

March 17, 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: March 10-12, 2014

Trip Dates:	March 10-12, 2014
EDI Field Staff:	Dawn Hansen, Joel MacFabe 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 March 10 to March 12, 2014. Air temperatures during the trip ranged from -5°C to +2°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 sites/stations were very low.

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 (February 10-12, 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. Stream discharge measurements were collected at each hydrometric station that was not frozen to substrate or dry, and where suitable conditions existed for measurements. Low water levels in Victoria Creek combined with thick ice conditions along the creek margins, resulted in poor monitoring conditions for the velocity-area, mid-section method with the ADV. The ADV was only used at the H-VC-U station, where conditions were acceptable. The salt tracer method with a salt slug injection was used at all stations where measurements were collected. Level logger data at the four continuous monitoring stations (H-VC-R, H-VC-DBC, H-VC-U, and H-DC-M) was collected.

Of note there was flow at the Back Creek station (H-BC) for the first time since October 2013; however, conditions were not suitable for discharge measurements due to water flowing through multiple layers of ice and slush. The H-DC-DX+105 station was frozen to bed. Many other stations remain frozen to bed or dry at this time, which is typical of the late-winter season (e.g. H-DC-R, H-PC-U, H-PC-DSP, H-DC-D1b, etc.).

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:	March 10-12, 2014
Weather at time of monitoring:	Weather conditions were typically clear and calm, with temperatures between -5°C to +2°C.

Station	Hydrometric Measurement Type	Notes & Comments
ATM-DC2/DC4	None	Both atmospheric barologgers did not download.
H-DC-DX+105	None	Channel frozen to bed.
H-DC-D1b	None	No hydrometric measurement taken, site frozen to substrate.
H-DC-B	None	Channel frozen to bed.
H-DC-M	Salt Slug	Water level very low, channel snow and ice covered (30 cm thick). Salt tracer used to estimate stream discharge. Logger downloaded
H-DC-R	None	Frozen to substrate. Overflow ice and thick ice conditions were not conducive for hydrometric monitoring.
H-VC-U	Salt Slug, Mid-section	Water level very low. Salt tracer used to measure discharge. The logger was downloaded. Channel is snow and ice covered.
H-BC	None	Overflow ice and thick ice conditions were not conducive for hydrometric monitoring.
H-VC-DBC	Salt Slug, Point Measurement	Water level low and clear. Salt tracer used to measure discharge. The logger was downloaded. Channel is snow and ice covered. Point discharge measurement taken.
H-VC-UMN	Salt Slug	Water levels very low. Salt tracer method used to measure stream



Station	Hydrometric Measurement Type	Notes & Comments
		discharge. Ice and snow covered.
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	Volumetric	Volumetric measurement taken. Flow gauge reading taken.
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 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, March 12, 2014.

This memo includes analytical results from samples collected during the February 10-12, 2014 trip (Appendix A) as well as copies of the ALS Certificate of Analysis (Appendix B).

Of note, the WQ-SEEP LT50 result for the February 2014 sample passed with a result of >96 hours. The LT50 results were originally a concern as the LT50 test from January 2014 failed for the first time (according to records going back to at least April 2012). An additional LT50 sample was collected from the site during the March 2014 trip to provide additional confirmation. These results will be forwarded to AAM upon receipt from the lab. It is suspected that the January 2014 LT50 result was an anomaly or lab error, as water quality parameters for the WQ-SEEP appear to be similar to results from other trips

Table 2. Water quality sampling program details.

WQ Sampling dates:	March 10-12, 2014	
Weather at time of sampling:	Weather conditions were typically clear and calm throughout the sampling event with temperatures ranging from -5°C to +2°C.	
Site	Sampled? (Yes/No)	Notes / Explanations
WQ-PIT1	Yes	Samples taken from just below the ice, total depth of 7.5 meters, ice 1.08 m thick.
WQ-PIT2	Yes	Samples taken from 3.0 m depth.
WQ-PIT3	Yes	Samples taken from 7.0 m depth.
WQ-SEEP	Yes	Conditions normal for this time of year. Ice build-up around pipe and barrel at the site. LT50 samples collected.



Site	Sampled? (Yes/No)	Notes / Explanations
WQ-TP	Yes	Ice thickness 65 cm. Sample collected below ice surface.
WQ-DC-DX	No	No water samples taken, site frozen to substrate.
WQ-DC-DX+105	No	No water samples taken, site frozen to substrate.
WQ-DC-D1b	No	No water samples taken, site frozen to substrate (overflow conditions).
WQ-DC-B	No	No water samples taken, 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-U	Yes	Water levels were low. Sample collected at regular location.
WQ-BC	Yes	Thick overflow ice conditions developed from previous visit when channel was dry. Ice thickness 0.54m. Water sampled through ice.
WQ-VC-DBC	Yes	Water levels were low. Sample taken from regular sample location.
WQ-VC-UMN	Yes	Water levels were low. Samples were collected at the regular sampling location.
WQ-VC-R+150	Yes	Water levels were low, with significant overflow ice.
WQ-PW	Yes	Drinking water sample collected.
WQ-PC-U	No	No water samples taken, site dry.
WQ-PC-D	No	No water samples taken, site dry.
WQ-MS-S-03	Yes	Water samples taken from regular site.
Quality Assurance/Quality Control Samples		
Field Replicate A	Yes	Collected from WQ-VC-DBC
Field Replicate B	Yes	Collected from WQ-SEEP
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. No flow observed beneath or between layers of ice.



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



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



Photo 4. H-VC-R (WQ-VC-R+150) looking upstream with discharge transect in foreground.



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



4. Additional Trip Information/Comments

Any changes to project scope (i.e. additional sites sampled):	None
Any alterations to sample scheduling:	None
Any events resulting in changes to budget:	None
Additional Comments:	<p>The WQ-SEEP LT50 sample result for February 2014 passed the 96-h LT50 test (Appendix B). This was originally a concern as the LT50 test from the January 2014 sample failed the test for the first time.</p> <p>An additional LT50 sample was collected during this March 2014 trip, to further confirm the status of the WQ-SEEP site. It is suspected that the LT50 test that failed in January 2014 is likely an anomaly or a lab error, as water quality results suggest no deviations from typical water quality conditions at this site.</p>
Wildlife Sightings:	None
Site concerns including safety concerns:	None



