 ^{DLA}	<0.000010	0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	0.00023	0.00020	0.00022	0.00020			
	Titanium (Ti)-Dissolved (mg/L)	0.00227	0.00464	0.00099	<0.00030	<0.00030			
	Uranium (U)-Dissolved (mg/L)	0.00153	0.00893	0.000270	0.000159	0.000076			
	Vanadium (V)-Dissolved (mg/L)	0.00186	0.0028	0.00128	<0.00050	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	0.0180	0.0135	0.0294	0.0076	0.0106			
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	0.00081	<0.00030	<0.00030	<0.00030			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1823304-16 Water 31-AUG-16 14:05 MP09-14	L1823304-17 Water 01-SEP-16 08:08 MP09-03	L1823304-18 Water 01-SEP-16 08:40 GSI-PC-04B	L1823304-19 Water 01-SEP-16 09:35 FB-4
Grouping	Analyte				
WATER					
Dissolved Metals	Lead (Pb)-Dissolved (mg/L)				<0.000050
	Lithium (Li)-Dissolved (mg/L)				<0.0010
	Magnesium (Mg)-Dissolved (mg/L)				<0.10
	Manganese (Mn)-Dissolved (mg/L)				<0.00010
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050			<0.0000050
	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)				<0.000050
	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)				<0.00030
	Uranium (U)-Dissolved (mg/L)				<0.000010
	Vanadium (V)-Dissolved (mg/L)				<0.00050
	Zinc (Zn)-Dissolved (mg/L)				<0.0010
	Zirconium (Zr)-Dissolved (mg/L)				<0.00030

* 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 Inorganic Carbon	MS-B	L1823304-1, -10, -19, -2, -4, -5, -6, -8, -9
Matrix Spike	Total Inorganic Carbon	MS-B	L1823304-3, -7
Matrix Spike	Total Inorganic Carbon	MS-B	L1823304-3, -7
Matrix Spike	Total Organic Carbon	MS-B	L1823304-1, -19, -2, -3, -4, -7
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1823304-1, -10, -11, -12, -13, -14, -15, -19, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1823304-1, -10, -11, -12, -13, -14, -15, -19, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1823304-1, -10, -11, -12, -13, -14, -15, -19, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Boron (B)-Dissolved	MS-B	L1823304-1, -10, -11, -12, -13, -14, -15, -19, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1823304-1, -10, -11, -12, -13, -14, -15, -19, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1823304-1, -10, -11, -12, -13, -14, -15, -19, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1823304-1, -10, -11, -12, -13, -14, -15, -19, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1823304-1, -10, -11, -12, -13, -14, -15, -19, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1823304-1, -10, -11, -12, -13, -14, -15, -19, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1823304-1, -10, -11, -12, -13, -14, -15, -19, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1823304-1, -10, -11, -12, -13, -14, -15, -19, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1823304-1, -10, -11, -12, -13, -14, -15, -19, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Nitrate (as N)	MS-B	L1823304-1, -10, -11, -12, -13, -16, -19, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1823304-1, -10, -11, -12, -13, -14, -15, -19, -2, -3, -4, -5, -6, -7, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHT	Parameter Exceeded Recommended Holding Time Prior to Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
CARBONS-TIC-VA	Water	Total inorganic carbon by CO2 purge	APHA 5310B 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 5310B TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			

Reference Information

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.			
F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
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 CaCO ₃ equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)
Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.			
HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.			
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 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
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).			
NH3-F-VA	Water	Ammonia in Water by Fluorescence	APHA 4500 NH3-NITROGEN (AMMONIA)
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.			
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.			
NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			

Reference Information

NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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.

SO4-IC-N-VA Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

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

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

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

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

Chain of Custody Numbers:

1 2

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.



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: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input checked="" type="checkbox"/> EDD (DIGITAL)			R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days)											
Contact: Natasha Sandys		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT											
Address: 230 - 2237 2nd Avenue Whitehorse, YT		<input type="checkbox"/> Criteria on Report - provide details below if box checked			E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT											
Phone: 887-458-4865		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge											
		Email 1 or Fax nsandys@hemmera.com			Specify Date Required for E2, E or P:											
		Email 2 chris@elr.ca			Analysis Request											
Invoice To		Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below											
Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input checked="" type="checkbox"/> MAIL <input type="checkbox"/> FAX														
Copy of Invoice with Report <input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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 #: Q66042		Approver ID:														
Job #: 1343-005.28		GL Account:														
PO / AFE:		Routing Code:														
LSD:		Activity Code:														
		Location:														
ALS Lab Work Order # (lab use only)		ALS Contact:			Sampler:			JC, MM, NB, AN								
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						Number of Containers	
1		GSI-DC-06B			31-Aug-16		11:10		Water							7
2		GSI-DC-07B			31-Aug-16		12:25		Water							7
3		GSI-DC-08B			31-Aug-16		15:10		Water							7
4		GSI-DC-09B			31-Aug-16		14:15		Water							7
5		GSI-DC-10B			31-Aug-16		13:00		Water							7
6		MP09-08			31-Aug-16		11:00		Water							7
7		MP09-12			01-Sep-16		9:35		Water							7
8		Trip Blank							Water							9
9		DUP-4			31-Aug-16		11:00		Water							7
10		FB-3			31-Aug-16		11:00		Water							7
11		MP09-03			31-Aug-16		8:45		Water							3
12		GSI-PC-03B			31-Aug-16		10:00		Water						3	
Drinking Water (DW) Samples¹ (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? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				- Please send ELR EQWin EDD file with regular results report.				Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>								
Are samples for human drinking water use? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No								Ice packs Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>								
								Cooling Initiated <input checked="" type="checkbox"/>								
								INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C				
								10				14.0				
SHIPMENT RELEASE (client use)				INITIAL SHIPMENT RECEPTION (lab use only)				FINAL SHIPMENT RECEPTION (lab use only)								
Released by:		Date: Sept. 2/16		Time: 10:00		Received by:		Date: 2-SEP-16		Time: 11:30		Received by: _____				
												Date: _____				
												Time: _____				



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

Date Received: 31-AUG-16
Report Date: 11-OCT-16 14:11 (MT)
Version: FINAL REV. 2

Client Phone: 867-456-4865

Certificate of Analysis

Lab Work Order #: L1822156
Project P.O. #: NOT SUBMITTED
Job Reference: 1343-005.28
C of C Numbers:
Legal Site Desc:

Comments:

11-OCT-2016 This report replaces the previous version and contains a change to a Manganese result due to re-analysis of the sample

