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February 18, 2014

EDI Job Number: 13-Y-0167

Assessment and Abandoned Mines Branch (AAM) K-149
Department of Energy, Mines and Resources, Yukon Government
Room 2C Royal Center, 4114-4th Avenue
PO 2703, Whitehorse, YT, Y1A 2C6

Attention: Adrienne Turcotte, Mount Nansen Project Officer

Re: Mount Nansen Surface Water Quality Field Memo: February 10-12, 2014

Trip Dates:	February 10-12, 2014
EDI Field Staff:	Caleb Light, Trevor Hann and Danny Skookum
Tasks:	Hydrology and Water Quality

Field Summary

EDI completed the surface water quality sampling and hydrometric monitoring at the Mount Nansen Site from February 10 to February 12, 2014. Air temperatures during the trip ranged from -20°C to -40°C. Weather conditions were clear with occasional light winds. All streams and water bodies had ice cover. Ice thickness was variable depending on the location and ranged from 5 cm to greater than 1 m. Some sampling sites were frozen to bed with no detectable flowing water. There was between 20 cm and 40 cm of snow on the ground during the site visit. Water levels at most of the sites were very low.

Several stations and sites were removed from the project scope and not sampled during the February monitoring event. The H-DX, H/WQ-DC-U1, H/WQ-DC-U2, H/WQ-MN, H/WQ-VC-REF and WQ-DRY stations/sites were removed from the monitoring network. One site was added to the scope at WQ-DC-B to replace water quality at the WQ-DC-U1 and WQ-DC-U2 sites. The WQ-PW had been removed from the scope for the January 2014 trip based on discussions with AAM, but was re-added to the scope for the February 2014 trip.

Each section below details additional site and station specific information for the Hydrology (Section 1) and Water Quality (Section 2) programs. Included in the Water Quality section are appendices of water quality parameters that exceeded guidelines and/or the Mount Nansen Effluent Quality Standards, ALS Lab Analysis Reports for the previous trip (January 13-15, 2014) (Appendix A, B). Section 3 contains relevant

photos of field conditions. Section 4 details additional monitoring program comments, noteworthy observations, and any changes to budget or scope moving forward. A map of water quality site and hydrometric stations is provided in Appendix C for reference.

1. Hydrology

All hydrometric stations were visited and station conditions documented, excluding sites that were frozen to substrate on the last trip. Air temperatures were too cold for ADV functioning, so no velocity-area, mid-section method discharge measurements could be completed. Stream discharge measurements were therefore collected at each hydrometric station that was not frozen or dry using the salt tracer method with a salt slug injection. Note air temperatures were also below the YSI equipment manufacturer recommended operating temperatures, and therefore stream discharges using the salt tracer method are considered estimates due to ambient air temperatures at the time of sampling (see Section 4, Additional Comments). Attempts were made to downloaded Levelogger data at the four continuous monitoring stations (H-VC-R, H-VC-DBC, H-VC-U, and H-DC-M), with limited to no success most likely due to the prohibitively cold temperatures.

Water levels at all stations were typical of the winter period, with low discharges. In general, ice thickness ranged from approximately 5 cm to greater than 1 m across the Mount Nansen Site. Table 1 summarizes the hydrometric monitoring program measurements completed at each station and any additional relevant station details.

Table 1. Hydrometric program details.

Hydrology program dates:	February 10-12, 2014
Weather at time of monitoring:	Weather conditions were typically clear and calm, with temperatures between -20°C to -40°C.

Station	Hydrometric Measurement Type	Notes & Comments
ATM-DC2/DC4	None	Both atmospheric barologgers did not download.
H-DC-DX	None	REMOVED FROM SCOPE
H-DC-DX+105	Salt slug	Water levels very low. Salt tracer method used to measure stream discharge. Ice and snow covered.
H-DC-D1b	None	No hydrometric measurement taken, site frozen to substrate.
H-DC-U1	None	REMOVED FROM SCOPE
H-DC-U2	None	REMOVED FROM SCOPE
H-DC-B	None	No hydrometric measurement taken, accumulating overflow ice.
H-DC-M	Salt Slug	Water level very low, channel snow and ice (30 cm thick) covered. Salt tracer used to estimate stream discharge. Logger did not download.
H-DC-R	None	Frozen to substrate. Overflow ice and thick ice conditions were not conducive for hydrometric sampling.

Station	Hydrometric Measurement Type	Notes & Comments
H-VC-REF	None	REMOVED FROM SCOPE
H-VC-U	None	Water level very low. Salt tracer used to measure discharge but did not dissolve. The logger was not downloaded. Channel is snow and ice covered.
H-BC	None	Frozen to substrate.
H-VC-DBC	Salt Slug	Water level low and clear. Salt tracer used to measure discharge. The logger was not downloaded. Channel is snow and ice covered.
H-VC-UMN	Salt Slug	Water levels very low. Salt tracer method used to measure stream discharge. Ice and snow covered.
H-MN	None	REMOVED FROM SCOPE
H-VC-R	Salt Slug	Water level very low and clear. Salt tracer used to estimate discharge 100 m downstream of stilling well due to thick overflow ice. Logger did not download.
H-SEEP	None	No measurement or staff gauge reading taken due to ice cover.
H-TP	None	No staff gauge reading taken due to ice cover.
H-PC-U	None	No hydrometric measurement taken, site frozen to substrate.
H-PC-DSP	None	No hydrometric measurement taken, site frozen to substrate.

2. Water Quality

Water quality samples were collected from all monitoring sites with the exception of those that were either removed from the program (see Section 4.0), dry or had unsuitable conditions for sampling and were considered frozen to substrate. Water levels were low to very low at all sites, with ice cover on all creek sites. Table 2 summarizes the water quality sampling conditions at each site. All water quality samples were delivered to ALS on Wednesday, February 12, 2014. Note an LT50 sample was collected outside of the regular sample schedule for this parameter, which occurs on a bi-monthly basis (every second week). This is the only scheduling and budgetary change.

This memo includes analytical results from samples collected during the January 13-14, 2014 trip (Appendix A) as well as copies of the ALS Certificate of Analysis (Appendix B).

Of note the acute toxicity test conducted for the WQ-SEEP site had a 96-h LT50 result of 10.7 hrs; indicating that the median lethal time at which there was 50% fish mortality was 10.7 hrs. The LT50 test results for this site are always greater than 96 hours, indicating no lethal toxicity (based on records from April 2012 to present). EDI followed up with ALS and Nautilus Environmental on February 18-19, 2014 to look into the report to ensure all Standard Operating Procedures were followed. According to their test fish stock information all parameters were within acceptable standards and their methods were in order. Refer to Appendix B – ALS Analytical Reports for details on the January 2014 test result.

EDI compared the other WQ-SEEP chemical analysis results from January 2014 with those from November 2013, when the previous LT50 samples were collected, and all parameters appeared to be within comparable ranges to previous results. There is no indication of any significant differences in any parameters of concern that would explain the recent 'fail' of the acute toxicity test. Since an LT50 sample was collected during this recent February 10-12, 2014 trip, AAM will receive a second LT50 result to confirm or follow up on the January 2014 test result. Based on the discussions with Nautilus Environmental on February 19, 2014, the February 2014 LT50 sample was mid-way (48 hours) through the test, and there was 100% fish survival, indicating that preliminary results suggest no toxicity issues. The final report from the February 2014 LT50 test is expected February 28, 2014.

Table 2. Water quality sampling program details.

WQ Sampling dates:	February 10-12, 2014
Weather at time of sampling:	Weather conditions were typically clear and calm throughout the sampling event with temperatures ranging from -20°C to -40°C.

Site	**Sampled? (Yes/No)**	**Notes / Explanations**
WQ-PIT1	Yes	Samples taken from just below the ice, total depth of 5.5 meters, ice 0.75 m thick.
WQ-PIT2	Yes	Samples taken from 2.5 m depth.
WQ-PIT3	Yes	Samples taken from 5 m depth.
WQ-SEEP	Yes	Conditions normal for this time of year. Ice build-up around pipe and barrel at the site. LT50 was collected (see Section 4, Scheduling Comments).
WQ-TP	Yes	Ice thickness 40 cm. Sample collected below ice.
WQ-DC-DX	No	No water samples taken, site frozen to substrate.
WQ-DC-DX+105	Yes	Water levels were low to very low.
WQ-DC-D1b	No	No water samples taken, site frozen to substrate.
WQ-DC-U1	No	REMOVED FROM SCOPE.
WQ-DC-U2	No	REMOVED FROM SCOPE.
WQ-DC-B	No	ADDED TO SCOPE, but frozen to substrate (overflow conditions).
WQ-DC-U	Yes	Water levels were low. Sample collected at regular location.
WQ-DC-R	No	No water samples taken, site frozen to substrate. Overflow conditions.
WQ-VC-REF	No	REMOVED FROM SCOPE.
WQ-VC-U	Yes	Water levels were low. Sample collected at regular location.
WQ-BC	No	No water samples taken, site dry.
WQ-VC-DBC	Yes	Water levels were low. Sample taken from regular sample location.
WQ-VC-UMN	Yes	Water levels were low. Water quality samples were collected at the regular sampling location.
WQ-MN	No	REMOVED FROM SCOPE.

Site	Sampled? (Yes/No)	Notes / Explanations
WQ-VC-R+150	Yes	Water levels were low, with significant overflow ice.
WQ-PW	Yes	RE-ADDED TO SCOPE. Drinking water sample collected, but no bacteriological sample collected.
WQ-PC-U	No	No water samples taken, site dry.
WQ-PC-D	No	No water samples taken, site dry.
WQ-ADIT-SEEP	No	No water samples taken, site dry.
WQ-MS-S-03	No	No water samples taken, site is dry.
WQ-DRY	No	REMOVED FROM SCOPE
Quality Assurance/Quality Control Samples		
Field Replicate A	Yes	Collected from H-SEEP
Field Replicate B	No	Not required due to lower number of sites sampled.
Field Blank	Yes	Samples prepared with lab-supplied de-ionized water at the site.
Travel Blank	Yes	Samples provided by lab and were transported to and from site.

3. Trip Photographs

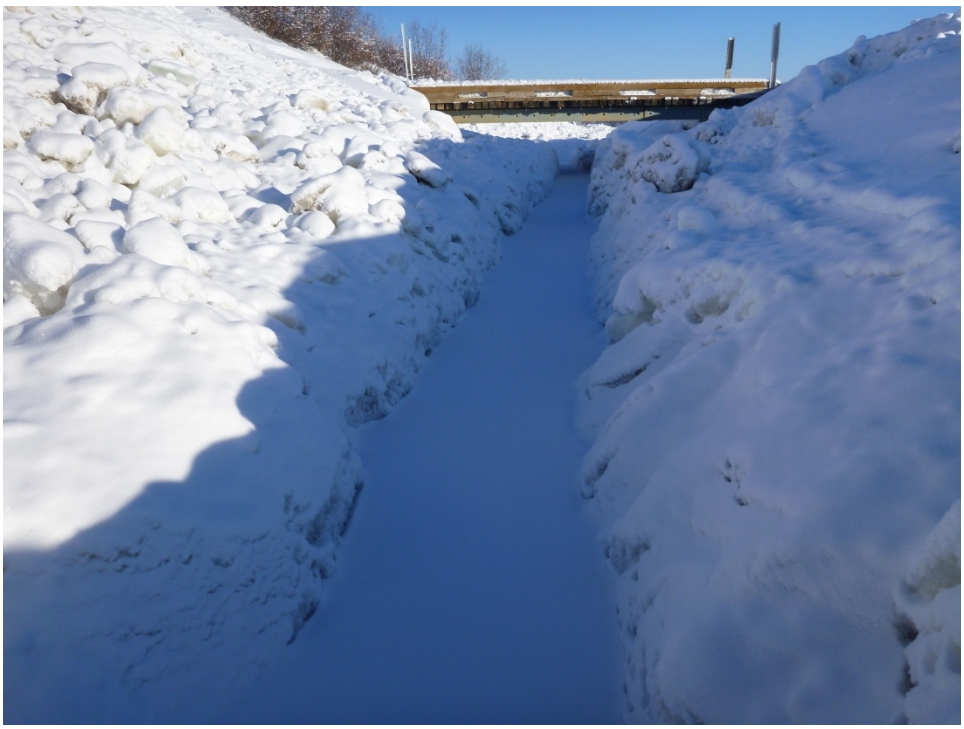

Photo 1. H-DC-B channel. Flow observed beneath and between layers of ice preventing discharge measurement or water quality sample.