Appendix A:
Water Quality Parameter Guideline Exceedances
February 10-12, 2014



Table A1. Water Quality Results for the February 10-12, 2014 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-140212-016 WQ-PIT-1 02/12/2014	0167-140212-017 WQ-PIT-3 02/12/2014	0167-140212-018 WQ-PIT-2 02/12/2014	0167-140212-019 WQ-PW 02/12/2014	0167-140211-006 WQ-VC-UMN 02/11/2014	0167-140211-003 WQ-TP 02/11/2014	0167-140211-008 WQ-VC-U 02/11/2014
Temperature (in-situ)	°C	-	-	-	0.1	3.9	4	-	0	0.6	0
Specific Conductivity (in-situ)	µS/cm	-	-	-	1992	1991	1990	-	206.9	1979	177.8
pH (in-situ)	-	6.5 - 9.0	6.0 - 8.5	-	7.42	7.1	7.01	-	7.05	7.3	7.18
Turbidity (In-situ)	NTU	-	-	-	-	-	-	-	1.81	4.23	0.32
Dissolved Oxygen (in-situ)	mg/L	-	-	-	-	-	-	-	-	-	-
Colour, True	CU	15	-	5	-	-	-	<5.0	-	-	-
Conductivity	µS/cm	-	-	2	1990	1980	1970	327	248	2250	219
Hardness (as CaCO3)	mg/L	-	-	0.5	1300	1280	1310	192	124	1370	112
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	8	7.95	7.99	7.65	7.88	7.92	7.85
Total Suspended Solids	mg/L	-	50	3	<3.0	6	<3.0	-	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	-	-	1	1730	1690	1680	200	134	1970	115
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	200	185	196	-	92.3	182	87.7
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<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
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	200	185	196	161	92.3	182	87.7
Ammonia, Total (as N)	mg/L	0.75	-	0.005	0.0084	0.0173	0.0081	-	<0.0050	0.719	<0.0050
Chloride (Cl)	mg/L	120	-	0.5	<5.0	<5.0	<5.0	<0.50	<0.50	<5.0	<0.50
Fluoride (F)	mg/L	0.12	-	0.02	0.38	0.35	0.3	0.105	0.049	0.42	0.046
Nitrate (as N)	mg/L	13	-	0.005	0.077	0.207	<0.050	0.129	0.141	0.237	0.165
Nitrite (as N)	mg/L	0.06	-	0.001	<0.010	<0.010	<0.010	<0.0010	<0.0010	<0.010	<0.0010
Sulfate (SO4)	mg/L	-	-	0.5	1130	1100	1080	32.6	30.7	1310	20
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	-	-	-	-	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	-	0.3	0.005	-	-	-	-	<0.0050	<0.0050	<0.0050
Cyanate	mg/L	-	-	0.2	-	-	-	-	<2.0	<0.20	<0.20
Thiocyanate (SCN)	mg/L	-	-	0.5	-	-	-	-	<0.50	<0.50	<0.50
Aluminum (Al)-Total	mg/L	0.1	-	0.003	0.0171	0.0372	0.0101	<0.010	0.0524	<0.0060	0.0166
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	0.00388	0.0027	0.00376	<0.00050	0.00025	0.0472	0.00011
Arsenic (As)-Total	mg/L	0.005	-	0.0001	0.0114	0.0123	0.0112	0.00037	0.00086	0.169	0.00025
Barium (Ba)-Total	mg/L	-	1	0.00005	0.0128	0.0154	0.0123	0.082	0.0777	0.0197	0.0812
Beryllium (Be)-Total	mg/L	-	-	0.0001	<0.00020	<0.00020	<0.00020	-	<0.00010	<0.00020	<0.00010
Bismuth (Bi)-Total	mg/L	-	-	0.0005	<0.0010	<0.0010	<0.0010	-	<0.00050	<0.0010	<0.00050
Boron (B)-Total	mg/L	-	-	0.01	<0.020	<0.020	<0.020	<0.10	<0.010	0.178	<0.010
Cadmium (Cd)-Total	mg/L	0.000033	0.02	0.00001	0.00404	0.00471	0.00394	<0.00020	0.000023	0.00309	0.000028
Calcium (Ca)-Total	mg/L	-	-	0.05	359	359	356	44.5	32.1	419	27.8
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	0.00036	<0.00020	<0.00020	<0.0020	0.00014	<0.00020	0.00011
Cobalt (Co)-Total	mg/L	-	-	0.0001	<0.00020	<0.00020	<0.00020	-	<0.00010	0.00096	<0.00010
Copper (Cu)-Total	mg/L	0.002	0.2	0.0005	0.0036	0.0035	0.0035	<0.0010	0.0014	0.0288	0.00198
Iron (Fe)-Total	mg/L	0.3	1	0.01	0.095	0.137	0.056	<0.030	0.084	0.41	0.031
Lead (Pb)-Total	mg/L	0.003	0.1	0.00005	0.00051	0.0018	0.00055	0.00071	0.000249	0.00291	0.000165
Lithium (Li)-Total	mg/L	-	-	0.0005	0.0107	0.0094	0.0093	-	0.00059	0.0151	<0.00050
Magnesium (Mg)-Total	mg/L	-	-	0.1	97.7	95.4	95.4	19.6	10.7	91.6	9.64
Manganese (Mn)-Total	mg/L	-	0.5	0.00005	0.106	0.238	0.117	<0.0020	0.0829	1.08	0.0776
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.00001	<0.000010	<0.000010	<0.000010	<0.00020	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	0.00015	0.00011	0.00015	-	0.000308	0.002	0.000324
Nickel (Ni)-Total	mg/L	0.1	0.3	0.0005	<0.0010	<0.0010	<0.0010	-	0.00075	0.0027	0.00052
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050	<0.050	<0.050	-	<0.050	<0.050	<0.050
Potassium (K)-Total	mg/L	-	-	0.1	3.97	3.91	3.98	0.86	0.8	24.2	0.7
Selenium (Se)-Total	mg/L	0.001	-	0.0001	<0.00020	<0.00020	<0.00020	<0.0010	<0.00010	<0.00020	<0.00010
Silicon (Si)-Total	mg/L	-	-	0.05	3.64	3.55	3.57	-	6.23	3.26	6.26
Silver (Ag)-Total	mg/L	0.0001	0.1	0.00001	<0.000020	0.000025	<0.000020	-	<0.000010	0.00007	<0.000010
Sodium (Na)-Total	mg/L	-	-	0.05	14.2	14	13.8	4.8	3.47	34	2.77
Strontium (Sr)-Total	mg/L	-	-	0.0002	1.22	1.19	1.16	-	0.304	1.13	0.302
Sulfur (S)-Total	mg/L	-	-	0.5	369	368	363	-	10.3	424	6.95
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	0.000075	0.000071	0.000072	-	<0.000010	0.000355	<0.000010



Table A1. Water Quality Results for the February 10-12, 2014 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-140212-016 WQ-PIT-1 02/12/2014	0167-140212-017 WQ-PIT-3 02/12/2014	0167-140212-018 WQ-PIT-2 02/12/2014	0167-140212-019 WQ-PW 02/12/2014	0167-140211-006 WQ-VC-UMN 02/11/2014	0167-140211-003 WQ-TP 02/11/2014	0167-140211-008 WQ-VC-U 02/11/2014
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00020	<0.00020	<0.00020	-	<0.00010	<0.00020	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.01	<0.020	<0.020	<0.020	-	<0.010	<0.020	<0.010
Uranium (U)-Total	mg/L	0.015	-	0.00001	0.00468	0.00468	0.00455	0.00176	0.000625	0.00195	0.000548
Vanadium (V)-Total	mg/L	-	-	0.001	<0.0020	<0.0020	<0.0020	-	<0.0010	<0.0020	<0.0010
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	0.549	0.535	0.521	<0.050	0.0033	0.366	<0.0030
Dissolved Metals Filtration Location		-	-	n/a	FIELD	FIELD	FIELD	-	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved	mg/L	0.005	-	0.001	<0.0020	<0.0020	<0.0020	-	0.0072	<0.0020	0.0074
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	0.00368	0.00267	0.00376	-	0.00023	0.0451	<0.00010
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	0.00884	0.00842	0.00881	-	0.0007	0.0981	0.00021
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.0121	0.0101	0.0126	-	0.0794	0.0199	0.0814
Beryllium (Be)-Dissolved	mg/L	-	-	0.0001	<0.00020	<0.00020	<0.00020	-	<0.00010	<0.00020	<0.00010
Bismuth (Bi)-Dissolved	mg/L	-	-	0.0005	<0.0010	<0.0010	<0.0010	-	<0.00050	<0.0010	<0.00050
Boron (B)-Dissolved	mg/L	-	-	0.01	<0.020	<0.020	<0.020	-	<0.010	0.163	<0.010
Cadmium (Cd)-Dissolved	mg/L	0.000033	-	0.00001	0.00397	0.00412	0.00379	-	0.00002	0.00294	0.000026
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	366	357	364	-	31.7	401	28.6
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	<0.00020	<0.00020	<0.00020	-	<0.00010	<0.00020	<0.00010
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	<0.00020	<0.00020	<0.00020	-	<0.00010	0.00091	<0.00010
Copper (Cu)-Dissolved	mg/L	0.002	-	0.0002	0.00252	0.00204	0.00234	-	0.00105	0.0255	0.00109
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	<0.010	<0.010	<0.010	-	0.014	0.043	0.013
Lead (Pb)-Dissolved	mg/L	0.001	-	0.00005	<0.00010	<0.00010	<0.00010	-	<0.000050	0.00032	<0.000050
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	0.0098	0.0091	0.009	-	<0.00050	0.0143	<0.00050
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	94.5	95.3	97	-	10.9	88.3	9.88
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	0.0856	0.188	0.101	-	0.0718	1.03	0.0742
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.00001	<0.000010	<0.000010	<0.000010	-	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved	mg/L	0.073	-	0.00005	0.00015	0.00011	0.00014	-	0.000301	0.00192	0.000298
Nickel (Ni)-Dissolved	mg/L	0.1	-	0.0005	<0.0010	<0.0010	<0.0010	-	<0.00050	0.0026	<0.00050
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050	<0.050	<0.050	-	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	-	-	0.1	4.08	3.98	4.05	-	0.76	25	0.71
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	<0.00020	<0.00020	<0.00020	-	<0.00010	<0.00020	<0.00010
Silicon (Si)-Dissolved	mg/L	-	-	0.05	3.67	3.46	3.6	-	6.21	3.18	6.36
Silver (Ag)-Dissolved	mg/L	0.0001	-	0.00001	<0.000020	<0.000020	<0.000020	-	<0.000010	0.000021	<0.000010
Sodium (Na)-Dissolved	mg/L	-	-	0.05	13.7	13.7	13.6	-	3.44	33.6	2.61
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	1.19	1.13	1.14	-	0.3	1.13	0.295
Sulfur (S)-Dissolved	mg/L	-	-	0.5	353	359	362	-	10.4	416	6.93
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	0.000072	0.000068	0.00007	-	<0.000010	0.000355	<0.000010
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00020	<0.00020	<0.00020	-	<0.00010	<0.00020	<0.00010
Titanium (Ti)-Dissolved	mg/L	-	-	0.01	<0.020	<0.020	<0.020	-	<0.010	<0.020	<0.010
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.00448	0.00451	0.00444	-	0.0006	0.00194	0.000536
Vanadium (V)-Dissolved	mg/L	-	-	0.001	<0.0020	<0.0020	<0.0020	-	<0.0010	<0.0020	<0.0010
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	0.544	0.517	0.513	-	0.0017	0.355	<0.0010