Brent Mack, B.Sc.
Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1822156-1 Water 29-AUG-16 15:45 CH-P-13-03/50	L1822156-2 Water 29-AUG-16 10:30 GSI-HA-04A	L1822156-3 Water 29-AUG-16 11:25 MW09-16	L1822156-4 Water 29-AUG-16 12:35 MW09-18	L1822156-5 Water 29-AUG-16 13:45 MW09-19	
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	2250	862	1760	2770	2200
	Hardness (as CaCO3) (mg/L)	1400	487	1120	1890	1440
	pH (pH)	7.62	7.38	7.65	7.87	7.44
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	376	170	327	529	524
	Ammonia, Total (as N) (mg/L)	0.0151	0.184	<0.0050	<0.0050	3.42
	Bromide (Br) (mg/L)					
	Chloride (Cl) (mg/L)	<2.5 ^{DLA}	<0.50	<2.5 ^{DLA}	<2.5 ^{DLA}	<2.5 ^{DLA}
	Fluoride (F) (mg/L)	0.16	0.058	0.15	0.11	0.10
	Nitrate (as N) (mg/L)	2.72	<0.0050	0.174	0.046	<0.025 ^{DLA}
	Nitrite (as N) (mg/L)	<0.0050 ^{DLA}	<0.0010	<0.0050	<0.0050 ^{DLA}	<0.0050 ^{DLA}
	Total Kjeldahl Nitrogen (mg/L)	0.58	0.840	0.148	0.119	4.07
	Sulfate (SO4) (mg/L)	1140	316	835	1490	1000
	Anion Sum (meq/L)	31.5	9.97	23.9	41.7	31.4
	Cation Sum (meq/L)	30.3	10.5	22.9	38.4	30.8
	Cation - Anion Balance (%)	-2.0	2.7	-2.2	-4.1	-0.9
	Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050 ^{HTP}
Cyanide, Total (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050 ^{HTP}	<0.0050
Thiocyanate (SCN) (mg/L)		<0.50	<0.50	<0.50	<0.50	0.55
Cyanide, Free (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050 ^{HTP}	<0.0050
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	90.5	45.9	86.1	137	139
	Total Organic Carbon (mg/L)	30.2	15.7	3.35	3.36	24.1
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

11-OCT-16 14:11 (MT)

Version: FINAL REV. 2

Sample ID Description Sampled Date Sampled Time Client ID	L1822156-6 Water 29-AUG-16 17:20 MW09-22	L1822156-7 Water 29-AUG-16 09:20 GSI-HA-03A	L1822156-8 Water TRAVEL BLANK	L1822156-9 Water 29-AUG-16 11:25 DUP-1	L1822156-10 Water 29-AUG-16 11:25 FB-1	
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	593	669	<2.0	1750	<2.0
	Hardness (as CaCO3) (mg/L)	287	364	<0.50 ^{HTC}	1100	<0.50
	pH (pH)	7.50	7.81	5.56	7.77	5.32
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	138	131	<1.0	330	<1.0
	Ammonia, Total (as N) (mg/L)	1.09		<0.0050	<0.0050	<0.0050
	Bromide (Br) (mg/L)					
	Chloride (Cl) (mg/L)	<0.50	0.74	<0.50	<2.5 ^{DLA}	<0.50
	Fluoride (F) (mg/L)	0.088	0.050	<0.020	0.15	<0.020
	Nitrate (as N) (mg/L)	0.187	0.0193	<0.0050	0.182	<0.0050
	Nitrite (as N) (mg/L)	0.0646	<0.0010	<0.0010	<0.0050 ^{DLA}	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	2.11	0.56 ^{PEHT}	<0.050	0.117	<0.050
	Sulfate (SO4) (mg/L)	182	234	<0.30	825	<0.30
	Anion Sum (meq/L)	6.57	7.51	<0.10	23.8	<0.10
	Cation Sum (meq/L)	7.59	9.39	<0.10	22.6	<0.10
	Cation - Anion Balance (%)	7.2	11.1	0.0	-2.5	0.0
	Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.050 ^{DLM}	<0.0050	<0.0050
Cyanide, Total (mg/L)		0.0102	<0.050 ^{DLM}	<0.0050	<0.0050	<0.0050
Thiocyanate (SCN) (mg/L)		<0.50		<0.50	<0.50	<0.50
Cyanide, Free (mg/L)		<0.0050	<0.050 ^{DLM}	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	39.4		<0.50	83.8	<0.50
	Total Organic Carbon (mg/L)	14.3		<0.50	3.23	<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)			<0.000020		
	Bismuth (Bi)-Total (mg/L)			<0.000050		
	Boron (B)-Total (mg/L)			<0.010		
	Cadmium (Cd)-Total (mg/L)			<0.0000050		
	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)			<0.0010		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

11-OCT-16 14:11 (MT)

Version: FINAL REV. 2

Sample ID Description Sampled Date Sampled Time Client ID	L1822156-11 Water 30-AUG-16 14:00 GSI-HA-03A	L1822156-12 Water 30-AUG-16 12:55 GSI-DC-02B	L1822156-13 Water 30-AUG-16 15:25 GSI-DC-03B	L1822156-14 Water 30-AUG-16 14:30 GSI-DC-05B	L1822156-15 Water 30-AUG-16 13:10 GSI-HA-01A	
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)		1020	1210	1300	1140
	Hardness (as CaCO3) (mg/L)		608	737	796	691
	pH (pH)		7.69	7.68	7.42	7.89
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)		289	265	255	291
	Ammonia, Total (as N) (mg/L)	0.392	1.12	0.277	0.899	0.0480
	Bromide (Br) (mg/L)					
	Chloride (Cl) (mg/L)		<1.0 ^{DLA}	<1.0 ^{DLA}	<1.0 ^{DLA}	<1.0 ^{DLA}
	Fluoride (F) (mg/L)		0.062	0.123	0.074	0.137
	Nitrate (as N) (mg/L)		<0.010 ^{DLA}	0.044	<0.010 ^{DLA}	0.011 ^{DLA}
	Nitrite (as N) (mg/L)		<0.0020 ^{DLA}	<0.0020 ^{DLA}	<0.0020 ^{DLA}	<0.0020 ^{DLA}
	Total Kjeldahl Nitrogen (mg/L)	0.658	1.55	0.578	1.64	0.240
	Sulfate (SO4) (mg/L)		326	474	550	405
	Anion Sum (meq/L)		12.6	15.2	16.5	14.3
	Cation Sum (meq/L)		15.0	15.2	16.9	14.2
	Cation - Anion Balance (%)		8.8	0.0	1.0	-0.3
Cyanides	Cyanide, Weak Acid Diss (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)		<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
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	49.3	77.1	65.7	64.7	71.2
	Total Organic Carbon (mg/L)	7.80	11.8	7.47	12.5	4.95
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	L1822156-16	L1822156-17	L1822156-18	L1822156-19	L1822156-20
		Description	Water	Water	Water	Water	Water
		Sampled Date	30-AUG-16	30-AUG-16	30-AUG-16	30-AUG-16	30-AUG-16
		Sampled Time	13:45	14:20	10:05	10:55	17:00
		Client ID	GSI-HA-02A	GSI-HA-05A	MP09-04	MP09-05	MP09-09
Grouping	Analyte						
WATER							
Physical Tests	Conductivity (uS/cm)		988	794	2530	1960	534
	Hardness (as CaCO3) (mg/L)		568	456	1490	1080	204
	pH (pH)		7.30	7.37	8.04	7.27	8.90
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)		222	158	91.0	307	99.9
	Ammonia, Total (as N) (mg/L)		1.00	0.291	9.48	6.35	3.91
	Bromide (Br) (mg/L)						
	Chloride (Cl) (mg/L)		<1.0 ^{DLA}	<0.50	<2.5 ^{DLA}	<2.5 ^{DLA}	4.93
	Fluoride (F) (mg/L)		0.052	0.059	0.42	<0.10 ^{DLA}	1.81
	Nitrate (as N) (mg/L)		0.044	0.0238	0.331	3.66	0.0058
	Nitrite (as N) (mg/L)		<0.0020 ^{DLA}	0.0064	0.0502	<0.0050 ^{DLA}	<0.0010
	Total Kjeldahl Nitrogen (mg/L)		1.56	10.4	10.1	7.98	5.97
	Sulfate (SO4) (mg/L)		350	296	1640	908	148
	Anion Sum (meq/L)		11.7	9.32	36.0	25.3	5.31
	Cation Sum (meq/L)		14.5	9.78	33.3	24.5	6.10
	Cation - Anion Balance (%)		10.4	2.4	-3.8	-1.5	6.9
Cyanides	Cyanide, Weak Acid Diss (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050	1.36
	Cyanide, Total (mg/L)		<0.0050	<0.0050	<0.0050	0.0083	1.93
	Thiocyanate (SCN) (mg/L)		<0.50	<0.50	<0.50	<0.50	1.12
	Cyanide, Free (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050	1.15
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)		55.3	38.1	53.4	80.5	13.6
	Total Organic Carbon (mg/L)		14.9	146	7.11	17.4	37.0
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