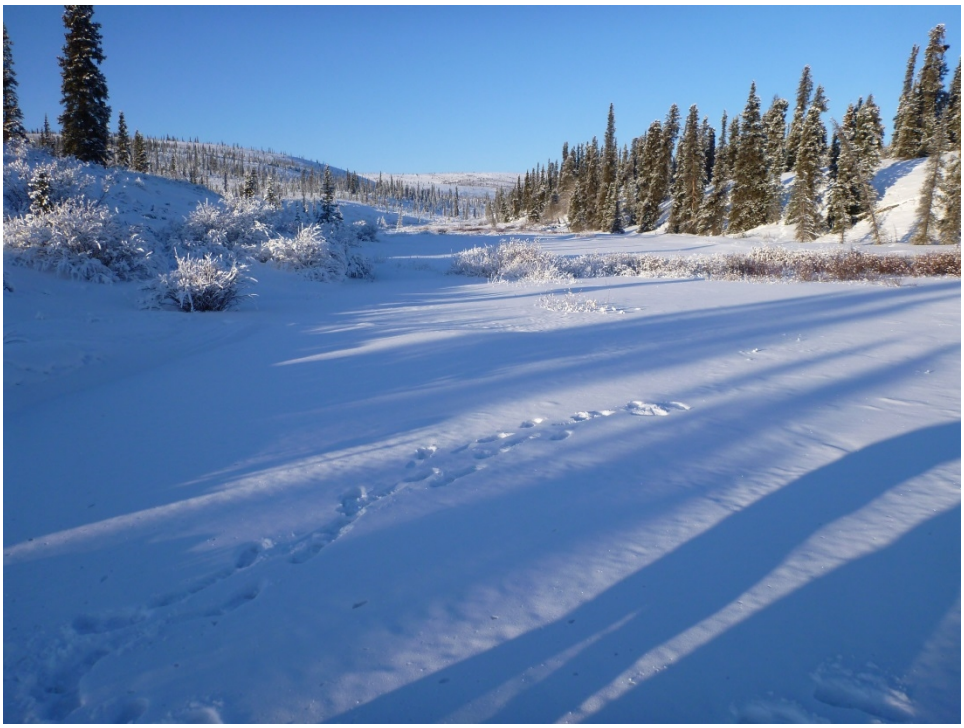

Photo 2. H/WQ-DC-R with thick (>1 m) overflow ice accumulation preventing measurement.

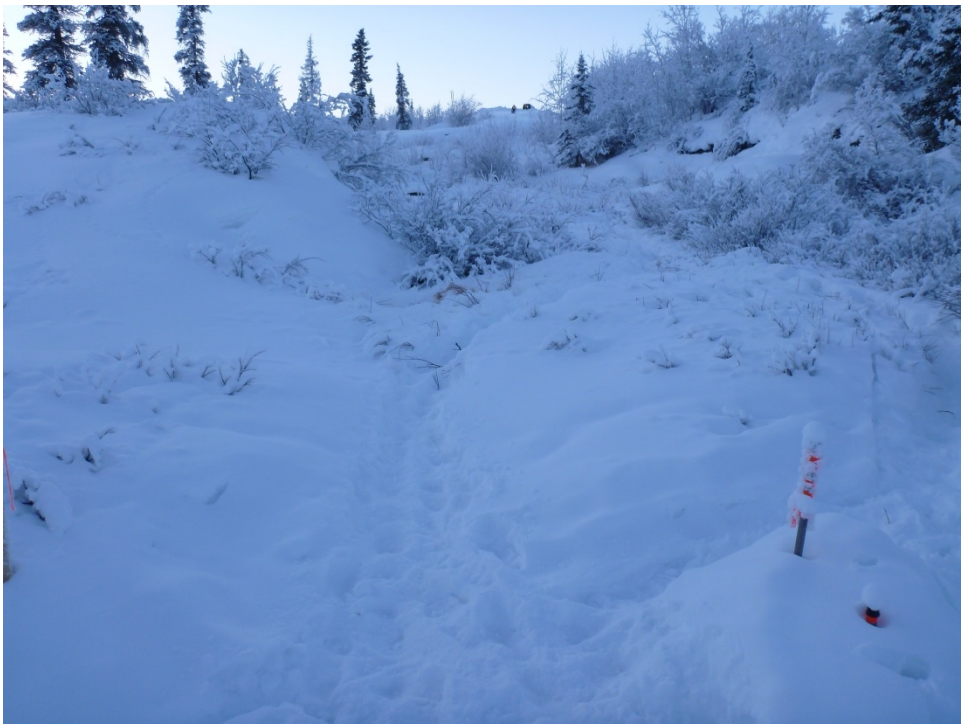

Photo 3. H-DC-M/WQ-DC-U upstream view, illustrating snow and ice cover conditions.

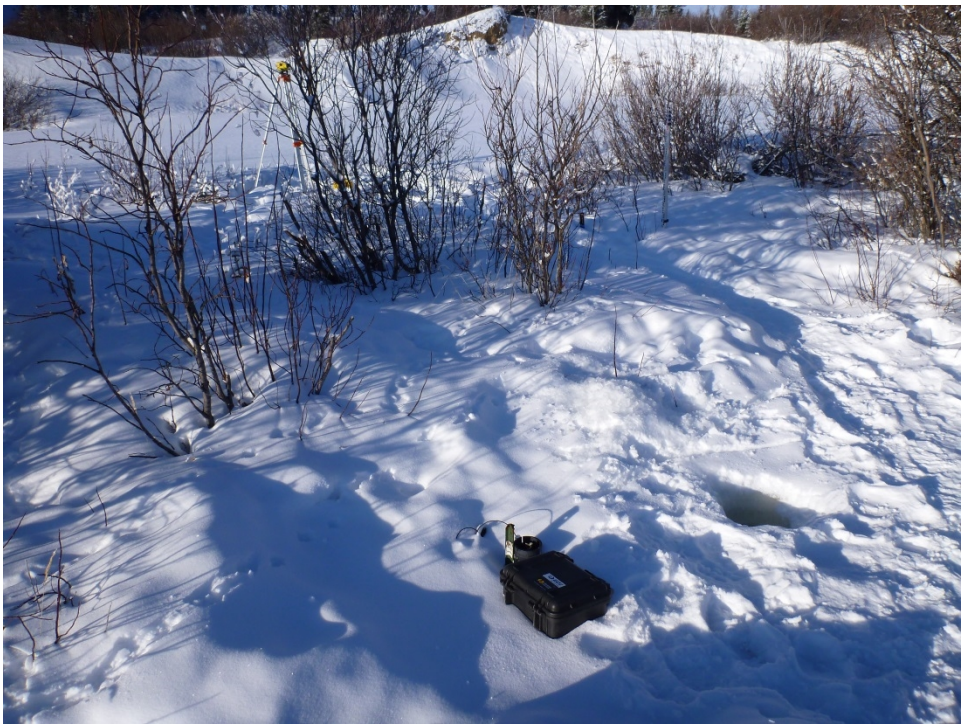

Photo 4. H-VC-R looking at right channel edge, with top of stilling well in the foreground.

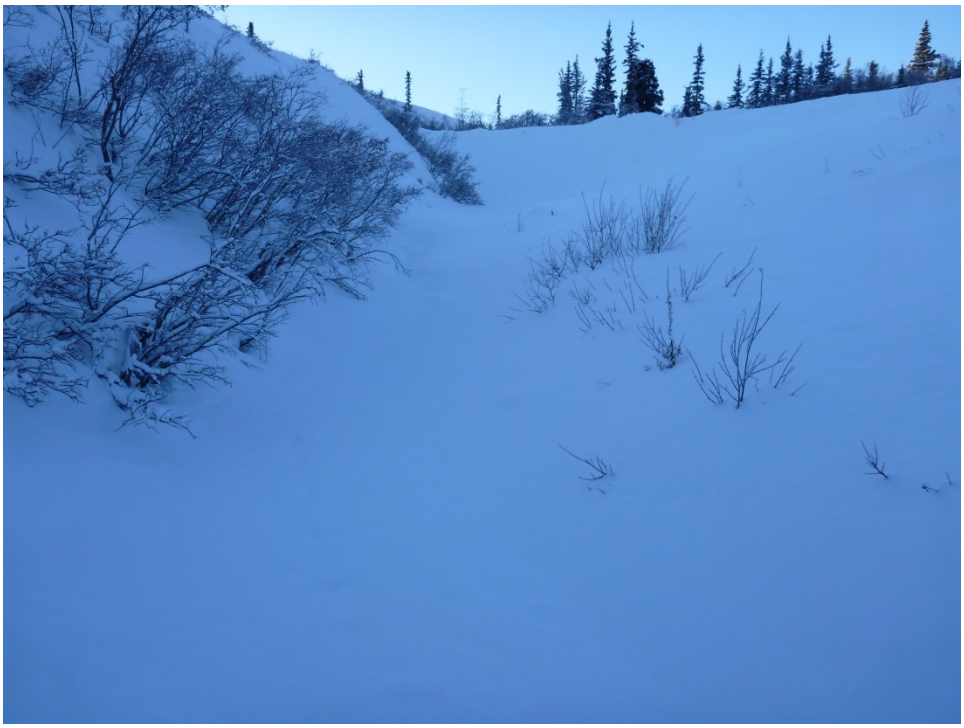

Photo 5. WQ-PC-DSP channel conditions upstream. No flow was observed.

4. Additional Trip Information/Comments

Any changes to project scope (i.e. additional sites sampled):	Stations/sites H-DX, H/WQ-DC-U1, H/WQ-DC-U2, H/WQ-MN, H/WQ-VC-REF and WQ-DRY were removed from the monitoring network. A water quality site (WQ-DC-B) was added at the same location as H-DC-B, to replace the WQ-DC-U1/U2 sites. Many of these sites are either frozen, dry or cannot otherwise be measured during the winter months.
Any alterations to sample scheduling:	An LT50 sample was collected from the WQ-SEEP, when it was supposed to be scheduled for the next trip (March 2014).
Any events resulting in changes to budget:	As indicated above, an LT50 sample was collected outside of the regular scheduling, which will result in an extra lab charge of approximately $200 to the February 2014 invoice.
Additional Comments:	Site weather conditions reached **prohibitively cold (i.e. -40°C) temperatures.** These temperatures are well beyond the ADV and YSI equipment manufacturers recommended operating temperatures. As a result, stream discharges are considered estimated due to ambient air temperatures at the time of sampling. The January 2014 test results indicated a fail of the **WQ- SEEP LT50 test**, with a 96 hr LT-50 result of 10.67 hours (Section 2, Appendix B). This is the first time the LT50 test has failed, as typically the LT50 result is >96 hours indicating a 'pass'. The other water chemistry results for the WQ-SEEP site show no indication of any significant differences in any parameters of concern that would explain the recent 'fail' of the acute toxicity test. The February 2014 LT50 sample (currently at the lab) will provide a confirmation or follow-up to this anomalous result.
Wildlife Sightings:	None
Site concerns including safety concerns:	None

Appendix A:

Water Quality Parameter Guideline Exceedances

January 13-14, 2014

Table A1. Water Quality Results for the January 13-15, 2014 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-140113-015 WQ-VC-R+150 1/13/2014	0167-140113-014 WQ-DC-U 1/13/2014	0167-140113-011 WQ-SEEP 1/13/2014	0167-140113-012 WQ-SEEP-r 1/13/2014	0167-140113-009 WQ-TP 1/13/2014	0167-140113-010 WQ-DC-DX+105 1/13/2014	0167-140113-008 WQ-MS-S-03 1/13/2014	0167-140114-018 WQ-PIT-2 1/14/2014
Temperature (in-situ)	°C	-	-	-	0	-0.1	0	-	0.1	0.4	0.3	4.6
Specific Conductivity (in-situ)	µS/cm	-	-	-	235.4	1680	1759	-	17.88	165	1172	2322
pH (in-situ)	-	6.5 - 9.0	6.0 - 8.5	-	7.14	7.27	7.03	-	7.41	7.22	7.25	6.97
Turbidity (In-situ)	NTU	-	-	-	0.65	31.3	50.8	-	4.76	2.5	1.82	0.53
Dissolved Oxygen (in-situ)	mg/L	-	-	-	-	-	-	-	-	-	-	3.45
Colour, True	CU	15	-	5	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	2	226	1670	1750	1740	2080	1140	1170	1950
Hardness (as CaCO3)	mg/L	-	-	0.5	127	1040	1020	1040	1330	717	719	1300
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	7.75	7.78	7.48	7.5	7.8	7.89	7.91	8.03
Total Suspended Solids	mg/L	-	50	3	<3.0	14.8	26.8	29.5	<3.0	<3.0	9.9	<3.0
Total Dissolved Solids	mg/L	-	-	1	144	1250	1500	1520	1560	885	913	1800
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	90.4	241	236	235	163	257	252	189
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	90.4	241	236	235	163	257	252	189
Ammonia, Total (as N)	mg/L	0.75	-	0.005	<0.0050	***3.38***	***4.43***	***4.33***	0.444	0.0195	0.0398	0.0053
Chloride (Cl)	mg/L	120	-	0.5	<0.50	10	12	11	12	<5.0	<5.0	<10
Fluoride (F)	mg/L	0.12	-	0.02	0.048	<0.40	<0.40	<0.40	<0.40	<0.20	***0.21***	<0.40
Nitrate (as N)	mg/L	13	-	0.005	0.129	0.93	1.3	1.3	0.52	0.063	<0.050	<0.10
Nitrite (as N)	mg/L	0.06	-	0.001	<0.0010	0.031	0.049	0.04	<0.020	<0.010	<0.010	<0.020
Sulfate (SO4)	mg/L	-	-	0.5	27.1	850	882	877	1240	430	453	1130
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	<0.0050	0.0123	0.0102	0.0125	<0.0050	<0.0050	<0.0050	-
Cyanide, Total	mg/L	-	0.3	0.005	<0.0050	0.0455	0.0618	0.0692	<0.0050	<0.0050	<0.0050	-
Cyanate	mg/L	-	-	0.2	<2.0	1.23	<0.20	0.48	<0.20	<0.20	<0.20	-
Thiocyanate (SCN)	mg/L	-	-	0.5	<0.50	1.4	2.66	2.68	<0.50	<0.50	<0.50	-
Aluminum (Al)-Total	mg/L	0.1	-	0.003	0.0267	0.0113	0.0136	0.0187	0.0114	0.0319	0.0824	<0.0060
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	0.00034	0.00068	0.00064	0.00066	0.0499	0.00997	0.0166	0.00366
Arsenic (As)-Total	mg/L	0.005	-	0.0001	0.00106	***0.037***	***0.0483***	***0.0484***	***0.157***	***0.0425***	***0.103***	***0.011***
Barium (Ba)-Total	mg/L	-	1	0.00005	0.0843	0.0683	0.0601	0.0613	0.02	0.0124	0.0197	0.0127
Beryllium (Be)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00020
Bismuth (Bi)-Total	mg/L	-	-	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010
Boron (B)-Total	mg/L	-	-	0.01	<0.010	0.06	0.077	0.073	0.147	<0.010	<0.010	<0.020
Cadmium (Cd)-Total	mg/L	0.000033	0.02	0.00001	0.000016	***0.000428***	***0.000687***	***0.000701***	***0.00179***	***0.00322***	***0.00352***	***0.00373***
Calcium (Ca)-Total	mg/L	-	-	0.05	31.4	280	296	296	396	182	190	351
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	0.00015	0.00036	0.00047	0.00047	<0.00020	<0.00010	0.00013	<0.00020
Cobalt (Co)-Total	mg/L	-	-	0.0001	<0.00010	0.00585	0.008	0.00804	0.00094	0.00052	0.00103	<0.00020
Copper (Cu)-Total	mg/L	0.002	0.2	0.0005	0.00115	***0.00257***	***0.0045***	***0.00406***	***0.0259***	0.00058	0.00178	***0.0032***
Iron (Fe)-Total	mg/L	0.3	1	0.01	0.052	***5.73***	***11.4***	***11.3***	0.3	***0.484***	***2.76***	0.058
Lead (Pb)-Total	mg/L	0.003	0.1	0.00005	0.00006	<0.000050	0.000066	0.00007	0.00231	0.000154	***0.00717***	0.00045
Lithium (Li)-Total	mg/L	-	-	0.0005	0.00104	0.00121	0.00093	0.00063	0.0127	0.00813	0.00972	0.0094
Magnesium (Mg)-Total	mg/L	-	-	0.1	10.5	76.3	68.1	68.4	88	63.3	65.3	100
Manganese (Mn)-Total	mg/L	-	0.5	0.00005	0.0295	***5.15***	***6.39***	***6.4***	***0.553***	***1.13***	***1.32***	0.117
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	0.000372	0.000872	0.00101	0.00101	0.00184	0.000397	0.000367	0.00017
Nickel (Ni)-Total	mg/L	0.1	0.3	0.0005	<0.00050	0.00219	0.00274	0.00275	0.0022	0.00156	0.00198	<0.0010
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total	mg/L	-	-	0.1	0.76	5.96	6.78	6.68	23.2	3.76	3.61	3.99
Selenium (Se)-Total	mg/L	0.001	-	0.0001	<0.00010	0.0002	0.00023	0.00027	<0.00020	<0.00010	<0.00010	<0.00020
Silicon (Si)-Total	mg/L	-	-	0.05	6.2	7.07	7.13	7.06	2.99	6.74	6.94	3.54
Silver (Ag)-Total	mg/L	0.0001	0.1	0.00001	<0.000010	0.000026	0.00004	0.000044	0.000069	<0.000010	***0.000176***	<0.000020
Sodium (Na)-Total	mg/L	-	-	0.05	3.24	31.2	37.8	38.8	30	5.09	4.69	13.6
Strontium (Sr)-Total	mg/L	-	-	0.0002	0.305	0.848	0.817	0.841	0.988	0.409	0.444	1.13
Sulfur (S)-Total	mg/L	-	-	0.5	9.32	263	283	282	395	139	147	348
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	<0.000010	<0.000010	<0.000010	0.000011	0.000319	0.000093	0.000101	0.00007
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00020
Titanium (Ti)-Total	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.020
Uranium (U)-Total	mg/L	0.015	-	0.00001	0.000652	0.00257	0.00286	0.00292	0.00191	0.00435	0.00392	0.00464
Vanadium (V)-Total	mg/L	-	-	0.001	<0.0010	0.0013	0.0018	0.0018	<0.0020	<0.0010	<0.0010	<0.0020
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	<0.0030	0.0085	0.0066	0.0066	***0.205***	***0.614***	***0.998***	***0.462***
Dissolved Metals Filtration Location		-	-	n/a	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved	mg/L	0.005	-	0.001	***0.0073***	***0.0063***	***0.0103***	***0.0091***	<0.0020	0.0013	0.0013	<0.0020
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	0.00033	0.00061	0.00055	0.00054	0.0481	0.00986	0.0155	0.00361
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	0.00094	***0.0282***	***0.0332***	***0.0334***	***0.107***	***0.0156***	***0.0676***	***0.00842***
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.0868	0.0653	0.0568	0.0586	0.0194	0.0119	0.0164	0.0126
Beryllium (Be)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00020
Bismuth (Bi)-Dissolved	mg/L	-	-	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010
Boron (B)-Dissolved	mg/L	-	-	0.01	<0.010	0.059	0.073	0.071	0.141	<0.010	<0.010	<0.020
Cadmium (Cd)-Dissolved	mg/L	0.000033	-	0.00001	0.000016	***0.000237***	***0.000501***	***0.000345***	***0.00169***	***0.000866***	***0.000416***	***0.00368***
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	32.5	288	296	302	390	183	185	357
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	<0.00010	0.00027	0.00036	0.00032	<0.00020	<0.00010	<0.00010	<0.00020
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	<0.00010	0.00588	0.0077	0.00783	0.00093	0.00048	0.00094	<0.00020
Copper (Cu)-Dissolved	mg/L	0.002	-	0.0002	0.00108	0.00116	0.0017	0.00163	***0.0236***	<0.00020	<0.00020	***0.00218***
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	0.014	***3.59***	***7.81***	***8.01***	0.043	0.221	***2.08***	<0.010

Table A1. Water Quality Results for the January 13-15, 2014 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-140113-015 WQ-VC-R+150 1/13/2014	0167-140113-014 WQ-DC-U 1/13/2014	0167-140113-011 WQ-SEEP 1/13/2014	0167-140113-012 WQ-SEEP-r 1/13/2014	0167-140113-009 WQ-TP 1/13/2014	0167-140113-010 WQ-DC-DX+105 1/13/2014	0167-140113-008 WQ-MS-S-03 1/13/2014	0167-140114-018 WQ-PIT-2 1/14/2014
Lead (Pb)-Dissolved	mg/L	0.001	-	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	0.00035	<0.000050	0.000121	<0.00010
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	0.00099	0.00119	0.00085	0.00077	0.0123	0.00906	0.00947	0.0092
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	11	78.6	67.1	68.7	85.7	63.2	62.5	98.2
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	0.0271	5.3	6.18	6.2	0.522	1.08	1.27	0.104
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved	mg/L	0.073	-	0.00005	0.000358	0.000828	0.000956	0.000945	0.00177	0.000396	0.000324	0.00015
Nickel (Ni)-Dissolved	mg/L	0.1	-	0.0005	<0.00050	0.00219	0.00264	0.00263	0.0021	0.00142	0.00188	<0.0010
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	-	-	0.1	0.79	6.2	6.72	6.81	22.9	3.79	3.47	4.07
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	<0.00010	0.00021	0.00021	0.00027	<0.00020	<0.00010	<0.00010	<0.00020
Silicon (Si)-Dissolved	mg/L	-	-	0.05	6.44	7.2	6.92	7.07	2.92	6.68	6.56	3.6
Silver (Ag)-Dissolved	mg/L	0.0001	-	0.00001	<0.000010	<0.000010	0.000013	0.000013	<0.000020	<0.000010	<0.000010	<0.000020
Sodium (Na)-Dissolved	mg/L	-	-	0.05	3.4	32.4	37	38.3	29.9	4.97	4.35	13.1
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	0.298	0.874	0.821	0.826	0.974	0.421	0.417	1.11
Sulfur (S)-Dissolved	mg/L	-	-	0.5	9.38	267	273	277	380	136	139	337
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	0.000306	0.000083	0.000077	0.000067
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00020
Titanium (Ti)-Dissolved	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.020
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.000648	0.00258	0.00279	0.00287	0.00183	0.00428	0.00368	0.00454
Vanadium (V)-Dissolved	mg/L	-	-	0.001	<0.0010	<0.0010	0.0013	0.0012	<0.0020	<0.0010	<0.0010	<0.0020
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	0.001	0.008	0.0061	0.0057	***0.199***	***0.598***	***0.971***	***0.446***