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 February 10-12, 2014 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-140211-002 WQ-DC-B 02/11/2014	0167-140211-010 WQ-DC-U 02/11/2014	0167-140211-001 WQ-DC-DX+105 02/11/2014	0167-140211-009 WQ-VC-DBC 02/11/2014	0167-140211-007 WQ-VC-R+150 02/11/2014	0167-140211-004 WQ-SEEP-r 02/11/2014	0167-140211-005 WQ-SEEP 02/11/2014
Temperature (in-situ)	°C	-	-	-	0	0	0.5	0	0.1	-	0
Specific Conductivity (in-situ)	µS/cm	-	-	-	1810	1415	965	177.8	204	-	1566
pH (in-situ)	-	6.5 - 9.0	6.0 - 8.5	-	6.93	7.17	7.33	7.18	7.43	-	7.56
Turbidity (In-situ)	NTU	-	-	-	21.1	42	3.9	1.38	0.6	-	48.6
Dissolved Oxygen (in-situ)	mg/L	-	-	-	-	-	-	-	-	-	-
Colour, True	CU	15	-	5	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	2	2070	1640	1130	220	242	1710	1770
Hardness (as CaCO3)	mg/L	-	-	0.5	1340	928	672	112	120	1000	1000
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	7.74	7.9	8.05	7.87	7.92	7.8	7.84
Total Suspended Solids	mg/L	-	50	3	13.3	12	4.7	<3.0	<3.0	24	24
Total Dissolved Solids	mg/L	-	-	1	1760	1310	796	117	129	1430	1430
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	284	225	244	90	89.1	222	224
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<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
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	284	225	244	90	89.1	222	224
Ammonia, Total (as N)	mg/L	0.75	-	0.005	0.472	3.81	0.0258	<0.0050	<0.0050	4.81	4.61
Chloride (Cl)	mg/L	120	-	0.5	<5.0	<5.0	<5.0	<0.50	<0.50	<5.0	<5.0
Fluoride (F)	mg/L	0.12	-	0.02	0.2	<0.20	0.34	0.044	0.05	0.23	0.27
Nitrate (as N)	mg/L	13	-	0.005	0.061	0.88	<0.050	0.151	0.148	1.13	1.13
Nitrite (as N)	mg/L	0.06	-	0.001	<0.010	0.025	<0.010	<0.0010	<0.0010	0.035	0.032
Sulfate (SO4)	mg/L	-	-	0.5	1120	786	408	20.2	29.6	869	865
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	<0.0050	0.011	<0.0050	<0.0050	<0.0050	0.0107	0.0124
Cyanide, Total	mg/L	-	0.3	0.005	<0.0050	0.0353	<0.0050	<0.0050	<0.0050	0.0486	0.0624
Cyanate	mg/L	-	-	0.2	<0.20	1.14	<0.20	<0.20	<0.20	0.54	1.11
Thiocyanate (SCN)	mg/L	-	-	0.5	<0.50	1.66	<0.50	<0.50	<0.50	2.57	2.55
Aluminum (Al)-Total	mg/L	0.1	-	0.003	0.0082	0.0142	0.094	0.0179	0.0116	0.014	0.0134
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	0.00123	0.00055	0.00905	0.00011	0.00043	0.00071	0.00068
Arsenic (As)-Total	mg/L	0.005	-	0.0001	0.00159	0.0517	0.0424	0.00029	0.00107	0.0558	0.0551
Barium (Ba)-Total	mg/L	-	1	0.00005	0.0743	0.0618	0.0128	0.0857	0.0779	0.0592	0.0592
Beryllium (Be)-Total	mg/L	-	-	0.0001	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total	mg/L	-	-	0.0005	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total	mg/L	-	-	0.01	<0.020	0.074	<0.010	<0.010	<0.010	0.088	0.086
Cadmium (Cd)-Total	mg/L	0.000033	0.02	0.00001	0.00016	0.000493	0.00294	0.000028	0.000015	0.000743	0.00074
Calcium (Ca)-Total	mg/L	-	-	0.05	318	267	170	28.8	30.7	295	298
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	<0.00020	0.00038	0.00013	0.00012	<0.00010	0.00045	0.00044
Cobalt (Co)-Total	mg/L	-	-	0.0001	0.00169	0.00634	0.00056	<0.00010	<0.00010	0.0078	0.00764
Copper (Cu)-Total	mg/L	0.002	0.2	0.0005	0.0011	0.00322	0.00085	0.0014	0.00128	0.00447	0.00372
Iron (Fe)-Total	mg/L	0.3	1	0.01	5.16	8.07	0.675	0.035	0.017	12.4	12.4
Lead (Pb)-Total	mg/L	0.003	0.1	0.00005	<0.00010	0.000092	0.000373	0.000053	<0.000050	0.000195	0.000067
Lithium (Li)-Total	mg/L	-	-	0.0005	0.0029	<0.00050	0.00874	<0.00050	0.00087	0.0009	0.00093
Magnesium (Mg)-Total	mg/L	-	-	0.1	142	65.2	59.3	9.95	10.8	66.4	66.3
Manganese (Mn)-Total	mg/L	-	0.5	0.00005	2.22	6.05	1.22	0.0814	0.0042	6.95	6.85
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
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	0.00033	0.000923	0.000396	0.000346	0.000347	0.00104	0.00111
Nickel (Ni)-Total	mg/L	0.1	0.3	0.0005	0.0017	0.00232	0.00142	<0.00050	<0.00050	0.00268	0.00265
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total	mg/L	-	-	0.1	4.01	5.93	3.58	0.73	0.85	6.57	6.58
Selenium (Se)-Total	mg/L	0.001	-	0.0001	<0.00020	0.00019	<0.00010	<0.00010	<0.00010	0.00025	0.00022
Silicon (Si)-Total	mg/L	-	-	0.05	8.57	6.82	6.59	6.38	6.12	7.07	7.03
Silver (Ag)-Total	mg/L	0.0001	0.1	0.00001	<0.000020	0.000027	0.000018	<0.000010	<0.000010	0.000038	0.000038
Sodium (Na)-Total	mg/L	-	-	0.05	16.8	32.9	4.87	2.72	3.35	38.8	38.5
Strontium (Sr)-Total	mg/L	-	-	0.0002	1.13	0.848	0.415	0.301	0.278	0.862	0.896
Sulfur (S)-Total	mg/L	-	-	0.5	356	255	134	7.18	10.1	281	283
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	<0.000020	<0.000010	0.000094	<0.000010	<0.000010	<0.000010	0.000011