11-OCT-16 14:11 (MT)

Version: FINAL REV. 2

		Sample ID	L1822156-21	L1822156-22	L1822156-23	L1822156-24	L1822156-25
		Description	Water	Water	Water	Water	Water
		Sampled Date	30-AUG-16	30-AUG-16	30-AUG-16	30-AUG-16	30-AUG-16
		Sampled Time	18:35	13:40	11:20	11:50	14:45
		Client ID	MP09-11	MW09-02	MW09-03	MW09-04	MW09-06
Grouping	Analyte						
WATER							
Physical Tests	Conductivity (uS/cm)		710	2500	2530	1160	1490
	Hardness (as CaCO3) (mg/L)		350	1390	1530	708	852
	pH (pH)		7.66	6.64	7.82	7.43	7.48
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)		414	65.1	111	263	162
	Ammonia, Total (as N) (mg/L)		15.1	9.51	6.59	<0.0050	0.142
	Bromide (Br) (mg/L)						
	Chloride (Cl) (mg/L)		<0.50	<2.5 ^{DLA}	<2.5 ^{DLA}	<1.0 ^{DLA}	<1.0 ^{DLA}
	Fluoride (F) (mg/L)		0.625	0.55	0.32	<0.040 ^{DLA}	0.261
	Nitrate (as N) (mg/L)		<0.0050	<0.025 ^{DLA}	0.906	2.26	0.016
	Nitrite (as N) (mg/L)		0.0193	<0.0050 ^{DLA}	<0.0050 ^{DLA}	<0.0020 ^{DLA}	<0.0020 ^{DLA}
	Total Kjeldahl Nitrogen (mg/L)		17.4	10.7	7.53	0.32	0.507
	Sulfate (SO4) (mg/L)		3.26	1580	1590	446	739
	Anion Sum (meq/L)		8.37	34.3	35.3	14.7	18.6
	Cation Sum (meq/L)		9.45	32.0	33.8	14.6	18.1
	Cation - Anion Balance (%)		6.1	-3.4	-2.2	-0.4	-1.4
	Cyanides	Cyanide, Weak Acid Diss (mg/L)		<0.0050	<0.0050	0.0101	<0.0050
Cyanide, Total (mg/L)			0.0150	0.0258	0.0175	<0.0050	<0.0050
Thiocyanate (SCN) (mg/L)			0.55	<0.50	<0.50	<0.50	<0.50
Cyanide, Free (mg/L)			<0.0050	<0.0050	0.0085	<0.0050	<0.0050
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)		102	17.2	27.5	68.7	39.5
	Total Organic Carbon (mg/L)		33.1	5.92	6.73	6.77	5.54
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

11-OCT-16 14:11 (MT)