Table A1. Water Quality Results for the January 13-15, 2014 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-140114-016 WQ-PIT-3 1/14/2014	0167-140114-017 WQ-PIT-1 1/14/2014	0167-140114-TRAVEL-BLANK TRAVEL BLANK 1/15/2014	0167-140114-FIELD-BLANK FIELD BLANK 1/13/2014	0167-140114-005 WQ-VC-UMN 1/14/2014	0167-140114-013 WQ-VC-REF 1/14/2014	0167-140114-007 WQ-VC-DBC 1/14/2014	0167-140114-006 WQ-VC-U 1/14/2014
Temperature (in-situ)	°C	-	-	-	5.2	0.3	-	-	0	0	0	0
Specific Conductivity (in-situ)	µS/cm	-	-	-	2687	2040	-	-	237.8	222.3	220.1	221.9
pH (in-situ)	-	6.5 - 9.0	6.0 - 8.5	-	6.81	7.46	-	-	7.11	7.31	7.26	7.22
Turbidity (In-situ)	NTU	-	-	-	1.43	1.13	-	-	0.91	0.33	0.87	0.75
Dissolved Oxygen (in-situ)	mg/L	-	-	-	1.02	8.06	-	-	-	-	-	-
Colour, True	CU	15	-	5	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	2	2520	1970	<2.0	<2.0	233	220	220	217
Hardness (as CaCO3)	mg/L	-	-	0.5	1690	1300	<0.50	<0.50	123	115	120	117
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	7.72	7.98	***5.69***	***5.6***	7.86	7.93	7.92	7.84
Total Suspended Solids	mg/L	-	50	3	3.1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	-	-	1	2490	1790	<10	<10	105	138	132	137
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	216	184	<1.0	<1.0	92	92	89.3	90.3
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	216	184	<1.0	<1.0	92	92	89.3	90.3
Ammonia, Total (as N)	mg/L	0.75	-	0.005	0.0402	<0.0050	0.0069	<0.0050	<0.0050	<0.0050	***0.99***	0.54
Chloride (Cl)	mg/L	120	-	0.5	11	11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.12	-	0.02	<0.40	<0.40	<0.020	<0.020	0.048	0.045	0.044	0.046
Nitrate (as N)	mg/L	13	-	0.005	0.12	<0.10	<0.0050	<0.0050	0.122	0.134	0.156	0.125
Nitrite (as N)	mg/L	0.06	-	0.001	<0.020	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulfate (SO4)	mg/L	-	-	0.5	1600	1140	<0.50	<0.50	27.1	19.5	20.1	20.3
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	-	0.3	0.005	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanate	mg/L	-	-	0.2	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Thiocyanate (SCN)	mg/L	-	-	0.5	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Aluminum (Al)-Total	mg/L	0.1	-	0.003	0.0072	0.0075	<0.0030	<0.0030	0.0451	0.0217	0.0322	0.0359
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	0.00088	0.0038	<0.00010	<0.00010	0.00034	0.00016	0.00016	0.00015
Arsenic (As)-Total	mg/L	0.005	-	0.0001	***0.0169***	***0.0111***	<0.00010	<0.00010	0.00144	0.00046	0.00033	0.00036
Barium (Ba)-Total	mg/L	-	1	0.00005	0.00765	0.0127	<0.000050	<0.000050	0.0889	0.0864	0.0895	0.0892
Beryllium (Be)-Total	mg/L	-	-	0.0001	<0.00020	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total	mg/L	-	-	0.0005	<0.0010	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total	mg/L	-	-	0.01	<0.020	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total	mg/L	0.000033	0.02	0.00001	***0.0107***	***0.00374***	<0.000010	<0.000010	***0.000065***	0.00002	***0.000056***	0.000032
Calcium (Ca)-Total	mg/L	-	-	0.05	494	355	<0.050	<0.050	32	29.8	31.2	29.8
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	<0.00020	<0.00020	<0.00010	<0.00010	0.00014	0.00014	0.00013	0.00012
Cobalt (Co)-Total	mg/L	-	-	0.0001	0.00129	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total	mg/L	0.002	0.2	0.0005	***0.0025***	***0.003***	<0.00050	<0.00050	0.00127	0.00109	0.00119	0.0011
Iron (Fe)-Total	mg/L	0.3	1	0.01	0.298	0.103	<0.010	<0.010	0.07	0.047	0.057	0.06
Lead (Pb)-Total	mg/L	0.003	0.1	0.00005	0.00044	0.00047	<0.000050	<0.000050	0.000102	<0.000050	0.000067	0.00006
Lithium (Li)-Total	mg/L	-	-	0.0005	0.011	0.0096	<0.00050	<0.00050	0.00061	0.00088	0.0009	0.0008
Magnesium (Mg)-Total	mg/L	-	-	0.1	140	102	<0.10	<0.10	10.6	10.2	10.3	9.91
Manganese (Mn)-Total	mg/L	-	0.5	0.00005	***2.24***	0.119	<0.000050	<0.000050	0.0568	0.0367	0.0522	0.0529
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	<0.00010	0.00016	<0.000050	<0.000050	0.000352	0.000394	0.000353	0.000371
Nickel (Ni)-Total	mg/L	0.1	0.3	0.0005	0.0014	<0.0010	<0.00050	<0.00050	0.00054	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total	mg/L	-	-	0.1	5.57	4.14	<0.10	<0.10	0.75	0.67	0.74	0.68
Selenium (Se)-Total	mg/L	0.001	-	0.0001	<0.00020	<0.00020	<0.00010	<0.00010	<0.00010	0.00041	0.00045	0.00024
Silicon (Si)-Total	mg/L	-	-	0.05	3.88	3.64	<0.050	<0.050	6.42	6.25	6.57	6.21
Silver (Ag)-Total	mg/L	0.0001	0.1	0.00001	<0.000020	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total	mg/L	-	-	0.05	16.5	14.2	<0.050	<0.050	2.98	2.54	2.56	2.62
Strontium (Sr)-Total	mg/L	-	-	0.0002	1.31	1.16	<0.00020	<0.00020	0.306	0.321	0.303	0.312
Sulfur (S)-Total	mg/L	-	-	0.5	510	354	<0.50	<0.50	8.96	6.71	6.86	7.02
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	0.000117	0.000074	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00020	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.01	<0.020	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	mg/L	0.015	-	0.00001	0.00399	0.00479	<0.000010	<0.000010	0.000653	0.000661	0.000593	0.000622
Vanadium (V)-Total	mg/L	-	-	0.001	<0.0020	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	***0.987***	***0.459***	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals Filtration Location		-	-	n/a	FIELD	FIELD	-	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved	mg/L	0.005	-	0.001	0.0024	<0.0020	-	<0.0010	***0.0078***	***0.0083***	***0.008***	***0.0095***
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	0.0008	0.00357	-	<0.00010	0.00025	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	***0.0101***	***0.00844***	-	<0.00010	0.00082	0.00021	0.00023	0.00025
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.00797	0.0128	-	<0.000050	0.0839	0.0881	0.0871	0.088
Beryllium (Be)-Dissolved	mg/L	-	-	0.0001	<0.00020	<0.00020	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Dissolved	mg/L	-	-	0.0005	<0.0010	<0.0010	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved	mg/L	-	-	0.01	<0.020	<0.020	-	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved	mg/L	0.000033	-	0.00001	***0.0109***	***0.0037***	-	<0.000010	0.000017	0.000016	***0.000048***	0.00002
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	461	353	-	<0.050	31.9	29.5	31	30.3
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	<0.00020	<0.00020	-	<0.00010	0.00014	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	0.00111	<0.00020	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved	mg/L	0.002	-	0.0002	0.00149	***0.00227***	-	<0.00020	0.00098	0.00085	0.0009	0.00089
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	0.116	<0.010	-	<0.010	0.013	0.013	0.013	0.013

Table A1. Water Quality Results for the January 13-15, 2014 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-140114-016 WQ-PIT-3 1/14/2014	0167-140114-017 WQ-PIT-1 1/14/2014	0167-140114-TRAVEL-BLANK TRAVEL BLANK 1/15/2014	0167-140114-FIELD-BLANK FIELD BLANK 1/13/2014	0167-140114-005 WQ-VC-UMN 1/14/2014	0167-140114-013 WQ-VC-REF 1/14/2014	0167-140114-007 WQ-VC-DBC 1/14/2014	0167-140114-006 WQ-VC-U 1/14/2014
Lead (Pb)-Dissolved	mg/L	0.001	-	0.00005	<0.00010	<0.00010	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	0.011	0.0094	-	<0.00050	0.00064	0.00085	0.0008	0.00089
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	131	102	-	<0.10	10.5	10.1	10.3	10.1
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	2.32	0.107	-	<0.000050	0.0475	0.0342	0.049	0.0485
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.00001	<0.000010	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved	mg/L	0.073	-	0.00005	<0.00010	0.00014	-	<0.000050	0.000367	0.000352	0.00035	0.000361
Nickel (Ni)-Dissolved	mg/L	0.1	-	0.0005	0.0014	<0.0010	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	-	-	0.1	5.13	4.07	-	<0.10	0.75	0.61	0.71	0.69
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	<0.00020	<0.00020	-	<0.00010	<0.00010	<0.00010	<0.00010	0.00025
Silicon (Si)-Dissolved	mg/L	-	-	0.05	3.58	3.6	-	<0.050	6.29	6.08	6.41	6.25
Silver (Ag)-Dissolved	mg/L	0.0001	-	0.00001	<0.000020	<0.000020	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved	mg/L	-	-	0.05	16.7	13.1	-	<0.050	2.91	2.53	2.57	2.65
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	1.29	1.13	-	<0.00020	0.301	0.301	0.308	0.301
Sulfur (S)-Dissolved	mg/L	-	-	0.5	471	345	-	<0.50	8.76	6.61	6.67	6.81
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	0.000122	0.00007	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00020	<0.00020	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	mg/L	-	-	0.01	<0.020	<0.020	-	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.00405	0.00452	-	<0.000010	0.000606	0.000628	0.0006	0.000588
Vanadium (V)-Dissolved	mg/L	-	-	0.001	<0.0020	<0.0020	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	***0.992***	***0.454***	-	<0.0010	0.0014	0.0012	<0.0010	<0.0010

Table A1. Water Quality Results for the January 13-15, 2014 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-140114-001 WQ-VC-REF-r 1/14/2014
Temperature (in-situ)	°C	-	-	-	-
Specific Conductivity (in-situ)	µS/cm	-	-	-	-
pH (in-situ)	-	6.5 - 9.0	6.0 - 8.5	-	-
Turbidity (In-situ)	NTU	-	-	-	-
Dissolved Oxygen (in-situ)	mg/L	-	-	-	-
Colour, True	CU	15	-	5	-
Conductivity	µS/cm	-	-	2	218
Hardness (as CaCO3)	mg/L	-	-	0.5	118
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	7.9
Total Suspended Solids	mg/L	-	50	3	<3.0
Total Dissolved Solids	mg/L	-	-	1	122
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	92.2
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	1	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	92.2
Ammonia, Total (as N)	mg/L	0.75	-	0.005	<0.0050
Chloride (Cl)	mg/L	120	-	0.5	<0.50
Fluoride (F)	mg/L	0.12	-	0.02	0.046
Nitrate (as N)	mg/L	13	-	0.005	0.133
Nitrite (as N)	mg/L	0.06	-	0.001	<0.0010
Sulfate (SO4)	mg/L	-	-	0.5	19.5
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	<0.0050
Cyanide, Total	mg/L	-	0.3	0.005	<0.0050
Cyanate	mg/L	-	-	0.2	<0.20
Thiocyanate (SCN)	mg/L	-	-	0.5	<0.50
Aluminum (Al)-Total	mg/L	0.1	-	0.003	0.0198
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	0.00016
Arsenic (As)-Total	mg/L	0.005	-	0.0001	0.00028
Barium (Ba)-Total	mg/L	-	1	0.00005	0.0878
Beryllium (Be)-Total	mg/L	-	-	0.0001	<0.00010
Bismuth (Bi)-Total	mg/L	-	-	0.0005	<0.00050
Boron (B)-Total	mg/L	-	-	0.01	<0.010
Cadmium (Cd)-Total	mg/L	0.000033	0.02	0.00001	0.000022
Calcium (Ca)-Total	mg/L	-	-	0.05	30.2
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	0.00012
Cobalt (Co)-Total	mg/L	-	-	0.0001	<0.00010
Copper (Cu)-Total	mg/L	0.002	0.2	0.0005	0.00115
Iron (Fe)-Total	mg/L	0.3	1	0.01	0.048
Lead (Pb)-Total	mg/L	0.003	0.1	0.00005	<0.000050
Lithium (Li)-Total	mg/L	-	-	0.0005	0.00115
Magnesium (Mg)-Total	mg/L	-	-	0.1	10.3
Manganese (Mn)-Total	mg/L	-	0.5	0.00005	0.0372
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.00001	<0.000010
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	0.000433
Nickel (Ni)-Total	mg/L	0.1	0.3	0.0005	<0.00050
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050
Potassium (K)-Total	mg/L	-	-	0.1	0.71
Selenium (Se)-Total	mg/L	0.001	-	0.0001	<0.00010
Silicon (Si)-Total	mg/L	-	-	0.05	6.41
Silver (Ag)-Total	mg/L	0.0001	0.1	0.00001	<0.000010
Sodium (Na)-Total	mg/L	-	-	0.05	2.59
Strontium (Sr)-Total	mg/L	-	-	0.0002	0.314
Sulfur (S)-Total	mg/L	-	-	0.5	6.73
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	<0.000010
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.01	<0.010
Uranium (U)-Total	mg/L	0.015	-	0.00001	0.000641
Vanadium (V)-Total	mg/L	-	-	0.001	<0.0010
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	<0.0030
Dissolved Metals Filtration Location		-	-	n/a	FIELD
Aluminum (Al)-Dissolved	mg/L	0.005	-	0.001	***0.0089***
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	0.00011
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	0.00028
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.0838
Beryllium (Be)-Dissolved	mg/L	-	-	0.0001	<0.00010
Bismuth (Bi)-Dissolved	mg/L	-	-	0.0005	<0.00050
Boron (B)-Dissolved	mg/L	-	-	0.01	<0.010
Cadmium (Cd)-Dissolved	mg/L	0.000033	-	0.00001	0.000018
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	30.4
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	<0.00010
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	<0.00010
Copper (Cu)-Dissolved	mg/L	0.002	-	0.0002	0.00082
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	0.017

Applied Guidelines: - Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012), CCME: Freshwater Aquatic Life
- Mount Nansen Effluent Quality Standards

Color Key:
Exceeds CCME Guideline
Exceeds MN Effluent Quality Standards (EQS)
Exceeds both CCME and EQS

Note: For those guidelines that are hardness dependent, the most conservative guideline has been applied.