Table A1. Water Quality Results for the February 10-12, 2014 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-140211-002 WQ-DC-B 02/11/2014	0167-140211-010 WQ-DC-U 02/11/2014	0167-140211-001 WQ-DC-DX+105 02/11/2014	0167-140211-009 WQ-VC-DBC 02/11/2014	0167-140211-007 WQ-VC-R+150 02/11/2014	0167-140211-004 WQ-SEEP-r 02/11/2014	0167-140211-005 WQ-SEEP 02/11/2014
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.01	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	mg/L	0.015	-	0.00001	0.00408	0.00221	0.00417	0.000589	0.00065	0.00268	0.0028
Vanadium (V)-Total	mg/L	-	-	0.001	<0.0020	0.0012	<0.0010	<0.0010	<0.0010	0.0016	0.0016
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	0.0506	0.007	0.57	<0.0030	<0.0030	0.0098	0.0221
Dissolved Metals Filtration Location		-	-	n/a	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved	mg/L	0.005	-	0.001	0.0025	0.0061	<0.0010	0.0082	0.0057	0.0085	0.0098
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	0.00117	0.0005	0.00901	<0.00010	0.00043	0.00063	0.00063
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	0.00079	0.0381	0.0192	0.00021	0.00102	0.0401	0.0407
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.0695	0.0625	0.0123	0.085	0.0784	0.0553	0.055
Beryllium (Be)-Dissolved	mg/L	-	-	0.0001	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Dissolved	mg/L	-	-	0.0005	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved	mg/L	-	-	0.01	<0.020	0.065	<0.010	<0.010	<0.010	0.078	0.077
Cadmium (Cd)-Dissolved	mg/L	0.000033	-	0.00001	0.000149	0.000218	0.000538	0.000028	0.000014	0.000335	0.000335
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	310	265	171	28.4	30.5	293	292
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	<0.00020	0.00027	<0.00010	<0.00010	<0.00010	0.00034	0.00023
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	0.00166	0.00588	0.00051	<0.00010	<0.00010	0.00752	0.00753
Copper (Cu)-Dissolved	mg/L	0.002	-	0.0002	0.00055	0.00113	<0.00020	0.00114	0.00102	0.00148	0.00149
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	3.55	5.33	0.313	0.013	<0.010	8.93	8.84
Lead (Pb)-Dissolved	mg/L	0.001	-	0.00005	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	0.0027	0.00069	0.00825	0.00053	0.00084	0.00069	0.00061
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	138	64.6	59.4	9.85	10.5	66	65.6
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	2.15	5.68	1.19	0.0777	0.0018	6.6	6.53
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	0.00031	0.000822	0.000368	0.000327	0.000342	0.000929	0.00096
Nickel (Ni)-Dissolved	mg/L	0.1	-	0.0005	0.0017	0.00208	0.00137	<0.00050	<0.00050	0.00258	0.00263
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	3.96	5.91	3.58	0.71	0.84	6.52	6.47
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	<0.00020	0.00018	<0.00010	<0.00010	<0.00010	0.00023	0.00024
Silicon (Si)-Dissolved	mg/L	-	-	0.05	8.25	6.63	6.42	6.25	5.92	6.76	6.76
Silver (Ag)-Dissolved	mg/L	0.0001	-	0.00001	<0.000020	0.000013	<0.000010	<0.000010	<0.000010	0.000015	0.000012
Sodium (Na)-Dissolved	mg/L	-	-	0.05	16.7	32	4.79	2.66	3.42	37.5	36.7
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	1.12	0.801	0.4	0.301	0.277	0.828	0.836
Sulfur (S)-Dissolved	mg/L	-	-	0.5	340	248	132	6.92	9.7	276	274
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	<0.000020	<0.000010	0.000082	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	mg/L	-	-	0.01	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.00382	0.00221	0.00411	0.000562	0.000638	0.00257	0.0026
Vanadium (V)-Dissolved	mg/L	-	-	0.001	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	0.0012
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	0.0496	0.0059	0.551	0.0011	0.0013	0.0075	0.0074



Table A1. Water Quality Results for the February 10-12, 2014 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-140212-FIELD-BLANK FIELD BLANK 02/12/2014	0167-140212-TRAVEL BLANK TRAVEL BLANK 02/12/2014
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	<2.0	<2.0
Hardness (as CaCO3)	mg/L	-	-	0.5	<0.50	<0.50
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	5.29	6.08
Total Suspended Solids	mg/L	-	50	3	<3.0	<3.0
Total Dissolved Solids	mg/L	-	-	1	<1.0	<1.0
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	<1.0	<1.0
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	1	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	<1.0	<1.0
Ammonia, Total (as N)	mg/L	0.75	-	0.005	<0.0050	<0.0050
Chloride (Cl)	mg/L	120	-	0.5	<0.50	<0.50
Fluoride (F)	mg/L	0.12	-	0.02	<0.020	<0.020
Nitrate (as N)	mg/L	13	-	0.005	0.0547	<0.0050
Nitrite (as N)	mg/L	0.06	-	0.001	<0.0010	<0.0010
Sulfate (SO4)	mg/L	-	-	0.5	<0.50	<0.50
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	<0.0050	<0.0050
Cyanide, Total	mg/L	-	0.3	0.005	<0.0050	<0.0050
Cyanate	mg/L	-	-	0.2	<0.20	<0.20
Thiocyanate (SCN)	mg/L	-	-	0.5	<0.50	<0.50
Aluminum (Al)-Total	mg/L	0.1	-	0.003	<0.0030	<0.0030
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	<0.00010	<0.00010
Arsenic (As)-Total	mg/L	0.005	-	0.0001	<0.00010	<0.00010
Barium (Ba)-Total	mg/L	-	1	0.00005	<0.000050	<0.000050
Beryllium (Be)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010
Bismuth (Bi)-Total	mg/L	-	-	0.0005	<0.00050	<0.00050
Boron (B)-Total	mg/L	-	-	0.01	<0.010	<0.010
Cadmium (Cd)-Total	mg/L	0.000033	0.02	0.00001	<0.000010	<0.000010
Calcium (Ca)-Total	mg/L	-	-	0.05	<0.050	<0.050
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	<0.00010	<0.00010
Cobalt (Co)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010
Copper (Cu)-Total	mg/L	0.002	0.2	0.0005	<0.00050	<0.00050
Iron (Fe)-Total	mg/L	0.3	1	0.01	<0.010	<0.010
Lead (Pb)-Total	mg/L	0.003	0.1	0.00005	<0.000050	<0.000050
Lithium (Li)-Total	mg/L	-	-	0.0005	<0.00050	<0.00050
Magnesium (Mg)-Total	mg/L	-	-	0.1	<0.10	<0.10
Manganese (Mn)-Total	mg/L	-	0.5	0.00005	<0.000050	<0.000050
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.00001	<0.000010	<0.000010
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	<0.000050	<0.000050
Nickel (Ni)-Total	mg/L	0.1	0.3	0.0005	<0.00050	<0.00050
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050	<0.050
Potassium (K)-Total	mg/L	-	-	0.1	<0.10	<0.10
Selenium (Se)-Total	mg/L	0.001	-	0.0001	<0.00010	<0.00010
Silicon (Si)-Total	mg/L	-	-	0.05	<0.050	<0.050
Silver (Ag)-Total	mg/L	0.0001	0.1	0.00001	<0.000010	<0.000010
Sodium (Na)-Total	mg/L	-	-	0.05	<0.050	<0.050
Strontium (Sr)-Total	mg/L	-	-	0.0002	<0.00020	<0.00020
Sulfur (S)-Total	mg/L	-	-	0.5	<0.50	<0.50
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	<0.000010	<0.000010