Version: FINAL REV. 2

Sample ID Description Sampled Date Sampled Time Client ID	L1822156-26 Water 30-AUG-16 09:10 MW09-08	L1822156-27 Water 30-AUG-16 11:55 MW09-21	L1822156-28 Water 30-AUG-16 10:30 MW09-23	L1822156-29 Water 30-AUG-16 09:35 MW09-24	L1822156-30 Water 30-AUG-16 09:35 DUP-2	
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	189	1850	1440	848	857
	Hardness (as CaCO3) (mg/L)	87.1	1060	857	503	514
	pH (pH)	6.55	6.93	7.35	7.46	7.46
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	105	287	329	311	303
	Ammonia, Total (as N) (mg/L)	2.23		2.41	0.0112	0.0109
	Bromide (Br) (mg/L)					
	Chloride (Cl) (mg/L)	<0.50	<2.5 ^{DLA}	<1.0 ^{DLA}	<0.50	<0.50
	Fluoride (F) (mg/L)	0.147	<0.10 ^{DLA}	0.105 ^{DLA}	0.047	0.048
	Nitrate (as N) (mg/L)	<0.0050	0.054	<0.010 ^{DLA}	1.82	1.79
	Nitrite (as N) (mg/L)	<0.0010	0.0198	<0.0020 ^{DLA}	<0.0010	0.0052
	Total Kjeldahl Nitrogen (mg/L)	2.65	6.78	2.99	0.526	0.53
	Sulfate (SO4) (mg/L)	<0.30	887	551	190	188
	Anion Sum (meq/L)	2.10	24.2	18.1	10.3	10.1
	Cation Sum (meq/L)	3.80	25.8	19.6	10.4	10.6
	Cation - Anion Balance (%)	28.8	3.2	4.1	0.5	2.5
	Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	0.0057	<0.0050	<0.0050
Cyanide, Total (mg/L)		<0.0050	0.0110	0.0236	<0.0050	<0.0050
Thiocyanate (SCN) (mg/L)		0.51	<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)	30.5	70.9	84.9	78.8	79.7
	Total Organic Carbon (mg/L)	27.5	23.1	17.5	10.8	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 Description Sampled Date Sampled Time Client ID	L1822156-31 Water 30-AUG-16 09:35 FB-2	L1822156-32 Water 30-AUG-16 17:00 DUP-3		
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (uS/cm)	<2.0	532		
	Hardness (as CaCO3) (mg/L)	<0.50	212		
	pH (pH)	5.53	9.09		
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	<1.0	98.1		
	Ammonia, Total (as N) (mg/L)	<0.0050	4.34		
	Bromide (Br) (mg/L)		0.251		
	Chloride (Cl) (mg/L)	<0.50	4.94		
	Fluoride (F) (mg/L)	<0.020	1.67		
	Nitrate (as N) (mg/L)	<0.0050	<0.0050		
	Nitrite (as N) (mg/L)	<0.0010	0.0020		
	Total Kjeldahl Nitrogen (mg/L)	<0.050	5.88		
	Sulfate (SO4) (mg/L)	<0.30	148		
	Anion Sum (meq/L)	<0.10	5.28		
	Cation Sum (meq/L)	<0.10	6.21		
	Cation - Anion Balance (%)	0.0	8.2		
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	1.25		
	Cyanide, Total (mg/L)	<0.0050	1.79		
	Thiocyanate (SCN) (mg/L)	<0.50	1.14		
	Cyanide, Free (mg/L)	<0.0050	0.944		
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	<0.50	13.6		
	Total Organic Carbon (mg/L)	<0.50	37.1		
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 Description Sampled Date Sampled Time Client ID	L1822156-1 Water 29-AUG-16 15:45 CH-P-13-03/50	L1822156-2 Water 29-AUG-16 10:30 GSI-HA-04A	L1822156-3 Water 29-AUG-16 11:25 MW09-16	L1822156-4 Water 29-AUG-16 12:35 MW09-18	L1822156-5 Water 29-AUG-16 13:45 MW09-19
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)					
	Zirconium (Zr)-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)	0.0066	0.0284	0.0010	<0.0020 ^{DLA}	0.0101 ^{DLA}
	Antimony (Sb)-Dissolved (mg/L)	0.00096	0.00047	0.0602	0.00036	<0.00020 ^{DLA}
	Arsenic (As)-Dissolved (mg/L)	0.00046	0.0342	0.0113	0.0554	0.140
	Barium (Ba)-Dissolved (mg/L)	0.0275	0.144	0.0145	0.00893	0.0496
	Beryllium (Be)-Dissolved (mg/L)	<0.000040 ^{DLA}	<0.000020	<0.000020	<0.000040 ^{DLA}	<0.000040 ^{DLA}
	Bismuth (Bi)-Dissolved (mg/L)	<0.00010 ^{DLA}	<0.000050	<0.000050	<0.00010 ^{DLA}	<0.00010 ^{DLA}
	Boron (B)-Dissolved (mg/L)	<0.020 ^{DLA}	<0.010	0.099	<0.020 ^{DLA}	0.336 ^{DLA}
	Cadmium (Cd)-Dissolved (mg/L)	0.000463	0.0000085	0.0270	0.000063	<0.000010 ^{DLA}
	Calcium (Ca)-Dissolved (mg/L)	364	125	259	349	308
	Chromium (Cr)-Dissolved (mg/L)	<0.00020 ^{DLA}	0.00021	<0.00010	<0.00020 ^{DLA}	0.00030
	Cobalt (Co)-Dissolved (mg/L)	<0.00020 ^{DLA}	0.00022	0.00013	<0.00020 ^{DLA}	0.00164 ^{DLA}
	Copper (Cu)-Dissolved (mg/L)	0.00445	<0.00020	0.00612	<0.00040 ^{DLA}	<0.00040 ^{DLA}
	Iron (Fe)-Dissolved (mg/L)	0.012	8.16	<0.010	0.013	15.0
	Lead (Pb)-Dissolved (mg/L)	<0.00010 ^{DLA}	0.000057	0.00642	<0.00010 ^{DLA}	<0.00010 ^{DLA}
	Lithium (Li)-Dissolved (mg/L)	0.0034	0.0029	0.0114	0.0230	0.0132

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1822156-6	L1822156-7	L1822156-8	L1822156-9	L1822156-10
		Description	Water	Water	Water	Water	Water
		Sampled Date	29-AUG-16	29-AUG-16		29-AUG-16	29-AUG-16
		Sampled Time	17:20	09:20		11:25	11:25
		Client ID	MW09-22	GSI-HA-03A	TRAVEL BLANK	DUP-1	FB-1
Grouping	Analyte						
WATER							
Total Metals	Magnesium (Mg)-Total (mg/L)				<0.10		
	Manganese (Mn)-Total (mg/L)				<0.00010		
	Mercury (Hg)-Total (mg/L)				<0.0000050		
	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)				<0.000050		
	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)				<0.00030		
	Uranium (U)-Total (mg/L)				<0.000010		
	Vanadium (V)-Total (mg/L)				<0.00050		
	Zinc (Zn)-Total (mg/L)				<0.0030		
	Zirconium (Zr)-Total (mg/L)				<0.00030		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD			FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0481	0.0229			0.0022	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	0.00012	0.00064			0.0605	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.0111	0.0238			0.0121	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0654	0.0532			0.0149	<0.000050
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020			<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	0.029	<0.010			0.097	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	0.0000240	0.000184			0.0271	<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	101	92.3			254	<0.050
	Chromium (Cr)-Dissolved (mg/L)	0.00089	0.00274			<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00533	0.00028			0.00013	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00123	0.00095			0.00623	<0.00020
	Iron (Fe)-Dissolved (mg/L)	15.2	33.5			<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	0.000059	0.000180			0.00645	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010			0.0113	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1822156-11	L1822156-12	L1822156-13	L1822156-14	L1822156-15
		Description	Water	Water	Water	Water	Water
		Sampled Date	30-AUG-16	30-AUG-16	30-AUG-16	30-AUG-16	30-AUG-16
		Sampled Time	14:00	12:55	15:25	14:30	13:10
		Client ID	GSI-HA-03A	GSI-DC-02B	GSI-DC-03B	GSI-DC-05B	GSI-HA-01A
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)						
	Zirconium (Zr)-Total (mg/L)						
Dissolved Metals	Dissolved Mercury Filtration Location			FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location			FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)			0.0180	0.0058	0.0081	0.0014
	Antimony (Sb)-Dissolved (mg/L)			0.00025	0.00080	0.00027	0.00017
	Arsenic (As)-Dissolved (mg/L)			0.162	0.00087	0.0385	0.00287
	Barium (Ba)-Dissolved (mg/L)			0.227	0.0253	0.0379	0.147
	Beryllium (Be)-Dissolved (mg/L)			<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)			<0.010	<0.010	0.013	<0.010
	Cadmium (Cd)-Dissolved (mg/L)			0.0000168	0.000656	0.0000124	0.0000120
	Calcium (Ca)-Dissolved (mg/L)			155	190	187	180
	Chromium (Cr)-Dissolved (mg/L)			0.00024	0.00136	0.00011	<0.00010
	Cobalt (Co)-Dissolved (mg/L)			0.00275	0.00106	0.00303	0.00046
	Copper (Cu)-Dissolved (mg/L)			<0.00020	0.00294	<0.00020	0.00044
	Iron (Fe)-Dissolved (mg/L)			42.7	0.013	6.67	0.825
	Lead (Pb)-Dissolved (mg/L)			<0.000050	0.000110	0.000068	<0.000050
	Lithium (Li)-Dissolved (mg/L)			<0.0010	0.0051	0.0020	0.0077