Table A1. Water Quality Results for the January 13-15, 2014 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-140114-001 WQ-VC-REF-r 1/14/2014
Lead (Pb)-Dissolved	mg/L	0.001	-	0.00005	<0.000050
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	0.00106
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	10.2
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	0.0344
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.00001	<0.000010
Molybdenum (Mo)-Dissolved	mg/L	0.073	-	0.00005	0.000384
Nickel (Ni)-Dissolved	mg/L	0.1	-	0.0005	<0.00050
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050
Potassium (K)-Dissolved	mg/L	-	-	0.1	0.71
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	<0.00010
Silicon (Si)-Dissolved	mg/L	-	-	0.05	6.34
Silver (Ag)-Dissolved	mg/L	0.0001	-	0.00001	<0.000010
Sodium (Na)-Dissolved	mg/L	-	-	0.05	2.59
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	0.307
Sulfur (S)-Dissolved	mg/L	-	-	0.5	6.52
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	<0.000010
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00010
Titanium (Ti)-Dissolved	mg/L	-	-	0.01	<0.010
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.000628
Vanadium (V)-Dissolved	mg/L	-	-	0.001	<0.0010
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	<0.0010

Appendix B:

ALS Analytical Reports

January 13-14, 2014

ENVIRONMENTAL DYNAMICS INC.
ATTN: Meghan Marjanovic
2195 - 2nd Ave
Whitehorse YT Y1A 3T8

Date Received: 15-JAN-14
Report Date: 23-JAN-14 16:46 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1412042

Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 13-Y-0167
C of C Numbers: 1, 2, 3, 4
Legal Site Desc:

Can Dang
Senior Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1412042-1	L1412042-2	L1412042-3	L1412042-4	L1412042-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-JAN-14	13-JAN-14	13-JAN-14	13-JAN-14	13-JAN-14
	Sampled Time	12:45	13:54	14:50	14:50	15:32
	Client ID	0167-140113-015	0167-140113-014	0167-140113-011	0167-140113-012	0167-140113-009
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	226	1670	1750	1740	2080
	Hardness (as CaCO3) (mg/L)	127	1040	1020	1040	1330
	pH (pH)	7.75	7.78	7.48	7.50	7.80
	Total Suspended Solids (mg/L)	<3.0	14.8	26.8	29.5	<3.0
	Total Dissolved Solids (mg/L)	144	1250	1500	1520	1560
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	90.4	241	236	235	163
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	90.4	241	236	235	163
	Ammonia, Total (as N) (mg/L)	<0.0050	3.38	4.43	4.33	0.444
	Chloride (Cl) (mg/L)	<0.50	10 DLM	12 DLM	11 DLM	12 DLM
	Fluoride (F) (mg/L)	0.048	<0.40	<0.40	<0.40	<0.40
	Nitrate (as N) (mg/L)	0.129	0.93	1.30	1.30	0.52
	Nitrite (as N) (mg/L)	<0.0010	0.031	0.049	0.040	<0.020 DLM
	Sulfate (SO4) (mg/L)	27.1	850	882	877	1240
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	0.0123	0.0102	0.0125	<0.0050
	Cyanide, Total (mg/L)	<0.0050	0.0455	0.0618	0.0692	<0.0050
	Cyanate (mg/L)	<2.0 DLIS	1.23	<0.20	0.48	<0.20
	Thiocyanate (SCN) (mg/L)	<0.50	1.40	2.66	2.68	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0267	0.0113	0.0136	0.0187	0.0114
	Antimony (Sb)-Total (mg/L)	0.00034	0.00068	0.00064	0.00066	0.0499
	Arsenic (As)-Total (mg/L)	0.00106	0.0370	0.0483	0.0484	0.157
	Barium (Ba)-Total (mg/L)	0.0843	0.0683	0.0601	0.0613	0.0200
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020 DLA
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010 DLA
	Boron (B)-Total (mg/L)	<0.010	0.060	0.077	0.073	0.147
	Cadmium (Cd)-Total (mg/L)	0.000016	0.000428	0.000687	0.000701	0.00179
	Calcium (Ca)-Total (mg/L)	31.4	280	296	296	396
	Chromium (Cr)-Total (mg/L)	0.00015	0.00036	0.00047	0.00047	<0.00020 DLA
	Cobalt (Co)-Total (mg/L)	<0.00010	0.00585	0.00800	0.00804	0.00094
	Copper (Cu)-Total (mg/L)	0.00115	0.00257	0.00450	0.00406	0.0259
	Iron (Fe)-Total (mg/L)	0.052	5.73	11.4	11.3	0.300
	Lead (Pb)-Total (mg/L)	0.000060	<0.000050	0.000066	0.000070	0.00231
	Lithium (Li)-Total (mg/L)	0.00104	0.00121	0.00093	0.00063	0.0127
	Magnesium (Mg)-Total (mg/L)	10.5	76.3	68.1	68.4	88.0
	Manganese (Mn)-Total (mg/L)	0.0295	5.15	6.39	6.40	0.553
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1412042-6	L1412042-7	L1412042-8	L1412042-9	L1412042-10
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-JAN-14	13-JAN-14	14-JAN-14	14-JAN-14	14-JAN-14
	Sampled Time	16:45	16:46	16:42	16:39	16:46
	Client ID	0167-140113-010	0167-140113-008	0167-140114-018	0167-140114-016	0167-140114-017
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	1140	1170	1950	2520	1970
	Hardness (as CaCO3) (mg/L)	717	719	1300	1690	1300
	pH (pH)	7.89	7.91	8.03	7.72	7.98
	Total Suspended Solids (mg/L)	<3.0	9.9	<3.0	3.1	<3.0
	Total Dissolved Solids (mg/L)	885	913	1800	2490	1790
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	257	252	189	216	184
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	257	252	189	216	184
	Ammonia, Total (as N) (mg/L)	0.0195	0.0398	0.0053	0.0402	<0.0050
	Chloride (Cl) (mg/L)	<5.0 DLM	<5.0 DLM	<10 DLM	11	11
	Fluoride (F) (mg/L)	<0.20 DLM	0.21	<0.40 DLM	<0.40 DLM	<0.40 DLM
	Nitrate (as N) (mg/L)	0.063	<0.050 DLM	<0.10 DLM	0.12	<0.10 DLM
	Nitrite (as N) (mg/L)	<0.010 DLM	<0.010 DLM	<0.020 DLM	<0.020 DLM	<0.020 DLM
	Sulfate (SO4) (mg/L)	430	453	1130	1600	1140
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050			
	Cyanide, Total (mg/L)	<0.0050	<0.0050			
	Cyanate (mg/L)	<0.20	<0.20			
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0319	0.0824	<0.0060 DLA	0.0072	0.0075
	Antimony (Sb)-Total (mg/L)	0.00997	0.0166	0.00366	0.00088	0.00380
	Arsenic (As)-Total (mg/L)	0.0425	0.103	0.0110	0.0169	0.0111
	Barium (Ba)-Total (mg/L)	0.0124	0.0197	0.0127	0.00765	0.0127
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00020 DLA	<0.00020 DLA	<0.00020 DLA
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.0010 DLA	<0.0010 DLA	<0.0010 DLA
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.020 DLA	<0.020 DLA	<0.020 DLA
	Cadmium (Cd)-Total (mg/L)	0.00322	0.00352	0.00373	0.0107	0.00374
	Calcium (Ca)-Total (mg/L)	182	190	351	494	355
	Chromium (Cr)-Total (mg/L)	<0.00010	0.00013	<0.00020 DLA	<0.00020 DLA	<0.00020 DLA
	Cobalt (Co)-Total (mg/L)	0.00052	0.00103	<0.00020 DLA	0.00129	<0.00020 DLA
	Copper (Cu)-Total (mg/L)	0.00058	0.00178	0.0032	0.0025	0.0030
	Iron (Fe)-Total (mg/L)	0.484	2.76	0.058	0.298	0.103
	Lead (Pb)-Total (mg/L)	0.000154	0.00717	0.00045	0.00044	0.00047
	Lithium (Li)-Total (mg/L)	0.00813	0.00972	0.0094	0.0110	0.0096
	Magnesium (Mg)-Total (mg/L)	63.3	65.3	100	140	102
	Manganese (Mn)-Total (mg/L)	1.13	1.32	0.117	2.24	0.119
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1412042-11	L1412042-12	L1412042-13	L1412042-14	L1412042-15
Description	Water	Water	Water	Water	Water
Sampled Date	15-JAN-14	13-JAN-14	14-JAN-14	14-JAN-14	14-JAN-14
Sampled Time	12:05	18:20	08:52	15:00	13:05
Client ID	TRAVEL BLANK	FIELD BLANK	0167-140114-005	0167-140114-013	0167-140114-007
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	<2.0	<2.0	233	220	220
Hardness (as CaCO3) (mg/L)	<0.50	<0.50	123	115	120
pH (pH)	5.69	5.60	7.86	7.93	7.92
Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0	<3.0	<3.0
Total Dissolved Solids (mg/L)	<10	<10	105	138	132
Anions and Nutrients Alkalinity, Bicarbonate (as CaCO3) (mg/L)	<1.0	<1.0	92.0	92.0	89.3
Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3) (mg/L)	<1.0	<1.0	92.0	92.0	89.3
Ammonia, Total (as N) (mg/L)	0.0069 RRV	<0.0050	<0.0050	<0.0050	0.99
Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F) (mg/L)	<0.020	<0.020	0.048	0.045	0.044
Nitrate (as N) (mg/L)	<0.0050	<0.0050	0.122	0.134	0.156
Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulfate (SO4) (mg/L)	<0.50	<0.50	27.1	19.5	20.1
Cyanides Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanate (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Total Metals Aluminum (Al)-Total (mg/L)	<0.0030	<0.0030	0.0451	0.0217	0.0322
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	0.00034	0.00016	0.00016
Arsenic (As)-Total (mg/L)	<0.00010	<0.00010	0.00144	0.00046	0.00033
Barium (Ba)-Total (mg/L)	<0.000050	<0.000050	0.0889	0.0864	0.0895
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	0.000065	0.000020	0.000056
Calcium (Ca)-Total (mg/L)	<0.050	<0.050	32.0	29.8	31.2
Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	0.00014	0.00014	0.00013
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	0.00127	0.00109	0.00119
Iron (Fe)-Total (mg/L)	<0.010	<0.010	0.070	0.047	0.057
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	0.000102	<0.000050	0.000067
Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	0.00061	0.00088	0.00090
Magnesium (Mg)-Total (mg/L)	<0.10	<0.10	10.6	10.2	10.3
Manganese (Mn)-Total (mg/L)	<0.000050	<0.000050	0.0568	0.0367	0.0522
Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1412042-16	L1412042-17			
	Description	Water	Water			
	Sampled Date	14-JAN-14	14-JAN-14			
	Sampled Time	13:25	15:00			
	Client ID	0167-140114-006	0167-140114-001			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	217	218			
	Hardness (as CaCO3) (mg/L)	117	118			
	pH (pH)	7.84	7.90			
	Total Suspended Solids (mg/L)	<3.0	<3.0			
	Total Dissolved Solids (mg/L)	137	122			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	90.3	92.2			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	90.3	92.2			
	Ammonia, Total (as N) (mg/L)	0.54	<0.0050			
	Chloride (Cl) (mg/L)	<0.50	<0.50			
	Fluoride (F) (mg/L)	0.046	0.046			
	Nitrate (as N) (mg/L)	0.125	0.133			
	Nitrite (as N) (mg/L)	<0.0010	<0.0010			
	Sulfate (SO4) (mg/L)	20.3	19.5			
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050			
	Cyanide, Total (mg/L)	<0.0050	<0.0050			
	Cyanate (mg/L)	<0.20	<0.20			
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0359	0.0198			
	Antimony (Sb)-Total (mg/L)	0.00015	0.00016			
	Arsenic (As)-Total (mg/L)	0.00036	0.00028			
	Barium (Ba)-Total (mg/L)	0.0892	0.0878			
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050			
	Boron (B)-Total (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	0.000032	0.000022			
	Calcium (Ca)-Total (mg/L)	29.8	30.2			
	Chromium (Cr)-Total (mg/L)	0.00012	0.00012			
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Total (mg/L)	0.00110	0.00115			
	Iron (Fe)-Total (mg/L)	0.060	0.048			
	Lead (Pb)-Total (mg/L)	0.000060	<0.000050			
	Lithium (Li)-Total (mg/L)	0.00080	0.00115			
	Magnesium (Mg)-Total (mg/L)	9.91	10.3			
	Manganese (Mn)-Total (mg/L)	0.0529	0.0372			
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1412042-1 Water 13-JAN-14 12:45 0167-140113-015	L1412042-2 Water 13-JAN-14 13:54 0167-140113-014	L1412042-3 Water 13-JAN-14 14:50 0167-140113-011	L1412042-4 Water 13-JAN-14 14:50 0167-140113-012	L1412042-5 Water 13-JAN-14 15:32 0167-140113-009
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)	0.000372	0.000872	0.00101	0.00101	0.00184
	Nickel (Ni)-Total (mg/L)	<0.00050	0.00219	0.00274	0.00275	0.0022
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.76	5.96	6.78	6.68	23.2
	Selenium (Se)-Total (mg/L)	<0.00010	0.00020	0.00023	0.00027	<0.00020 DLA
	Silicon (Si)-Total (mg/L)	6.20	7.07	7.13	7.06	2.99
	Silver (Ag)-Total (mg/L)	<0.000010	0.000026	0.000040	0.000044	0.000069
	Sodium (Na)-Total (mg/L)	3.24	31.2	37.8	38.8	30.0
	Strontium (Sr)-Total (mg/L)	0.305	0.848	0.817	0.841	0.988
	Sulfur (S)-Total (mg/L)	9.32	263	283	282	395
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	0.000011	0.000319
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020 DLA
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.020 DLA
	Uranium (U)-Total (mg/L)	0.000652	0.00257	0.00286	0.00292	0.00191
	Vanadium (V)-Total (mg/L)	<0.0010	0.0013	0.0018	0.0018	<0.0020 DLA
	Zinc (Zn)-Total (mg/L)	<0.0030	0.0085	0.0066	0.0066	0.205
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)	0.0073	0.0063	0.0103	0.0091	<0.0020 DLA
	Antimony (Sb)-Dissolved (mg/L)	0.00033	0.00061	0.00055	0.00054	0.0481
	Arsenic (As)-Dissolved (mg/L)	0.00094	0.0282	0.0332	0.0334	0.107
	Barium (Ba)-Dissolved (mg/L)	0.0868	0.0653	0.0568	0.0586	0.0194
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020 DLA
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010 DLA
	Boron (B)-Dissolved (mg/L)	<0.010	0.059	0.073	0.071	0.141
	Cadmium (Cd)-Dissolved (mg/L)	0.000016	0.000237	0.000501	0.000345	0.00169
	Calcium (Ca)-Dissolved (mg/L)	32.5	288	296	302	390
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00027	0.00036	0.00032	<0.00020 DLA
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	0.00588	0.00770	0.00783	0.00093
	Copper (Cu)-Dissolved (mg/L)	0.00108	0.00116	0.00170	0.00163	0.0236
	Iron (Fe)-Dissolved (mg/L)	0.014	3.59	7.81	8.01	0.043
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.00035
	Lithium (Li)-Dissolved (mg/L)	0.00099	0.00119	0.00085	0.00077	0.0123
	Magnesium (Mg)-Dissolved (mg/L)	11.0	78.6	67.1	68.7	85.7
	Manganese (Mn)-Dissolved (mg/L)	0.0271	5.30	6.18	6.20	0.522
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000358	0.000828	0.000956	0.000945	0.00177