Table A1. Water Quality Results for the February 10-12, 2014 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-140212-FIELD-BLANK FIELD BLANK 02/12/2014	0167-140212-TRAVEL BLANK TRAVEL BLANK 02/12/2014
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.01	<0.010	<0.010
Uranium (U)-Total	mg/L	0.015	-	0.00001	<0.000010	<0.000010
Vanadium (V)-Total	mg/L	-	-	0.001	<0.0010	<0.0010
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	<0.0030	<0.0030
Dissolved Metals Filtration Location		-	-	n/a	FIELD	-
Aluminum (Al)-Dissolved	mg/L	0.005	-	0.001	<0.0010	-
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	<0.00010	-
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	<0.00010	-
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	<0.000050	-
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	<0.000010	-
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	<0.050	-
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	<0.00020	-
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	<0.010	-
Lead (Pb)-Dissolved	mg/L	0.001	-	0.00005	<0.000050	-
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	<0.00050	-
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	<0.10	-
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	<0.000050	-
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.00001	<0.000010	-
Molybdenum (Mo)-Dissolved	mg/L	0.073	-	0.00005	<0.000050	-
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	<0.10	-
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	<0.00010	-
Silicon (Si)-Dissolved	mg/L	-	-	0.05	<0.050	-
Silver (Ag)-Dissolved	mg/L	0.0001	-	0.00001	<0.000010	-
Sodium (Na)-Dissolved	mg/L	-	-	0.05	<0.050	-
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	<0.00020	-
Sulfur (S)-Dissolved	mg/L	-	-	0.5	<0.50	-
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	<0.000010	-
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
February 10-12, 2014



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

Date Received: 12-FEB-14
Report Date: 28-FEB-14 17:43 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1421864
Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 13-Y-0167
C of C Numbers: 1, 2
Legal Site Desc:

Comments: Note the following observations:
- The two samples, "0167-140211-004" and "0167-140211-005", were not received.
- Two extra samples "Travel Blank" and "Field Blank", were received. Analyses were performed on these samples as per the bottles received.

Can Dang
Senior Account Manager

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1421864-1 Water 11-FEB-14 09:15 0167-140211-006	L1421864-2 Water 11-FEB-14 15:00 0167-140211-003	L1421864-3 Water 11-FEB-14 11:55 0167-140211-008	L1421864-4 Water 11-FEB-14 15:20 0167-140211-002	L1421864-5 Water 11-FEB-14 14:00 0167-140211-010	
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	248	2250	219	2070	1640
	Hardness (as CaCO3) (mg/L)	124	1370	112	1340	928
	pH (pH)	7.88	7.92	7.85	7.74	7.90
	Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0	13.3	12.0
	Total Dissolved Solids (mg/L)	134	1970	115	1760	1310
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	92.3	182	87.7	284	225
	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)	92.3	182	87.7	284	225
	Ammonia, Total (as N) (mg/L)	<0.0050	0.719	<0.0050	0.472	3.81
	Chloride (Cl) (mg/L)	<0.50	<5.0 ^{DLA}	<0.50	<5.0 ^{DLA}	<5.0 ^{DLA}
	Fluoride (F) (mg/L)	0.049	0.42	0.046	0.20	<0.20 ^{DLA}
	Nitrate (as N) (mg/L)	0.141	0.237	0.165	0.061	0.880
	Nitrite (as N) (mg/L)	<0.0010	<0.010 ^{DLA}	<0.0010	<0.010 ^{DLA}	0.025
	Sulfate (SO4) (mg/L)	30.7	1310	20.0	1120	786
	Anion Sum (meq/L)	2.50	30.9	2.18	29.0	20.9
	Cation Sum (meq/L)	2.65	29.5	2.37	27.9	20.9
	Cation - Anion Balance (%)	2.9	-2.4	4.2	-1.9	-0.2
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	0.0110
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	0.0353
	Cyanate (mg/L)	<2.0 ^{DLIS}	<0.20	<0.20	<0.20	1.14
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50 ^{DLA}	<0.50	<0.50	1.66
Total Metals	Aluminum (Al)-Total (mg/L)	0.0524	<0.0060 ^{DLA}	0.0166	0.0082	0.0142
	Antimony (Sb)-Total (mg/L)	0.00025	0.0472	0.00011	0.00123	0.00055
	Arsenic (As)-Total (mg/L)	0.00086	0.169	0.00025	0.00159	0.0517
	Barium (Ba)-Total (mg/L)	0.0777	0.0197	0.0812	0.0743	0.0618
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00020 ^{DLA}	<0.00010	<0.00020 ^{DLA}	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.0010 ^{DLA}	<0.00050	<0.0010 ^{DLA}	<0.00050
	Boron (B)-Total (mg/L)	<0.010	0.178	<0.010	<0.020 ^{DLA}	0.074
	Cadmium (Cd)-Total (mg/L)	0.000023	0.00309	0.000028	0.000160	0.000493
	Calcium (Ca)-Total (mg/L)	32.1	419	27.8	318	267
	Chromium (Cr)-Total (mg/L)	0.00014	<0.00020 ^{DLA}	0.00011	<0.00020 ^{DLA}	0.00038
	Cobalt (Co)-Total (mg/L)	<0.00010	0.00096	<0.00010	0.00169	0.00634
	Copper (Cu)-Total (mg/L)	0.00140	0.0288	0.00198	0.0011	0.00322
	Iron (Fe)-Total (mg/L)	0.084	0.410	0.031	5.16	8.07
	Lead (Pb)-Total (mg/L)	0.000249	0.00291	0.000165	<0.00010 ^{DLA}	0.000092
	Lithium (Li)-Total (mg/L)	0.00059	0.0151	<0.00050	0.0029	<0.00050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1421864-6 Water 11-FEB-14 16:00 0167-140211-001	L1421864-7 Water 11-FEB-14 10:50 0167-140211-009	L1421864-8 Water 11-FEB-14 08:30 0167-140211-007	L1421864-9 Water 11-FEB-14 14:20 0167-140211-004	L1421864-10 Water 11-FEB-14 14:20 0167-140211-005	
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	1130	220	242	1710	1770
	Hardness (as CaCO3) (mg/L)	672	112	120	1000	1000
	pH (pH)	8.05	7.87	7.92	7.80	7.84
	Total Suspended Solids (mg/L)	4.7	<3.0	<3.0	24.0	24.0
	Total Dissolved Solids (mg/L)	796	117	129	1430	1430
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	244	90.0	89.1	222	224
	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)	244	90.0	89.1	222	224
	Ammonia, Total (as N) (mg/L)	0.0258	<0.0050	<0.0050	4.81	4.61
	Chloride (Cl) (mg/L)	<5.0 ^{DLA}	<0.50	<0.50	<5.0 ^{DLA}	<5.0 ^{DLA}
	Fluoride (F) (mg/L)	0.34	0.044	0.050	0.23	0.27
	Nitrate (as N) (mg/L)	<0.050 ^{DLA}	0.151	0.148	1.13	1.13
	Nitrite (as N) (mg/L)	<0.010 ^{DLA}	<0.0010	<0.0010	0.035	0.032
	Sulfate (SO4) (mg/L)	408	20.2	29.6	869	865
	Anion Sum (meq/L)	13.4	2.23	2.41	22.6	22.6
	Cation Sum (meq/L)	13.8	2.37	2.56	22.9	22.8
	Cation - Anion Balance (%)	1.5	2.9	3.0	0.6	0.4
	Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	0.0107
Cyanide, Total (mg/L)		<0.0050	<0.0050	<0.0050	0.0486	0.0624
Cyanate (mg/L)		<0.20	<0.20	<0.20	0.54	1.11
Thiocyanate (SCN) (mg/L)		<0.50	<0.50	<0.50	2.57	2.55
Total Metals	Aluminum (Al)-Total (mg/L)	0.0940	0.0179	0.0116	0.0140	0.0134
	Antimony (Sb)-Total (mg/L)	0.00905	0.00011	0.00043	0.00071	0.00068
	Arsenic (As)-Total (mg/L)	0.0424	0.00029	0.00107	0.0558	0.0551
	Barium (Ba)-Total (mg/L)	0.0128	0.0857	0.0779	0.0592	0.0592
	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	0.088	0.086
	Cadmium (Cd)-Total (mg/L)	0.00294	0.000028	0.000015	0.000743	0.000740
	Calcium (Ca)-Total (mg/L)	170	28.8	30.7	295	298
	Chromium (Cr)-Total (mg/L)	0.00013	0.00012	<0.00010	0.00045	0.00044
	Cobalt (Co)-Total (mg/L)	0.00056	<0.00010	<0.00010	0.00780	0.00764
	Copper (Cu)-Total (mg/L)	0.00085	0.00140	0.00128	0.00447	0.00372
	Iron (Fe)-Total (mg/L)	0.675	0.035	0.017	12.4	12.4
	Lead (Pb)-Total (mg/L)	0.000373	0.000053	<0.000050	0.000195	0.000067
	Lithium (Li)-Total (mg/L)	0.00874	<0.00050	0.00087	0.00090	0.00093