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1822156-16 Water 30-AUG-16 13:45 GSI-HA-02A	L1822156-17 Water 30-AUG-16 14:20 GSI-HA-05A	L1822156-18 Water 30-AUG-16 10:05 MP09-04	L1822156-19 Water 30-AUG-16 10:55 MP09-05	L1822156-20 Water 30-AUG-16 17:00 MP09-09
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)					
	Zirconium (Zr)-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)	0.0175	0.0329	0.0021	0.0148	<0.0050 ^{DLA}
	Antimony (Sb)-Dissolved (mg/L)	0.00019	0.00049	0.291	0.00037	0.120
	Arsenic (As)-Dissolved (mg/L)	0.0283	0.0256	3.52	0.0128	23.4
	Barium (Ba)-Dissolved (mg/L)	0.161	0.133	0.0111	0.0578	0.00056
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000040 ^{DLA}	<0.000040 ^{DLA}	<0.00010 ^{DLA}
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.00010 ^{DLA}	<0.00010 ^{DLA}	<0.00025 ^{DLA}
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	0.236	0.155	0.191
	Cadmium (Cd)-Dissolved (mg/L)	0.0000357	0.0000094	0.000046	0.00129	0.000769
	Calcium (Ca)-Dissolved (mg/L)	142	116	462	332	80.7
	Chromium (Cr)-Dissolved (mg/L)	0.00028	0.00029	<0.00020 ^{DLA}	0.00040	<0.00050 ^{DLA}
	Cobalt (Co)-Dissolved (mg/L)	0.00152	0.00020	0.00117	0.0170	0.0468
	Copper (Cu)-Dissolved (mg/L)	0.00025	0.00022	<0.00040 ^{DLA}	0.00587	0.214
	Iron (Fe)-Dissolved (mg/L)	47.5	6.60	<0.010	3.84	0.174
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	0.00047	<0.00010 ^{DLA}	0.00054
	Lithium (Li)-Dissolved (mg/L)	<0.0010	0.0021	0.0114	<0.0020 ^{DLA}	<0.0050 ^{DLA}

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1822156-21 Water 30-AUG-16 18:35 MP09-11	L1822156-22 Water 30-AUG-16 13:40 MW09-02	L1822156-23 Water 30-AUG-16 11:20 MW09-03	L1822156-24 Water 30-AUG-16 11:50 MW09-04	L1822156-25 Water 30-AUG-16 14:45 MW09-06
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)					
	Zirconium (Zr)-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)	0.0207	<0.0050 ^{DLA}	0.0172	0.0011	0.0013
	Antimony (Sb)-Dissolved (mg/L)	0.0172	0.00486	0.378	0.00155	0.287
	Arsenic (As)-Dissolved (mg/L)	4.58	13.8	2.26	0.00096	0.124
	Barium (Ba)-Dissolved (mg/L)	0.235	0.00512	0.0228	0.0699	0.00632
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.00010 ^{DLA}	<0.000040 ^{DLA}	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	0.000159	<0.00025 ^{DLA}	<0.00010 ^{DLA}	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	0.032	0.083	0.224	0.012	0.131
	Cadmium (Cd)-Dissolved (mg/L)	0.000541	0.000933	0.000364	0.0000690	0.00553
	Calcium (Ca)-Dissolved (mg/L)	76.8	457	465	187	275
	Chromium (Cr)-Dissolved (mg/L)	0.00155	<0.00050 ^{DLA}	<0.00020 ^{DLA}	0.00018	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00149	0.0115	0.00188	0.00017	0.00091
	Copper (Cu)-Dissolved (mg/L)	0.00141	<0.0010 ^{DLA}	0.00150	0.00273	0.00509
	Iron (Fe)-Dissolved (mg/L)	15.0	18.1	0.017	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	0.0560	<0.00025 ^{DLA}	<0.00010 ^{DLA}	<0.000050	0.000282
	Lithium (Li)-Dissolved (mg/L)	0.0012	0.0157	<0.0020 ^{DLA}	<0.0010	0.0123

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1822156-26 Water 30-AUG-16 09:10 MW09-08	L1822156-27 Water 30-AUG-16 11:55 MW09-21	L1822156-28 Water 30-AUG-16 10:30 MW09-23	L1822156-29 Water 30-AUG-16 09:35 MW09-24	L1822156-30 Water 30-AUG-16 09:35 DUP-2
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)					
	Zirconium (Zr)-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)	0.105	0.0431	0.0401	0.0032	0.0035
	Antimony (Sb)-Dissolved (mg/L)	0.00028	0.00028	0.00021	0.00017	0.00018
	Arsenic (As)-Dissolved (mg/L)	0.110	0.0535	0.0353	0.00158	0.00151
	Barium (Ba)-Dissolved (mg/L)	0.107	0.143	0.0466	0.0707	0.0708
	Beryllium (Be)-Dissolved (mg/L)	0.000026	<0.000020	<0.000040 ^{DLA}	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.00010 ^{DLA}	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	0.115	0.070	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	0.000186	0.000018	0.0000511	0.0000518
	Calcium (Ca)-Dissolved (mg/L)	25.5	298	216	138	141
	Chromium (Cr)-Dissolved (mg/L)	0.00134	0.00093	0.00047	0.00031	0.00031
	Cobalt (Co)-Dissolved (mg/L)	0.00078	0.0156	0.0107	0.00013	0.00013
	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.00315	<0.00040 ^{DLA}	0.00666	0.00679
	Iron (Fe)-Dissolved (mg/L)	31.8	15.3	15.7	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	0.000190	<0.000050	<0.00010 ^{DLA}	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0020 ^{DLA}	<0.0010	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1822156-31 Water 30-AUG-16 09:35 FB-2	L1822156-32 Water 30-AUG-16 17:00 DUP-3		
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)				
	Zirconium (Zr)-Total (mg/L)				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	<0.0010	0.0070		
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	0.118		
	Arsenic (As)-Dissolved (mg/L)	<0.00010	25.0		
	Barium (Ba)-Dissolved (mg/L)	<0.000050	0.00062		
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.00010 ^{DLA}		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.00025 ^{DLA}		
	Boron (B)-Dissolved (mg/L)	<0.010	0.197		
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	0.000792		
	Calcium (Ca)-Dissolved (mg/L)	<0.050	83.8		
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00050 ^{DLA}		
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	0.0436		
	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.397		
	Iron (Fe)-Dissolved (mg/L)	<0.010	0.175		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	0.00053		
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0050 ^{DLA}		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