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1412042-6	L1412042-7	L1412042-8	L1412042-9	L1412042-10
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-JAN-14	13-JAN-14	14-JAN-14	14-JAN-14	14-JAN-14
	Sampled Time	16:45	16:46	16:42	16:39	16:46
	Client ID	0167-140113-010	0167-140113-008	0167-140114-018	0167-140114-016	0167-140114-017
Grouping	**Analyte**					
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)	0.000397	0.000367	0.00017	<0.00010 DLA	0.00016
	Nickel (Ni)-Total (mg/L)	0.00156	0.00198	<0.0010 DLA	0.0014	<0.0010 DLA
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	3.76	3.61	3.99	5.57	4.14
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00020 DLA	<0.00020 DLA	<0.00020 DLA
	Silicon (Si)-Total (mg/L)	6.74	6.94	3.54	3.88	3.64
	Silver (Ag)-Total (mg/L)	<0.000010	0.000176	<0.000020 DLA	<0.000020 DLA	<0.000020 DLA
	Sodium (Na)-Total (mg/L)	5.09	4.69	13.6	16.5	14.2
	Strontium (Sr)-Total (mg/L)	0.409	0.444	1.13	1.31	1.16
	Sulfur (S)-Total (mg/L)	139	147	348	510	354
	Thallium (Tl)-Total (mg/L)	0.000093	0.000101	0.000070	0.000117	0.000074
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00020 DLA	<0.00020 DLA	<0.00020 DLA
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.020 DLA	<0.020 DLA	<0.020 DLA
	Uranium (U)-Total (mg/L)	0.00435	0.00392	0.00464	0.00399	0.00479
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0020 DLA	<0.0020 DLA	<0.0020 DLA
	Zinc (Zn)-Total (mg/L)	0.614	0.998	0.462	0.987	0.459
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)	0.0013	0.0013	<0.0020 DLA	0.0024	<0.0020 DLA
	Antimony (Sb)-Dissolved (mg/L)	0.00986	0.0155	0.00361	0.00080	0.00357
	Arsenic (As)-Dissolved (mg/L)	0.0156	0.0676	0.00842	0.0101	0.00844
	Barium (Ba)-Dissolved (mg/L)	0.0119	0.0164	0.0126	0.00797	0.0128
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00020 DLA	<0.00020 DLA	<0.00020 DLA
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.0010 DLA	<0.0010 DLA	<0.0010 DLA
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.020 DLA	<0.020 DLA	<0.020 DLA
	Cadmium (Cd)-Dissolved (mg/L)	0.000866	0.000416	0.00368	0.0109	0.00370
	Calcium (Ca)-Dissolved (mg/L)	183	185	357	461	353
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00020 DLA	<0.00020 DLA	<0.00020 DLA
	Cobalt (Co)-Dissolved (mg/L)	0.00048	0.00094	<0.00020 DLA	0.00111	<0.00020 DLA
	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	0.00218	0.00149	0.00227
	Iron (Fe)-Dissolved (mg/L)	0.221	2.08	<0.010	0.116	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000121	<0.00010 DLA	<0.00010 DLA	<0.00010 DLA
	Lithium (Li)-Dissolved (mg/L)	0.00906	0.00947	0.0092	0.0110	0.0094
	Magnesium (Mg)-Dissolved (mg/L)	63.2	62.5	98.2	131	102
	Manganese (Mn)-Dissolved (mg/L)	1.08	1.27	0.104	2.32	0.107
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000396	0.000324	0.00015	<0.00010 DLA	0.00014

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1412042-11 Water 15-JAN-14 12:05 TRAVEL BLANK	L1412042-12 Water 13-JAN-14 18:20 FIELD BLANK	L1412042-13 Water 14-JAN-14 08:52 0167-140114-005	L1412042-14 Water 14-JAN-14 15:00 0167-140114-013	L1412042-15 Water 14-JAN-14 13:05 0167-140114-007
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)	<0.000050	<0.000050	0.000352	0.000394	0.000353
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	0.00054	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	<0.10	<0.10	0.75	0.67	0.74
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	0.00041	0.00045
	Silicon (Si)-Total (mg/L)	<0.050	<0.050	6.42	6.25	6.57
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	<0.050	<0.050	2.98	2.54	2.56
	Strontium (Sr)-Total (mg/L)	<0.00020	<0.00020	0.306	0.321	0.303
	Sulfur (S)-Total (mg/L)	<0.50	<0.50	8.96	6.71	6.86
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	<0.000010	<0.000010	0.000653	0.000661	0.000593
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location		FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location		FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)		<0.0010	0.0078	0.0083	0.0080
	Antimony (Sb)-Dissolved (mg/L)		<0.00010	0.00025	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)		<0.00010	0.00082	0.00021	0.00023
	Barium (Ba)-Dissolved (mg/L)		<0.000050	0.0839	0.0881	0.0871
	Beryllium (Be)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)		<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)		<0.000010	0.000017	0.000016	0.000048
	Calcium (Ca)-Dissolved (mg/L)		<0.050	31.9	29.5	31.0
	Chromium (Cr)-Dissolved (mg/L)		<0.00010	0.00014	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)		<0.00020	0.00098	0.00085	0.00090
	Iron (Fe)-Dissolved (mg/L)		<0.010	0.013	0.013	0.013
	Lead (Pb)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)		<0.00050	0.00064	0.00085	0.00080
	Magnesium (Mg)-Dissolved (mg/L)		<0.10	10.5	10.1	10.3
	Manganese (Mn)-Dissolved (mg/L)		<0.000050	0.0475	0.0342	0.0490
	Mercury (Hg)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)		<0.000050	0.000367	0.000352	0.000350

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1412042-16	L1412042-17			
	Description	Water	Water			
	Sampled Date	14-JAN-14	14-JAN-14			
	Sampled Time	13:25	15:00			
	Client ID	0167-140114-006	0167-140114-001			
Grouping	**Analyte**					
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)	0.000371	0.000433			
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050			
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050			
	Potassium (K)-Total (mg/L)	0.68	0.71			
	Selenium (Se)-Total (mg/L)	0.00024	<0.00010			
	Silicon (Si)-Total (mg/L)	6.21	6.41			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	2.62	2.59			
	Strontium (Sr)-Total (mg/L)	0.312	0.314			
	Sulfur (S)-Total (mg/L)	7.02	6.73			
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.000622	0.000641			
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	0.0095	0.0089			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	0.00011			
	Arsenic (As)-Dissolved (mg/L)	0.00025	0.00028			
	Barium (Ba)-Dissolved (mg/L)	0.0880	0.0838			
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050			
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (mg/L)	0.000020	0.000018			
	Calcium (Ca)-Dissolved (mg/L)	30.3	30.4			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.00089	0.00082			
	Iron (Fe)-Dissolved (mg/L)	0.013	0.017			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.00089	0.00106			
	Magnesium (Mg)-Dissolved (mg/L)	10.1	10.2			
	Manganese (Mn)-Dissolved (mg/L)	0.0485	0.0344			
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000361	0.000384			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1412042-1	L1412042-2	L1412042-3	L1412042-4	L1412042-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-JAN-14	13-JAN-14	13-JAN-14	13-JAN-14	13-JAN-14
	Sampled Time	12:45	13:54	14:50	14:50	15:32
	Client ID	0167-140113-015	0167-140113-014	0167-140113-011	0167-140113-012	0167-140113-009
Grouping	**Analyte**					
WATER						
Dissolved Metals	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00219	0.00264	0.00263	0.0021
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.79	6.20	6.72	6.81	22.9
	Selenium (Se)-Dissolved (mg/L)	<0.00010	0.00021	0.00021	0.00027	<0.00020 DLA
	Silicon (Si)-Dissolved (mg/L)	6.44	7.20	6.92	7.07	2.92
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	0.000013	0.000013	<0.000020 DLA
	Sodium (Na)-Dissolved (mg/L)	3.40	32.4	37.0	38.3	29.9
	Strontium (Sr)-Dissolved (mg/L)	0.298	0.874	0.821	0.826	0.974
	Sulfur (S)-Dissolved (mg/L)	9.38	267	273	277	380
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000306
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020 DLA
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.020 DLA
	Uranium (U)-Dissolved (mg/L)	0.000648	0.00258	0.00279	0.00287	0.00183
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	0.0013	0.0012	<0.0020 DLA
	Zinc (Zn)-Dissolved (mg/L)	0.0010	0.0080	0.0061	0.0057	0.199

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1412042-6	L1412042-7	L1412042-8	L1412042-9	L1412042-10
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-JAN-14	13-JAN-14	14-JAN-14	14-JAN-14	14-JAN-14
	Sampled Time	16:45	16:46	16:42	16:39	16:46
	Client ID	0167-140113-010	0167-140113-008	0167-140114-018	0167-140114-016	0167-140114-017
Grouping	**Analyte**					
WATER						
Dissolved Metals	Nickel (Ni)-Dissolved (mg/L)	0.00142	0.00188	<0.0010 DLA	0.0014	<0.0010 DLA
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	3.79	3.47	4.07	5.13	4.07
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00020 DLA	<0.00020 DLA	<0.00020 DLA
	Silicon (Si)-Dissolved (mg/L)	6.68	6.56	3.60	3.58	3.60
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000020 DLA	<0.000020 DLA	<0.000020 DLA
	Sodium (Na)-Dissolved (mg/L)	4.97	4.35	13.1	16.7	13.1
	Strontium (Sr)-Dissolved (mg/L)	0.421	0.417	1.11	1.29	1.13
	Sulfur (S)-Dissolved (mg/L)	136	139	337	471	345
	Thallium (Tl)-Dissolved (mg/L)	0.000083	0.000077	0.000067	0.000122	0.000070
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00020 DLA	<0.00020 DLA	<0.00020 DLA
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.020 DLA	<0.020 DLA	<0.020 DLA
	Uranium (U)-Dissolved (mg/L)	0.00428	0.00368	0.00454	0.00405	0.00452
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0020 DLA	<0.0020 DLA	<0.0020 DLA
	Zinc (Zn)-Dissolved (mg/L)	0.598	0.971	0.446	0.992	0.454