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1421864-11 Water 12-FEB-14 08:00 FIELD BLANK	L1421864-12 Water 12-FEB-14 14:25 TRAVEL BLANK		
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (uS/cm)	<2.0	<2.0		
	Hardness (as CaCO3) (mg/L)	<0.50	<0.50		
	pH (pH)	5.29	6.08		
	Total Suspended Solids (mg/L)	<3.0	<3.0		
	Total Dissolved Solids (mg/L)	<1.0	<1.0		
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	<1.0	<1.0		
	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)	<1.0	<1.0		
	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050		
	Chloride (Cl) (mg/L)	<0.50	<0.50		
	Fluoride (F) (mg/L)	<0.020	<0.020		
	Nitrate (as N) (mg/L)	0.0547 ^{RCR}	<0.0050		
	Nitrite (as N) (mg/L)	<0.0010	<0.0010		
	Sulfate (SO4) (mg/L)	<0.50	<0.50		
	Anion Sum (meq/L)	<0.10	<0.10		
	Cation Sum (meq/L)	<0.10	<0.10		
	Cation - Anion Balance (%)	0.0	0.0		
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050		
	Cyanide, Total (mg/L)	<0.0050	<0.0050		
	Cyanate (mg/L)	<0.20	<0.20		
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50		
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030	<0.0030		
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010		
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010		
	Barium (Ba)-Total (mg/L)	<0.000050	<0.000050		
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010		
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050		
	Boron (B)-Total (mg/L)	<0.010	<0.010		
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010		
	Calcium (Ca)-Total (mg/L)	<0.050	<0.050		
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010		
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010		
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050		
	Iron (Fe)-Total (mg/L)	<0.010	<0.010		
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050		
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1421864-1 Water 11-FEB-14 09:15 0167-140211-006	L1421864-2 Water 11-FEB-14 15:00 0167-140211-003	L1421864-3 Water 11-FEB-14 11:55 0167-140211-008	L1421864-4 Water 11-FEB-14 15:20 0167-140211-002	L1421864-5 Water 11-FEB-14 14:00 0167-140211-010	
Grouping	Analyte					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)	10.7	91.6	9.64	142	65.2
	Manganese (Mn)-Total (mg/L)	0.0829	1.08	0.0776	2.22	6.05
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000308	0.00200	0.000324	0.00033	0.000923
	Nickel (Ni)-Total (mg/L)	0.00075	0.0027	0.00052	0.0017	0.00232
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.80	24.2	0.70	4.01	5.93
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00020 ^{DLA}	<0.00010	<0.00020 ^{DLA}	0.00019
	Silicon (Si)-Total (mg/L)	6.23	3.26	6.26	8.57	6.82
	Silver (Ag)-Total (mg/L)	<0.000010	0.000070	<0.000010	<0.000020 ^{DLA}	0.000027
	Sodium (Na)-Total (mg/L)	3.47	34.0	2.77	16.8	32.9
	Strontium (Sr)-Total (mg/L)	0.304	1.13	0.302	1.13	0.848
	Sulfur (S)-Total (mg/L)	10.3	424	6.95	356	255
	Thallium (Tl)-Total (mg/L)	<0.000010	0.000355 ^{DLA}	<0.000010	<0.000020 ^{DLA}	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00020 ^{DLA}	<0.00010	<0.00020 ^{DLA}	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.020 ^{DLA}	<0.010	<0.020 ^{DLA}	<0.010
	Uranium (U)-Total (mg/L)	0.000625	0.00195 ^{DLA}	0.000548	0.00408 ^{DLA}	0.00221
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0020 ^{DLA}	<0.0010	<0.0020 ^{DLA}	0.0012
	Zinc (Zn)-Total (mg/L)	0.0033	0.366	<0.0030	0.0506	0.0070
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)	0.0072	<0.0020 ^{DLA}	0.0074	0.0025	0.0061
	Antimony (Sb)-Dissolved (mg/L)	0.00023	0.0451	<0.00010	0.00117	0.00050
	Arsenic (As)-Dissolved (mg/L)	0.00070	0.0981	0.00021	0.00079	0.0381
	Barium (Ba)-Dissolved (mg/L)	0.0794	0.0199	0.0814	0.0695	0.0625
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00020 ^{DLA}	<0.00010	<0.00020 ^{DLA}	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.0010 ^{DLA}	<0.00050	<0.0010 ^{DLA}	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	0.163	<0.010	<0.020 ^{DLA}	0.065
	Cadmium (Cd)-Dissolved (mg/L)	0.000020	0.00294	0.000026	0.000149	0.000218
	Calcium (Ca)-Dissolved (mg/L)	31.7	401	28.6	310	265
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00020 ^{DLA}	<0.00010	<0.00020 ^{DLA}	0.00027
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	0.00091	<0.00010	0.00166	0.00588
	Copper (Cu)-Dissolved (mg/L)	0.00105	0.0255	0.00109	0.00055	0.00113
	Iron (Fe)-Dissolved (mg/L)	0.014	0.043	0.013	3.55	5.33
	Lead (Pb)-Dissolved (mg/L)	<0.000050	0.00032	<0.000050	<0.00010 ^{DLA}	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.00050	0.0143	<0.00050	0.0027	0.00069
	Magnesium (Mg)-Dissolved (mg/L)	10.9	88.3	9.88	138	64.6