11-OCT-16 14:11 (MT)

Version: FINAL REV. 2

Sample ID Description Sampled Date Sampled Time Client ID		L1822156-1 Water 29-AUG-16 15:45 CH-P-13-03/50	L1822156-2 Water 29-AUG-16 10:30 GSI-HA-04A	L1822156-3 Water 29-AUG-16 11:25 MW09-16	L1822156-4 Water 29-AUG-16 12:35 MW09-18	L1822156-5 Water 29-AUG-16 13:45 MW09-19
Grouping	Analyte					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	120	42.3	114	246	162
	Manganese (Mn)-Dissolved (mg/L)	0.207	2.49	0.0217	0.308	4.95
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.00065	0.000110	0.000076	<0.00010 ^{DLA}	<0.00010 ^{DLA}
	Nickel (Ni)-Dissolved (mg/L)	0.0145	<0.00050	0.00426	<0.0010 ^{DLA}	0.0013
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	0.153
	Potassium (K)-Dissolved (mg/L)	7.23	2.63	6.01	7.15	7.82
	Selenium (Se)-Dissolved (mg/L)	0.00639	0.000107	0.000097	0.00057	0.00032
	Silicon (Si)-Dissolved (mg/L)	6.05	8.74	5.61	4.75	9.55
	Silver (Ag)-Dissolved (mg/L)	<0.000020 ^{DLA}	<0.000010	0.000017	<0.000020 ^{DLA}	<0.000020 ^{DLA}
	Sodium (Na)-Dissolved (mg/L)	47.5	4.38	8.32	12.6	15.6
	Strontium (Sr)-Dissolved (mg/L)	0.861	0.328	0.594	0.975	0.999
	Sulfur (S)-Dissolved (mg/L)	356	106	254	439	312
	Thallium (Tl)-Dissolved (mg/L)	0.000052	<0.000010	0.000285	0.000273	<0.000020 ^{DLA}
	Tin (Sn)-Dissolved (mg/L)	0.00225	<0.00010	<0.00010	<0.00020 ^{DLA}	<0.00020 ^{DLA}
	Titanium (Ti)-Dissolved (mg/L)	<0.00060 ^{DLA}	0.00106	<0.00030	<0.00060 ^{DLA}	0.00106
	Uranium (U)-Dissolved (mg/L)	0.0122	0.000112	0.00287	0.00774	0.000559
	Vanadium (V)-Dissolved (mg/L)	<0.0010 ^{DLA}	0.00072	<0.00050	<0.0010 ^{DLA}	0.0011
	Zinc (Zn)-Dissolved (mg/L)	0.0138	0.0047	3.54	0.0037	<0.0020 ^{DLA}
	Zirconium (Zr)-Dissolved (mg/L)	<0.00060 ^{DLA}	<0.00030	<0.00030	<0.00060 ^{DLA}	<0.00060 ^{DLA}

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1822156-6	L1822156-7	L1822156-8	L1822156-9	L1822156-10
		Description	Water	Water	Water	Water	Water
		Sampled Date	29-AUG-16	29-AUG-16		29-AUG-16	29-AUG-16
		Sampled Time	17:20	09:20		11:25	11:25
		Client ID	MW09-22	GSI-HA-03A	TRAVEL BLANK	DUP-1	FB-1
Grouping	Analyte						
WATER							
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)		8.41	32.5		113	<0.10
	Manganese (Mn)-Dissolved (mg/L)		2.88	3.10		0.0233	<0.00010
	Mercury (Hg)-Dissolved (mg/L)		0.0000060	<0.0000050		<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)		0.000454	0.00135		0.000073	<0.000050
	Nickel (Ni)-Dissolved (mg/L)		0.00112	0.00637		0.00435	<0.00050
	Phosphorus (P)-Dissolved (mg/L)		<0.050	<0.050		<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)		3.22	1.47		5.84	<0.10
	Selenium (Se)-Dissolved (mg/L)		0.000221	0.000056		0.000106	<0.000050
	Silicon (Si)-Dissolved (mg/L)		4.68	5.50		5.51	<0.050
	Silver (Ag)-Dissolved (mg/L)		0.000028	<0.000010		0.000024	<0.000010
	Sodium (Na)-Dissolved (mg/L)		17.8	3.57		8.40	<0.050
	Strontium (Sr)-Dissolved (mg/L)		0.340	0.268		0.593	<0.00020
	Sulfur (S)-Dissolved (mg/L)		64.7	77.8		255	<0.50
	Thallium (Tl)-Dissolved (mg/L)		<0.000010	<0.000010		0.000287	<0.000010
	Tin (Sn)-Dissolved (mg/L)		<0.00010	<0.00010		<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)		0.00182	0.00098		<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)		0.000187	0.000025		0.00290	<0.000010
	Vanadium (V)-Dissolved (mg/L)		0.00189	0.00052		<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)		0.0029	0.0138		3.63	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)		0.00049	<0.00030		<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1822156-11	L1822156-12	L1822156-13	L1822156-14	L1822156-15
		Description	Water	Water	Water	Water	Water
		Sampled Date	30-AUG-16	30-AUG-16	30-AUG-16	30-AUG-16	30-AUG-16
		Sampled Time	14:00	12:55	15:25	14:30	13:10
		Client ID	GSI-HA-03A	GSI-DC-02B	GSI-DC-03B	GSI-DC-05B	GSI-HA-01A
Grouping	Analyte						
WATER							
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)			53.5	63.6	79.9	58.9
	Manganese (Mn)-Dissolved (mg/L)			4.04	2.32	3.32	0.122
	Mercury (Hg)-Dissolved (mg/L)			<0.0000050	0.000013 ^{DLIS}	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)			0.000365	0.00143	0.000574	0.000190
	Nickel (Ni)-Dissolved (mg/L)			0.00311	0.00923	0.00359	0.00139
	Phosphorus (P)-Dissolved (mg/L)			<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)			3.55	2.67	2.60	3.74
	Selenium (Se)-Dissolved (mg/L)			0.000075	0.000210	0.000069	<0.000050
	Silicon (Si)-Dissolved (mg/L)			9.03	7.66	7.73	6.51
	Silver (Ag)-Dissolved (mg/L)			<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)			4.91	6.18	8.39	4.88
	Strontium (Sr)-Dissolved (mg/L)			0.367	0.489	0.605	0.432
	Sulfur (S)-Dissolved (mg/L)			109	155	177	132
	Thallium (Tl)-Dissolved (mg/L)			<0.000010	0.000013	0.000011	<0.000010
	Tin (Sn)-Dissolved (mg/L)			<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)			0.00079	<0.00030	0.00039	<0.00030
	Uranium (U)-Dissolved (mg/L)			0.000187	0.00114	0.00163	0.000187
	Vanadium (V)-Dissolved (mg/L)			0.00083	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)			0.0051	0.0193	0.0020	0.0055
	Zirconium (Zr)-Dissolved (mg/L)			<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1822156-16 Water 30-AUG-16 13:45 GSI-HA-02A	L1822156-17 Water 30-AUG-16 14:20 GSI-HA-05A	L1822156-18 Water 30-AUG-16 10:05 MP09-04	L1822156-19 Water 30-AUG-16 10:55 MP09-05	L1822156-20 Water 30-AUG-16 17:00 MP09-09
Grouping	Analyte					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	51.8	40.3	81.6	61.4	0.52
	Manganese (Mn)-Dissolved (mg/L)	5.29	1.66	7.21	6.85	0.0352
	Mercury (Hg)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.0000395
	Molybdenum (Mo)-Dissolved (mg/L)	0.000659	0.000166	0.00675	0.00046	0.0138
	Nickel (Ni)-Dissolved (mg/L)	0.00547	<0.00050	<0.0010 ^{DLA}	0.0023	0.0113
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	0.076	<0.050	0.392
	Potassium (K)-Dissolved (mg/L)	3.52	2.44	51.1	9.48	9.05
	Selenium (Se)-Dissolved (mg/L)	<0.000050	0.000097	<0.00010 ^{DLA}	0.00013	0.00110
	Silicon (Si)-Dissolved (mg/L)	7.43	9.02	14.0	4.40	7.15
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000020 ^{DLA}	<0.000020 ^{DLA}	0.00151
	Sodium (Na)-Dissolved (mg/L)	4.92	4.02	30.0	40.5	34.6
	Strontium (Sr)-Dissolved (mg/L)	0.424	0.308	1.19	0.880	0.124
	Sulfur (S)-Dissolved (mg/L)	116	99.5	466	279	52.7
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	0.000116 ^{DLA}	0.000109 ^{DLA}	0.000051 ^{DLA}
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00050 ^{DLA}
	Titanium (Ti)-Dissolved (mg/L)	0.00064	0.00103	<0.00060 ^{DLA}	<0.00060 ^{DLA}	<0.0015 ^{DLA}
	Uranium (U)-Dissolved (mg/L)	0.000351	0.000085	0.000194 ^{DLA}	0.00161 ^{DLA}	0.00189 ^{DLA}
	Vanadium (V)-Dissolved (mg/L)	<0.00050	0.00071	<0.0010 ^{DLA}	<0.0010 ^{DLA}	<0.0025 ^{DLA}
	Zinc (Zn)-Dissolved (mg/L)	0.0362	0.0027	0.554 ^{DLA}	0.0116 ^{DLA}	0.0068 ^{DLA}
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00060 ^{DLA}	<0.00060 ^{DLA}	<0.0015 ^{DLA}