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1412042-11	L1412042-12	L1412042-13	L1412042-14	L1412042-15
Description	Water	Water	Water	Water	Water
Sampled Date	15-JAN-14	13-JAN-14	14-JAN-14	14-JAN-14	14-JAN-14
Sampled Time	12:05	18:20	08:52	15:00	13:05
Client ID	TRAVEL BLANK	FIELD BLANK	0167-140114-005	0167-140114-013	0167-140114-007
Grouping **Analyte**					
WATER					
Dissolved Metals Nickel (Ni)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Dissolved (mg/L)		<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved (mg/L)		<0.10	0.75	0.61	0.71
Selenium (Se)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
Silicon (Si)-Dissolved (mg/L)		<0.050	6.29	6.08	6.41
Silver (Ag)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)		<0.050	2.91	2.53	2.57
Strontium (Sr)-Dissolved (mg/L)		<0.00020	0.301	0.301	0.308
Sulfur (S)-Dissolved (mg/L)		<0.50	8.76	6.61	6.67
Thallium (Tl)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)		<0.010	<0.010	<0.010	<0.010
Uranium (U)-Dissolved (mg/L)		<0.000010	0.000606	0.000628	0.000600
Vanadium (V)-Dissolved (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Dissolved (mg/L)		<0.0010	0.0014	0.0012	<0.0010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1412042-16	L1412042-17			
	Description	Water	Water			
	Sampled Date	14-JAN-14	14-JAN-14			
	Sampled Time	13:25	15:00			
	Client ID	0167-140114-006	0167-140114-001			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050			
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			
	Potassium (K)-Dissolved (mg/L)	0.69	0.71			
	Selenium (Se)-Dissolved (mg/L)	0.00025	<0.00010			
	Silicon (Si)-Dissolved (mg/L)	6.25	6.34			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	2.65	2.59			
	Strontium (Sr)-Dissolved (mg/L)	0.301	0.307			
	Sulfur (S)-Dissolved (mg/L)	6.81	6.52			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.000588	0.000628			
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010			
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010			

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Beryllium (Be)-Total	DLA	L1412042-1, -10, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Bismuth (Bi)-Total	DLA	L1412042-1, -10, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Total	DLA	L1412042-1, -10, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Selenium (Se)-Total	DLA	L1412042-1, -10, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Tin (Sn)-Total	DLA	L1412042-1, -10, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Titanium (Ti)-Total	DLA	L1412042-1, -10, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Vanadium (V)-Total	DLA	L1412042-1, -10, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cyanate	DLIS	L1412042-1, -11, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7
Duplicate	Fluoride (F)	DLM	L1412042-1, -10, -11, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLM	L1412042-1, -10, -11, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1412042-1, -10, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1412042-1, -10, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1412042-1, -10, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1412042-1, -10, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1412042-1, -10, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1412042-1, -10, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1412042-1, -10, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1412042-1, -10, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Total	MS-B	L1412042-1, -10, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Total	MS-B	L1412042-1, -10, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Total	MS-B	L1412042-1, -10, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L1412042-1, -10, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLIS	Detection Limit Adjusted: Insufficient Sample
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-PCT-VA	Water	Alkalinity by Auto. 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.

ALK-PCT-VA	Water	Alkalinity by Auto. 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.

Reference Information

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CN-CNO-WT	Water	Cyanate	APHA 4500-CN-L

This analysis is carried out using procedures adapted from APHA method 4500-CN "Cyanide". Cyanate is determined by the Cyanate hydrolysis method using an ammonia selective electrode

CN-SCN-VA	Water	Thiocyanate by Colour	APHA 4500-CN CYANIDE

This analysis is carried out using procedures adapted from APHA Method 4500-CN- M "Thiocyanate" Thiocyanate is determined by the ferric nitrate colourimetric method.

CN-T-CFA-VA	Water	Total Cyanide in water by CFA	ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

CN-WAD-CFA-VA	Water	Weak Acid Diss. Cyanide in water by CFA	APHA 4500-CN CYANIDE

This analysis is carried out using procedures adapted from APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by in-line sample distillation with final determination by colourimetric analysis.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

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

HG-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

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

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

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

Reference Information

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

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

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

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

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

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

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

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

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

S-TOT-ICP-VA	Water	Total Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

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

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

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

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

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

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

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

Chain of Custody Numbers:

Reference Information

1 2 3 4

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.

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 4

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	EDI	☑ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Meghan Marjanovic	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	2195 - 2nd Ave	Email 1: mmarjanovic@edynamics.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Y1A 3T8	Email 2:	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-393-4882 Fax:	Email 3:	
Invoice To	Same as Report ? ☐ Yes ☑ No	Client / Project Information	
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: Mount Nansen 13-Y-0167	
Company:	Environmental Dynamics Inc	PO / AFE:	
Contact:	Shannon Jenner sjenner@edynamics.com	LSD:	
Address:	2195 - 2nd Ave, Y1A 3T8		
Phone:	867-393-4882 Fax:	Quote #: Q38399	
Lab Work Order # (lab use only)	L1412042	ALS Contact:	Sampler: LAURA GRIEVE

Analysis Request — Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-PCT-VA	ANIONS-ALL-IC-WR	CN-CNO-WT (P)	CN-SCN-VA (P)	CN-T-CFA-VA (P)	CN-WAD-CFA-VA	EC-MAN-WR,PH-MAN-WR	MET-D-BCMDG-A (F/P)	MET-T-BCMDG-VA (P)	NH3-F-VA (P)	TDS-VA,TSS-VA	LT50	Number of Containers
1	0167-1401 13 - 015	13-Jan-2014	12:45	Water	X	X	X	X	X	X	X	X	X	X	X		9
2	0167-1401 13 - 014	13-Jan-2014	1354	Water	X	X	X	X	X	X	X	X	X	X	X		9
3	0167-1401 13 - 011	13-Jan-2014	1450	Water	X	X	X	X	X	X	X	X	X	X	X	X	9
4	0167-1401 13 - 012	13-Jan-2014	1450	Water	X	X	X	X	X	X	X	X	X	X	X		9
5	0167-1401 13 - 009	13-Jan-2014	1532	Water	X	X	X	X	X	X	X	X	X	X	X		9
6	0167-1401 13 - 010	13-Jan-2014	1645	Water	X	X	X	X	X	X	X	X	X	X	X		9
7	0167-1401 13 - 008	13-Jan-2014	1646	Water	X	X	X	X	X	X	X	X	X	X	X		9

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - I

L1412042-COFC

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBL

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			[signature]	15-JAN-14	12:05	3.4, 1.2, 2.3 °C				

Doreen Jan 16 1251 PC

GENF 18.01 Front

ALS Environmental

Chain of Custody / Analytical Request Form
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COC # _____

Page 2 of 4

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	EDI	☑ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Meghan Marjanovic	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	2195 - 2nd Ave	Email 1:	mmarjanovic@edynamics.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Y1A 3A2	Email 2:		○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-393-4882 Fax:	Email 3:		**Analysis Request**
Invoice To	Same as Report ? ☐ Yes ☑ No	**Client / Project Information**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #:	Mount Nansen 13-Y-0167	
Company:	Environmental Dynamics Inc	PO / AFE:		
Contact:	Shannon Jenner sjenner@edynamics.com	LSD:		
Address:	2195 - 2nd Ave, Y1A 3A2			
Phone:	867-393-4882 Fax:	Quote #:	Q38400	
Lab Work Order # (lab use only)	L1412042	ALS Contact:	Sampler: Laura Grieve	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-PCT-VA	ANIONS-ALL-IC-WR	NH3-F-VA	TSS-VA,TDS-VA	EC-MAN-WR	PH-MAN-WR	MET-T-BCMDG-VA	MET-D-BCMDG-A	FULL-TOT-DW-VA	Number of Containers
8	0167-1401 14 - 18	14 -Jan-2014	1642	Water	x	x	x	x	x	x	x	x		6
9	0167-1401 14 - 16	14 -Jan-2014	1639	Water	x	x	x	x	x	x	x	x		6
10	0167-1401 14 - 17	14 -Jan-2014	1646	Water	x	x	x	x	x	x	x	x		6
	~~0167-1401 -~~	~~Jan-2014~~		~~Water~~										

L1412042-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			[signature]	15-JAN-14	12:05	3.4, 1.2, 2.3 °C				

Doreen Jan 16 1253 8

GENF 18.01 Front

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 3 of 4

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	EDI	☑ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Meghan Marjanovic	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	2195 - 2nd Ave	Email 1: mmarjanovic@edynamics.com		○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Y1A 3T8	Email 2:		○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-393-4882 Fax:	Email 3:		
Invoice To	Same as Report ? ☐ Yes ☑ No	Client / Project Information		Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #:	Mount Nansen 13-Y-0167	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	Environmental Dynamics Inc	PO / AFE:		
Contact:	Shannon Jenner sjenner@edynamics.com	LSD:		
Address:	2195 - 2nd Ave, Y1A 3T8			
Phone:	867-393-4882 Fax:	Quote #:	Q38399	
Lab Work Order # (lab use only)	L1412042	ALS Contact:	Sampler: LAURA GRIEVE	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-PCT-VA	ANIONS-ALL-IC-WR	CN-CNO-WT	CN-SCN-VA	CN-T-CFA-VA	CN-WAD-CFA-VA	EC-MAN-WR,PH-MAN-WR	MET-D-BCMDG-A	MET-T-BCMDG-VA	NH3-F-VA	TDS-VA,TSS-VA		Number of Containers
	0167-1401 TRAVEL BLANK	N/A-Jan-2014	n/a	Water	X	X	X	X	X	X	X	X	X	X	X		9
	0167-1401 FIELD BLANK	13-Jan-2014	18:20	Water	X	X	X	X	X	X	X	X	X	X	X		9
	0167-1401 -	-Jan-2014		Water	X	X	X	X	X	X	X	X	X	X	X		9
	0167-1401 -	-Jan-2014		Water	X	X	X	X	X	X	X	X	X	X	X		9
	0167-1401 -	-Jan-2014		Water	X	X	X	X	X	X	X	X	X	X	X		9
	0167-1401 -	-Jan-2014		Water	X	X	X	X	X	X	X	X	X	X	X		9
	0167-1401 -	-Jan-2014		Water	X	X	X	X	X	X	X	X	X	X	X		9

L1412042-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
				15-JAN-14	12:05	3.4,1.2,2.3°C				

GENF 18.01 Front

Dorm Jan 16 12:53 8°C

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 4 of 4

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	EDI	☑ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Meghan Marjanovic	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	2195 - 2nd Ave	Email 1:	mmarjanovic@edynamics.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Y1A 3T8	Email 2:		○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-393-4882 Fax:	Email 3:		
Invoice To	Same as Report ? ☐ Yes ☑ No	Client / Project Information		Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #:	Mount Nansen 13-Y-0167	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	Environmental Dynamics Inc	PO / AFE:		
Contact:	Shannon Jenner sjenner@edynamics.com	LSD:		
Address:	2195 - 2nd Ave, Y1A 3T8			
Phone:	867-393-4882 Fax:	Quote #:	Q38399	
Lab Work Order # (lab use only)	L1412042	ALS Contact:	Sampler:	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-PCT-VA	ANIONS-ALL-IC-WR	CN-CNO-WT	CN-SCN-VA	CN-T-CFA-VA	CN-WAD-CFA-VA	EC-MAN-WR,PH-MAN-WR	MET-D-BCMDG-A	MET-T-BCMDG-VA	NH3-F-VA	TDS-VA,TSS-VA		Number of Containers
					P	P	P	P	P	P		F/P	P	P			
13	0167-1401 14 - 005	14-Jan-2014	08:52	Water	X	X	X	X	X	X	X	X	X	X	X		9
14	0167-1401 14 - 013	14-Jan-2014	15:00	Water	X	X	X	X	X	X	X	X	X	X	X		9
15	0167-1401 14 - 007	14-Jan-2014	13:05	Water	X	X	X	X	X	X	X	X	X	X	X		9
16	0167-1401 14 - 006	14-Jan-2014	1325	Water	X	X	X	X	X	X	X	X	X	X	X		9
17	0167-1401 14 - 001	14-Jan-2014	1500	Water	X	X	X	X	X	X	X	X	X	X	X		9
	0167-1401 -	-Jan-2014		Water	X	X	X										
	0167-1401 -	-Jan-2014		Water	X	X	X										

L1412042-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 -

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
				15-JAN-14	12:05	3.4, 1.2, 2.3 °C				

Doreen Jan 16 1235 8°C

GENF 18.01 Front

ENVIRONMENTAL DYNAMICS INC.
ATTN: Meghan Marjanovic
2195 - 2nd Ave
Whitehorse YT Y1A 3T8

Date Received: 15-JAN-14
Report Date: 31-JAN-14 17:09 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1412100

Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 13-Y-0167
C of C Numbers: 1
Legal Site Desc:

Comments: Please note ALS identified samples L1412100-1 was sublet to Nautilus Environmental for LT50 analysis.