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1421864-6 Water 11-FEB-14 16:00 0167-140211-001	L1421864-7 Water 11-FEB-14 10:50 0167-140211-009	L1421864-8 Water 11-FEB-14 08:30 0167-140211-007	L1421864-9 Water 11-FEB-14 14:20 0167-140211-004	L1421864-10 Water 11-FEB-14 14:20 0167-140211-005
Grouping	Analyte					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)	59.3	9.95	10.8	66.4	66.3
	Manganese (Mn)-Total (mg/L)	1.22	0.0814	0.00420	6.95	6.85
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000396	0.000346	0.000347	0.00104	0.00111
	Nickel (Ni)-Total (mg/L)	0.00142	<0.00050	<0.00050	0.00268	0.00265
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	3.58	0.73	0.85	6.57	6.58
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	0.00025	0.00022
	Silicon (Si)-Total (mg/L)	6.59	6.38	6.12	7.07	7.03
	Silver (Ag)-Total (mg/L)	0.000018	<0.000010	<0.000010	0.000038	0.000038
	Sodium (Na)-Total (mg/L)	4.87	2.72	3.35	38.8	38.5
	Strontium (Sr)-Total (mg/L)	0.415	0.301	0.278	0.862	0.896
	Sulfur (S)-Total (mg/L)	134	7.18	10.1	281	283
	Thallium (Tl)-Total (mg/L)	0.000094	<0.000010	<0.000010	<0.000010	0.000011
	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)	0.00417	0.000589	0.000650	0.00268	0.00280
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	0.0016	0.0016
	Zinc (Zn)-Total (mg/L)	0.570	<0.0030	<0.0030	0.0098	0.0221
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)	<0.0010	0.0082	0.0057	0.0085	0.0098
	Antimony (Sb)-Dissolved (mg/L)	0.00901	<0.00010	0.00043	0.00063	0.00063
	Arsenic (As)-Dissolved (mg/L)	0.0192	0.00021	0.00102	0.0401	0.0407
	Barium (Ba)-Dissolved (mg/L)	0.0123	0.0850	0.0784	0.0553	0.0550
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	0.078	0.077
	Cadmium (Cd)-Dissolved (mg/L)	0.000538	0.000028	0.000014	0.000335	0.000335
	Calcium (Ca)-Dissolved (mg/L)	171	28.4	30.5	293	292
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	0.00034	0.00023
	Cobalt (Co)-Dissolved (mg/L)	0.00051	<0.00010	<0.00010	0.00752	0.00753
	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.00114	0.00102	0.00148	0.00149
	Iron (Fe)-Dissolved (mg/L)	0.313	0.013	<0.010	8.93	8.84
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.00825	0.00053	0.00084	0.00069	0.00061
	Magnesium (Mg)-Dissolved (mg/L)	59.4	9.85	10.5	66.0	65.6

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1421864-11	L1421864-12		
	Description	Water	Water		
	Sampled Date	12-FEB-14	12-FEB-14		
	Sampled Time	08:00	14:25		
	Client ID	FIELD BLANK	TRAVEL BLANK		
Grouping	Analyte				
WATER					
Total Metals	Magnesium (Mg)-Total (mg/L)	<0.10	<0.10		
	Manganese (Mn)-Total (mg/L)	<0.000050	<0.000050		
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010		
	Molybdenum (Mo)-Total (mg/L)	<0.000050	<0.000050		
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050		
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050		
	Potassium (K)-Total (mg/L)	<0.10	<0.10		
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010		
	Silicon (Si)-Total (mg/L)	<0.050	<0.050		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	<0.050	<0.050		
	Strontium (Sr)-Total (mg/L)	<0.00020	<0.00020		
	Sulfur (S)-Total (mg/L)	<0.50	<0.50		
	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)	<0.000010	<0.000010		
	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			
	Dissolved Metals Filtration Location	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	<0.0010			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	<0.00010			
	Barium (Ba)-Dissolved (mg/L)	<0.000050			
	Beryllium (Be)-Dissolved (mg/L)	<0.00010			
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050			
	Boron (B)-Dissolved (mg/L)	<0.010			
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010			
	Calcium (Ca)-Dissolved (mg/L)	<0.050			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	<0.00020			
	Iron (Fe)-Dissolved (mg/L)	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	<0.00050			
	Magnesium (Mg)-Dissolved (mg/L)	<0.10			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

28-FEB-14 17:43 (MT)

Version: FINAL

		Sample ID	L1421864-1	L1421864-2	L1421864-3	L1421864-4	L1421864-5
		Description	Water	Water	Water	Water	Water
		Sampled Date	11-FEB-14	11-FEB-14	11-FEB-14	11-FEB-14	11-FEB-14
		Sampled Time	09:15	15:00	11:55	15:20	14:00
		Client ID	0167-140211-006	0167-140211-003	0167-140211-008	0167-140211-002	0167-140211-010
Grouping	Analyte						
WATER							
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	0.0718	1.03	0.0742	2.15	5.68	
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000301	0.00192	0.000298	0.00031	0.000822	
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.0026	<0.00050	0.0017	0.00208	
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Potassium (K)-Dissolved (mg/L)	0.76	25.0	0.71	3.96	5.91	
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00020 ^{DLA}	<0.00010	<0.00020 ^{DLA}	0.00018	
	Silicon (Si)-Dissolved (mg/L)	6.21	3.18	6.36	8.25	6.63	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	0.000021	<0.000010	<0.000020 ^{DLA}	0.000013	
	Sodium (Na)-Dissolved (mg/L)	3.44	33.6	2.61	16.7	32.0	
	Strontium (Sr)-Dissolved (mg/L)	0.300	1.13	0.295	1.12	0.801	
	Sulfur (S)-Dissolved (mg/L)	10.4	416	6.93	340	248	
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	0.000355 ^{DLA}	<0.000010	<0.000020 ^{DLA}	<0.000010	
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00020 ^{DLA}	<0.00010	<0.00020 ^{DLA}	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.020 ^{DLA}	<0.010	<0.020 ^{DLA}	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.000600	0.00194 ^{DLA}	0.000536	0.00382 ^{DLA}	0.00221	
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0020 ^{DLA}	<0.0010	<0.0020 ^{DLA}	<0.0010	
	Zinc (Zn)-Dissolved (mg/L)	0.0017	0.355	<0.0010	0.0496	0.0059	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1421864-6 Water 11-FEB-14 16:00 0167-140211-001	L1421864-7 Water 11-FEB-14 10:50 0167-140211-009	L1421864-8 Water 11-FEB-14 08:30 0167-140211-007	L1421864-9 Water 11-FEB-14 14:20 0167-140211-004	L1421864-10 Water 11-FEB-14 14:20 0167-140211-005
Grouping	Analyte					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	1.19	0.0777	0.00180	6.60	6.53
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000368	0.000327	0.000342	0.000929	0.000960
	Nickel (Ni)-Dissolved (mg/L)	0.00137	<0.00050	<0.00050	0.00258	0.00263
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	3.58	0.71	0.84	6.52	6.47
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	0.00023	0.00024
	Silicon (Si)-Dissolved (mg/L)	6.42	6.25	5.92	6.76	6.76
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	0.000015	0.000012
	Sodium (Na)-Dissolved (mg/L)	4.79	2.66	3.42	37.5	36.7
	Strontium (Sr)-Dissolved (mg/L)	0.400	0.301	0.277	0.828	0.836
	Sulfur (S)-Dissolved (mg/L)	132	6.92	9.70	276	274
	Thallium (Tl)-Dissolved (mg/L)	0.000082	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00411	0.000562	0.000638	0.00257	0.00260
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	0.0012	0.0012
	Zinc (Zn)-Dissolved (mg/L)	0.551	0.0011	0.0013	0.0075	0.0074