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1822156-21 Water 30-AUG-16 18:35 MP09-11	L1822156-22 Water 30-AUG-16 13:40 MW09-02	L1822156-23 Water 30-AUG-16 11:20 MW09-03	L1822156-24 Water 30-AUG-16 11:50 MW09-04	L1822156-25 Water 30-AUG-16 14:45 MW09-06	
Grouping	Analyte					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	38.4	60.5	91.0	58.2	40.2
	Manganese (Mn)-Dissolved (mg/L)	1.62	22.1	19.1	0.00077	2.15
	Mercury (Hg)-Dissolved (mg/L)	0.0000070	<0.0000050	<0.0000050	<0.0000050	0.0000062
	Molybdenum (Mo)-Dissolved (mg/L)	0.00246	0.00740	0.00574	0.000204	0.00317
	Nickel (Ni)-Dissolved (mg/L)	0.00479	0.0101	0.0010	<0.00050	0.00174
	Phosphorus (P)-Dissolved (mg/L)	0.080	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	6.48	29.0	28.7	1.80	15.1
	Selenium (Se)-Dissolved (mg/L)	0.000264	<0.00025 ^{DLA}	<0.00010 ^{DLA}	0.000737	0.000259
	Silicon (Si)-Dissolved (mg/L)	10.1	7.11	12.1	5.90	8.57
	Silver (Ag)-Dissolved (mg/L)	0.000046	<0.000050 ^{DLA}	<0.000020 ^{DLA}	<0.000010	0.000041
	Sodium (Na)-Dissolved (mg/L)	8.09	24.0	28.1	9.21	14.6
	Strontium (Sr)-Dissolved (mg/L)	0.655	1.13	1.37	0.470	0.626
	Sulfur (S)-Dissolved (mg/L)	1.65	452	486	142	232
	Thallium (Tl)-Dissolved (mg/L)	0.000304	0.000278 ^{DLA}	0.000027 ^{DLA}	<0.000010	0.000296
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00050 ^{DLA}	<0.00020 ^{DLA}	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	0.00259	<0.0015 ^{DLA}	<0.00060 ^{DLA}	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000183	0.00109	0.00108	0.00454	0.00126
	Vanadium (V)-Dissolved (mg/L)	0.00869	<0.0025 ^{DLA}	<0.0010 ^{DLA}	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0475	0.352 ^{DLA}	0.0034 ^{DLA}	0.0044	0.113
	Zirconium (Zr)-Dissolved (mg/L)	0.00218	<0.0015 ^{DLA}	<0.00060 ^{DLA}	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1822156-26	L1822156-27	L1822156-28	L1822156-29	L1822156-30
		Description	Water	Water	Water	Water	Water
		Sampled Date	30-AUG-16	30-AUG-16	30-AUG-16	30-AUG-16	30-AUG-16
		Sampled Time	09:10	11:55	10:30	09:35	09:35
		Client ID	MW09-08	MW09-21	MW09-23	MW09-24	DUP-2
Grouping	Analyte						
WATER							
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)		5.69	77.2	77.2	38.6	39.2
	Manganese (Mn)-Dissolved (mg/L)		2.30	5.51	14.7	0.0463	0.0436
	Mercury (Hg)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Molybdenum (Mo)-Dissolved (mg/L)		<0.000050	0.000448	0.00142	0.000339	0.000324
	Nickel (Ni)-Dissolved (mg/L)		<0.00050	0.00170	0.0012	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)		0.120	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)		1.16	11.0	5.67	1.84	1.93
	Selenium (Se)-Dissolved (mg/L)		0.000139	0.000222	0.00011	0.000415	0.000478
	Silicon (Si)-Dissolved (mg/L)		10.2	5.82	6.62	6.48	6.67
	Silver (Ag)-Dissolved (mg/L)		<0.000010	0.000011	<0.000020 ^{DLA}	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)		1.50	46.1	17.4	6.97	6.94
	Strontium (Sr)-Dissolved (mg/L)		0.117	0.824	0.536	0.434	0.412
	Sulfur (S)-Dissolved (mg/L)		1.16	281	184	60.6	60.9
	Thallium (Tl)-Dissolved (mg/L)		<0.000010	0.000015	<0.000020 ^{DLA}	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00020 ^{DLA}	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)		0.00593	0.00208	0.00106	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)		0.000095	0.000815	0.00128	0.00331	0.00314
	Vanadium (V)-Dissolved (mg/L)		0.00473	0.00287	0.0025	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)		0.0066	0.0045	0.0128	0.0010	0.0024
	Zirconium (Zr)-Dissolved (mg/L)		0.00088	0.00086	0.00062	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1822156-31 Water 30-AUG-16 09:35 FB-2	L1822156-32 Water 30-AUG-16 17:00 DUP-3		
Grouping	Analyte				
WATER					
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	<0.10	0.55		
	Manganese (Mn)-Dissolved (mg/L)	<0.00010	0.0231		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	0.0000413		
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	0.0139		
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.0197		
	Phosphorus (P)-Dissolved (mg/L)	<0.050	0.414		
	Potassium (K)-Dissolved (mg/L)	<0.10	10.2		
	Selenium (Se)-Dissolved (mg/L)	<0.000050	0.00118		
	Silicon (Si)-Dissolved (mg/L)	<0.050	7.54		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	0.00690		
	Sodium (Na)-Dissolved (mg/L)	<0.050	32.0		
	Strontium (Sr)-Dissolved (mg/L)	<0.00020	0.124		
	Sulfur (S)-Dissolved (mg/L)	<0.50	54.1		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	0.000063		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00050 ^{DLA}		
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.0015 ^{DLA}		
	Uranium (U)-Dissolved (mg/L)	<0.000010	0.00186 ^{DLA}		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.0025 ^{DLA}		
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	0.0073 ^{DLA}		
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.0015 ^{DLA}		