Can Dang
Senior Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID					
Grouping **Analyte**					

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

** 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

Chain of Custody Numbers:

1

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.

Nautilus Environmental

ALS Environmental
ATTN: Can Dang
Suite 100-8081 Lougheed Hwy.
Burnaby, BC
V5A 1W9

Report Date: January 30, 2014
Work Order: 14033

Data Report

Species: **Rainbow trout (*Oncorhynchus mykiss*)**
Protocol: **EPS 1/RM/13 (Second Ed. with 2007 amendments)**

Table 1. Results for the 96-h rainbow trout acute toxicity test.

Sample ID	Collection Date and Time	96-h LT-50 [with 95% confidence Limits] (hours)
L1412100-1 (0167-140113-011)	January 13, 2014 @ N/A	10.7 [4.3 – 18.5]

Due to an insufficient number of viable fish, the 96-h rainbow trout toxicity testing was subcontracted to Integrated Resource Consultants. The test met performance criteria and there were no deviations from the test methods. The results presented here relate only to the sample tested.

Jacob Frank, B.Sc.
Laboratory Biologist

Reviewed By:
Julianna Kalocai, M.Sc., R.P.Bio
QA Officer

Integrated Resource Consultants Inc.

Suite 160, 14480 River Road
Richmond, BC, Canada V6V 1L4
Tel. 604-278-7714 Fax 604-278-7741
info@ircintegratedresource.com

FILE:NAUTILUS/1401093.RTT

DATE: 28 January 2014

REPORT TO: Mr. Jacob Frank
Nautilus Environmental
8664 Commerce Court
Burnaby, B.C.
V5A 4N7

REPORT ON: RAINBOW TROUT BIOASSAY RESULTS

SAMPLE DESCRIPTION:

IRC Sample ID No.:	1401093
Sample Name:	**0167-140113-011** **PO # 14033**
Sample collected by:	N/A
Date collected:	13 January 2014
Date, time received:	17 January 2014; 1230 hrs.
Collection Method:	Grab
Amount, Container:	1 x 20 L plastic container
Physical description:	Opaque. orange liquid
Date, time tested:	17 January 2014; 1340 hrs.

RAINBOW TROUT 96 HR RESULTS:
The 96 hour (static) LT_{50} was 10.67 hours, with a 95% confidence interval between 4.329 and 18.52 hours.
100% trout mortality in undiluted sample.

The LT_{50} is defined as the median lethal time or the time at which there is 50% fish mortality. Results are calculated using the method described by Stephan (Methods for calculating an LC_{50} in: Aquatic Toxicology and Hazard Evaluation, American Society for Testing and Materials, 1977).

The method used for this test was as per the IRC laboratory "Standard Operating Procedure for Rainbow Trout Holding and Testing" RTver5. This procedure follows the "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout" EPS 1/RM/13, Second Edition – December 2000 (with May 2007 amendments). The test volume was 15 litres with 10 fish exposed per test vessel. Aeration was by forced air through airstones at a rate of approximately 6.5 ± 1 ml/L/min. The sample was not pH adjusted or filtered prior to testing.

The initial dissolved oxygen level was 9.2 mg/L at 14.5°C, the conductivity was 1761 µS/cm and the initial pH was 6.9. After pre-aerating the sample for 30 minutes, the dissolved oxygen level was 9.4 mg/L. As the dissolved oxygen level was greater than 70% saturation and less than 100% saturation the test was initiated at this time. The test set-up technician was DB.

Please call should you have any questions.

IRC Integrated Resource Consultants Inc.

Ditty Chacko Kakkassery
Laboratory Biologist
b359
enclosure

FILE:NAUTILUS/1401093.RTT

RAW DATA:

TEST CONCENTRATION		HOURS 0	3	24	48	72	96
100%	Percent Survival	100%	80%	50%	0%	0%	0%
	Dissolved Oxygen (mg/L)	9.4		9.5	9.4		
	Temperature (°C)	14.5		15.0	15.0		
	pH	7.0		8.1	8.1		
	Conductivity (µScm)	1761			1561		
	Symptoms	1	2	2,3	-	-	-
	Loading Density (g/L)	0.31	0.25	0.16	0.00	0.00	0.00
CONTROL	Percent Survival	100%	100%	100%	100%	100%	100%
	Dissolved Oxygen (mg/L)	10.0		9.7	9.5	9.7	9.6
	Temperature (°C)	15.0		15.0	15.0	15.0	15.0
	pH	7.1		7.3	6.6	7.2	7.1
	Conductivity (µScm)	48					52
	Symptoms	1	1	1	1	1	1
	Loading Density (g/L)	0.31	0.31	0.31	0.31	0.31	0.31
	Technician	DB	DB	DB	CW	MH	MH

KEY TO SYMPTOMS:

1 = no apparent effect
2 = fish showing signs of stress
3 = loss of equilibrium

TEST FISH STOCK INFORMATION:

Date received:	23 December 2013	
Source:	Miracle Springs Rainbow Trout Hatchery	
Species:	*Oncorhynchus mykiss* (Rainbow Trout)	
Fork Length:	Mean:	37.0 mm ± 5.0 mm
	Range:	30.0 mm – 45.0 mm
Wet weight:	Mean:	0.47 g ± 0.16 g
	Range:	0.30 g – 0.76 g
Condition Factor (100xWt/length^{3}cm):	0.92	

Acclimation History	
Acclimation temperature:	13.0 to 15.5 °CELSIUS
Treatments:	None
Water:	Dechlorinated tap water
Feeding:	Nutra 2000 fry feed
Mortality:	0.89 %

RAINBOW TROUT REFERENCE TOXICANT DATA

Stock Arrival Date (y/m/d)	Test Date (y/m/d)	Toxicant	LC50 (mg/L)	95% Confidence Interval
12.06.12	12.06.21	Phenol	14.11	13.07 to 15.24
12.06.22	12.07.05	"	11.43	9.96 to 13.13
12.07.17	12.07.31	"	11.52	10.16 to 13.07
12.07.31	12.08.20	"	9.26	7.83 to 10.95
12.09.06	12.09.15	"	13.55	12.23 to 15.02
12.09.12	12.10.03	"	9.80	8.62 to 11.14
12.10.16	12.10.31	"	9.80	8.62 to 11.14
12.11.06	12.11.27	"	11.52	10.16 to 13.07
12.12.04	12.12.31	"	7.75	6.60 to 9.11
13.01.04	13.01.08	"	22.41	17.46 to 28.76
13.01.04	13.01.16	"	11.43	9.96 to 13.13
13.01.15	13.01.31	"	11.52	10.16 to 13.07
13.02.12	13.02.20	"	14.08	11.33 to 17.43
13.02.21	13.03.08	"	9.80	8.62 to 11.14
13.03.07	13.03.20	"	13.01	11.57 to 14.64
13.03.26	13.04.09	"	13.45	11.50 to 15.72
13.04.16	13.04.16	"	11.70	9.61 to 14.24
13.04.30	13.05.15	"	9.80	8.62 to 11.14
13.05.21	13.06.04	"	12.50	11.02 to 14.17
13.06.07	13.06.21	"	15.57	13.15 to 18.45
13.07.23	13.08.08	"	13.50	11.78 to 15.45
13.08.22	13.09.05	"	11.91	10.25 to 13.83
13.09.12	13.09.27	"	14.70	12.93 to 16.71
13.10.04	13.10.18	"	10.20	9.45 to 11.02
13.10.31	13.11.15	"	8.65	7.04 to 10.25
13.11.21	13.12.05	"	9.02	7.42 to 10.65
13.12.12	13.12.30	"	14.10	12.06 to 16.42
13.12.23	14.01.14	"	10.66	9.60 to 11.82
LAB GEOMETRIC MEAN ± 2 standard deviations:				11.667 mg/L ± 5.496
Warning Limits:				6.171 mg/L to 17.163 mg/L

CONTROL/DILUTION WATER QUALITY:

Hardness: 15 mg/L

Total Residual Chlorine: 13 µg/L

Short Holding Time

Rush Processing

L1412100

VANCOUVER

Subcontract Request Form

Subcontract To:

NAUTILUS ENVIRONMENTAL
8664 COMMERCE COURT
BURNABY,BC V5A 4N7

WO# 14033

NOTES: Please reference on final report and invoice: PO# *L1412100*
ALS requires QC data to be provided with your final results.

LT50 Rainbow Trout. - Testing Subcontracted to IRC

Please see enclosed 1 **sample(s) in** 1 **Container(s)**

SAMPLE NUMBER	CLIENT ID / ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L1412100-1	0167-140113-011 Special Request- Nautilus Environmental (SPECIAL REQUEST-NL 14)	1/ 13/ 2014 3/15/2014	

Subcontract Info Contact: Dorota Jamro (604) 253-4188

Analysis and reporting info contact: Can Dang
8081 LOUGHEED HWY
SUITE 100
BURNABY,BC V5A 1W9
Phone: (604) 253-4188 Email: can.dang@alsglobal.com

Please email confirmation of receipt to: **can.dang@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: YML Date Received: Jan. 16/14 @1615

Verified By: _____ Date Verified: _____

Temperature: 15.2

Sample Integrity Issues: _____

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC #

Page 1 of 1

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	EDI	☑ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Meghan Marjanovic	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	2195 - 2nd Ave	Email 1:	mmarjanovic@edynamics.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Y1A 3T8	Email 2:		○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-393-4882 Fax:	Email 3:		
Invoice To	Same as Report ? ☐ Yes ☑ No	Client / Project Information		Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #:	Mount Nansen 13-Y-0167	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	Environmental Dynamics Inc	PO / AFE:		P P P P F/P P P
Contact:	Shannon Jenner sjenner@edynamics.com	LSD:		
Address:	2195 - 2nd Ave, Y1A 3T8			
Phone:	867-393-4882 Fax:	Quote #:	Q38399	

Lab Work Order # (lab use only): L1412100

ALS Contact:

Sampler: LAURA GRIEVE

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	LT50	Number of Containers
1	0167-1401 13 - 015	13-Jan-2014	12:45	Water		9
2	0167-1401 13 - 014	13-Jan-2014	13:54	Water		9
3	0167-1401 13 - 011	13-Jan-2014	1450	Water	X	9
4	0167-1401 13 - 012	13-Jan-2014	1450	Water		9
5	0167-1401 13 - 009	13-Jan-2014	1532	Water		9
6	0167-1401 13 - 010	13-Jan-2014	1645	Water		9
7	0167-1401 13 - 008	13-Jan-2014	1646	Water		9
8						
9						
10						
11						
12						

L1412100-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

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Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
				15-JAN-14	12:05	3.4, 1.2, 2.3 °C				

Jan 16 1255 8°C

GENF 18.01 Front

Appendix C:

Map of Mount Nansen Site and Station Locations

Mount Nansen Site: Hydrometric Stations and Water Quality Sites

Legend

- Atmospheric Station (label ex: ATM-DC-2)
- Hydrometric Station and Water Quality Site (label ex: H/WQ-VC-UMN)
- Hydrometric Station (label ex: H-VC-R)
- Water Quality Site (label ex: WQ-PC-U)
- Unpaved Road/Access
- Drainage Areas (Local)

1:50,000 and 1:250,000 Topographic Spatial Data provided by Geomatics - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

Digital Elevation Model provided by Geomatics - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

Watercourse, drainage areas and Mount Nansen Road layers digitized / modified by EDI (2011) using orthophotos provided by Yukon Government, Energy, Mines and Resources (2011).

Project data displayed is site specific. Data collected by EDI Environmental Dynamics Inc. (2011) was obtained using Garmin GPS technology.

This document is not an official land survey and the spatial data presented is subject to change.

0 200 400 600 800 1,000

metres

Map Scale = 1:22,000 (printed on 11 x 17)

Map Projection: North American Datum 1983 UTM Zone 8N

Drawn:	Checked:	FIGURE 1	Date: 31/01/2014
LG	MM		

Mount Nansen Map Area

Carmacks

Yukon

EDI

Path: J:\Yukon\Projects\2013\13_Y_0167_AAM_Mount Nansen_Surface_Water\Mapping\Fig1_Hydro_Sites_31Jan2014.mxd