* 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)
Method Blank	Alkalinity, Total (as CaCO3)	B	L1822156-22, -23, -24, -25, -26, -27, -28, -29, -30, -32
Matrix Spike	Total Inorganic Carbon	MS-B	L1822156-2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32
Matrix Spike	Total Organic Carbon	MS-B	L1822156-15, -19, -20, -21, -26, -27, -28, -32
Matrix Spike	Mercury (Hg)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31,

Reference Information

	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Silicon (Si)-Dissolved	MS-B	-32, -4, -5, -6, -7, -9 L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Aluminum (Al)-Total	MS-B	L1822156-8
Matrix Spike	Barium (Ba)-Total	MS-B	L1822156-8
Matrix Spike	Manganese (Mn)-Total	MS-B	L1822156-8
Matrix Spike	Sodium (Na)-Total	MS-B	L1822156-8
Matrix Spike	Strontium (Sr)-Total	MS-B	L1822156-8
Matrix Spike	Ammonia, Total (as N)	MS-B	L1822156-11, -12, -13, -14, -15, -16, -17, -21, -23, -24, -5, -6
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -7, -9
Matrix Spike	Sulfate (SO ₄)	MS-B	L1822156-1, -10, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Kjeldahl Nitrogen	MS-B	L1822156-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -8, -9
Matrix Spike	Total Kjeldahl Nitrogen	MS-B	L1822156-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -32, -4, -5, -6, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
DLA	Detection Limit adjusted for required dilution
DLIS	Detection Limit Adjusted: Insufficient Sample
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
HTP	Sample preparation or preservation hold time was exceeded.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHT	Parameter Exceeded Recommended Holding Time Prior to Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
CARBONS-TIC-VA	Water	Total inorganic carbon by CO ₂ purge	APHA 5310B TOTAL ORGANIC CARBON (TOC)

Reference Information

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 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CL-IC-N-VA Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CL-IC-N-WR Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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.

F-IC-N-VA Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

F-IC-N-WR Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

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 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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

Reference Information

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 EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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 APHA 4500 NH3-NITROGEN (AMMONIA)

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.

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.

NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO2-L-IC-N-WR Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-WR Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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).

Reference Information

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.

SO4-IC-N-VA Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SO4-IC-N-WR Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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:

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.

APPENDIX D
Response to Client Comments

Response to Client Comments from Draft Report Version (as Received November 1, 2016)

Comment No.	Page	Comment	Response
1	5	<p>While I understand that field notes are preliminary observations taken at the time of sampling and are not necessarily a conclusion on site status – field notes do indicate that this well may be plugged with bentonite. Please confirm.</p> <p>This well was listed as frozen during the June sampling event – is it possible that the well may have been plugged at that point too?</p>	<p>This comment appears to be referring to Well MW09-17. We have reviewed the past information from this well, and it appears that it was dry and had bentonite residue on the bottom, leading to the confusion. During the spring 2016 event a frozen bentonite plug was encountered at 1.31 m below ground, hence the frozen designation (was not classified as blocked as the obstruction was only present due to frozen conditions). During the August 2016 event the DTB measurements were consistent with other previous events (spring blockage was not encountered), suggesting it was dry with bentonite residue.</p> <p>What appears to be happening is that bentonite is leaking in slightly below ground level, likely through a breakage in the well casing.</p>
2	18	Dry or plugged (i.e., with bentonite)? Field notes for this well indicate plugged.	The well was confirmed to be dry, but I have added some text to provide more information about the well being dry with bentonite residue.
3	19	While Table 3-3 does indicate that exceedances of ammonia were reported for GSI-HA-03A and GSI-HA-04A, Table A (analytical results) contradicts Table 3-3. Please double check results and confirm whether there were any exceedances of ammonia in the Mill Complex Area.	We have confirmed that table A is correct, and the issue with Table 3-3 has been corrected.
4	19	Deleted reference to DES for clarity – AAM restricts access to areas on site, while the C&M operator enforces it.	Acknowledged
5	20	I think this should be recorded in the cell above this one? (i.e., exceedance of ammonia at GSI-DC-05B, not GSI-DC-06B)	This is correct and has been corrected.
6	20	Table A indicates that the concentration of ammonia at GSI-HA-03A is 0.392 mg/L (and not an exceedance). Please confirm and adjust if necessary.	Table A has the correct value, and Table 3-3 has been corrected.
7	20	Table A indicates that the concentration of ammonia at GSI-HA-04A is 0.184 mg/L (and not an exceedance). Please confirm and adjust if necessary.	Table A has the correct value, and Table 3-3 has been corrected.
8	22	Table 3-2 indicates that gas measurements were obtained from these destroyed wells – is that correct? Additionally, Table 3-2 lists MP-09-02 as frozen (not destroyed).	These records have been corrected – there should not have been gas measurements indicated for the destroyed wells, nor should MP-09-02 have been noted as being destroyed.