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1421864-11	L1421864-12		
Description	Water	Water			
Sampled Date	12-FEB-14	12-FEB-14			
Sampled Time	08:00	14:25			
Client ID	FIELD BLANK	TRAVEL BLANK			
Grouping	Analyte				
WATER					
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	<0.000050			
	Mercury (Hg)-Dissolved (mg/L)	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050			
	Nickel (Ni)-Dissolved (mg/L)	<0.000050			
	Phosphorus (P)-Dissolved (mg/L)	<0.050			
	Potassium (K)-Dissolved (mg/L)	<0.10			
	Selenium (Se)-Dissolved (mg/L)	<0.00010			
	Silicon (Si)-Dissolved (mg/L)	<0.050			
	Silver (Ag)-Dissolved (mg/L)	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	<0.050			
	Strontium (Sr)-Dissolved (mg/L)	<0.00020			
	Sulfur (S)-Dissolved (mg/L)	<0.50			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010			
	Uranium (U)-Dissolved (mg/L)	<0.000010			
	Vanadium (V)-Dissolved (mg/L)	<0.0010			
	Zinc (Zn)-Dissolved (mg/L)	<0.0010			

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Antimony (Sb)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Beryllium (Be)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Boron (B)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Copper (Cu)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Lithium (Li)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nickel (Ni)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Selenium (Se)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Silver (Ag)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Thallium (Tl)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Tin (Sn)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Titanium (Ti)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Vanadium (V)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Zinc (Zn)-Dissolved	DLA	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cyanate	DLIS	L1421864-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Boron (B)-Dissolved	MS-B	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1421864-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cadmium (Cd)-Dissolved	MS-B	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1421864-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1421864-1, -10, -11, -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
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RCR	Result Confirmed After Data Review

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.			
ANIONS-CL-IC-WR	Water	Chloride by Ion Chromatography	EPA 300.1
This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.			
ANIONS-F-IC-WR	Water	Fluoride by Ion Chromatography	EPA 300.1
This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.			

Reference Information

ANIONS-NO2-IC-WR	Water	Nitrite Nitrogen by Ion Chromatography	EPA 300.1
This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.			
ANIONS-NO3-IC-WR	Water	Nitrate Nitrogen by Ion Chromatography	EPA 300.1
This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.			
ANIONS-SO4-IC-WR	Water	Sulphate by Ion Chromatography	EPA 300.1
This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.			
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 CaCO ₃ equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).			
HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).			
IONBALANCE-VA	Water	Ion Balance Calculation	APHA 1030E
Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.			
Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:			
Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]			
MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).			
MET-DIS-LOW-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA 3005A/6010B

Reference Information

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

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS 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-CALC-VA Water TDS (Calculated) APHA 1030E (20TH EDITION)

This analysis is carried out using procedures adapted from APHA 1030E "Checking Correctness of Analyses".

TSS-MAN-WR Water Total Suspended Solids by Gravimetric APHA 2540 D

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

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

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

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

WR	ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA
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Reference Information

WT ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
VA ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1 2

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

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

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

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



Report To				Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)													
Company: EDI				<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other				<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)													
Contact: Meghan Marjanovic				<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax				<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT													
Address: 2195 - 2nd Ave Y1A 3T8				Email 1: mmarianovic@edynamics.com				<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT													
Phone: 867-393-4882 Fax:				Email 2:				<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT													
Invoice To Same as Report? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				Client / Project Information				Analysis Request													
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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				Quote #: Q38399																	
Phone: 867-393-4882 Fax:				ALS Contact:																	
Lab Work Order # (lab use only) L1421864				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
0167-1402 11 - 006				11 - FEB - 2014		9:15		Water		X	X	X	X	X	X	X	X	X	X	X	9
0167-1402 11 - 003				11 - FEB - 2014		15:00		Water		X	X	X	X	X	X	X	X	X	X	X	9
0167-1402 11 - 005				11 - FEB - 2014		14:30		Water		X	X	X	X	X	X	X	X	X	X	X	9
0167-1402 11 - 008				11 - FEB - 2014		11:55		Water		X	X	X	X	X	X	X	X	X	X	X	9
0167-1402 11 - 002				11 - FEB - 2014		15:20		Water		X	X	X	X	X	X	X	X	X	X	X	9
0167-1402 11 - 010				11 - FEB - 2014		14:00		Water		X	X	X	X	X	X	X	X	X	X	X	9
0167-1402 11 - 001				11 - FEB - 2014		16:00		Water		X	X	X	X	X	X	X	X	X	X	X	9
0167-1402 11 - 009				11 - FEB 2014		10:50		WATER		X	X	X	X	X	X	X	X	X	X	X	9
0167-1402 11 - 007				11 - FEB 2014		8:30		WATER		X	X	X	X	X	X	X	X	X	X	X	9
0167-1402 11 - 004				11 FEB 2014		1420		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 - 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): 12-FEB-14		Time (hh-mm): 1500		Received by:		Date: 12-FEB-14		Time: 2:25		Temperature: 4.8, 5.2, 3.7 C		Verified by:		Date:		Time:		Observations: Yes / No ? If Yes add SIF	





ENVIRONMENTAL DYNAMICS INC.
ATTN: Meghan Marjanovic
2195 - 2nd Ave
Whitehorse YT Y1A 3A2

Date Received: 12-FEB-14
Report Date: 24-FEB-14 12:30 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1421859
Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 13-Y-0167
C of C Numbers: 1
Legal Site Desc:

Can Dang
Senior Account Manager

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1421859-1 Surface Water 12-FEB-14 12:00 0167-140212-016	L1421859-2 Surface Water 12-FEB-14 12:00 0167-140212-017	L1421859-3 Surface Water 12-FEB-14 12:00 0167-140212-018	L1421859-4 Surface Water 12-FEB-14 12:00 0167-140212-019	
Grouping	Analyte				
WATER					
Physical Tests	Colour, True (CU)				<5.0
	Conductivity (uS/cm)	1990	1980	1970	327
	Hardness (as CaCO3) (mg/L)	1300	1280	1310	192
	pH (pH)	8.00	7.95	7.99	7.65
	Total Suspended Solids (mg/L)	<3.0	6.0	<3.0	
	Total Dissolved Solids (mg/L)	1730	1690	1680	200
	Turbidity (NTU)				<0.10
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	200	185	196	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	200	185	196	161
	Ammonia, Total (as N) (mg/L)	0.0084	0.0173	0.0081	
	Chloride (Cl) (mg/L)	<5.0 ^{DLA}	<5.0 ^{DLA}	<5.0 ^{DLA}	<0.50
	Fluoride (F) (mg/L)	0.38	0.35	0.30	0.105
	Nitrate (as N) (mg/L)	0.077	0.207	<0.050 ^{DLA}	0.129
	Nitrite (as N) (mg/L)	<0.010 ^{DLA}	<0.010 ^{DLA}	<0.010 ^{DLA}	<0.0010
	Sulfate (SO4) (mg/L)	1130	1100	1080	32.6
	Anion Sum (meq/L)	27.5	26.7	26.5	3.91
	Cation Sum (meq/L)	26.7	26.4	26.9	4.07
	Cation - Anion Balance (%)	-1.4	-0.6	0.7	2.0
Total Metals	Aluminum (Al)-Total (mg/L)	0.0171	0.0372	0.0101	<0.010
	Antimony (Sb)-Total (mg/L)	0.00388	0.00270	0.00376	<0.00050
	Arsenic (As)-Total (mg/L)	0.0114	0.0123	0.0112	0.00037
	Barium (Ba)-Total (mg/L)	0.0128	0.0154	0.0123	0.082
	Beryllium (Be)-Total (mg/L)	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}	
	Bismuth (Bi)-Total (mg/L)	<0.0010 ^{DLA}	<0.0010 ^{DLA}	<0.0010 ^{DLA}	
	Boron (B)-Total (mg/L)	<0.020 ^{DLA}	<0.020 ^{DLA}	<0.020 ^{DLA}	<0.10
	Cadmium (Cd)-Total (mg/L)	0.00404	0.00471	0.00394	<0.00020
	Calcium (Ca)-Total (mg/L)	359	359	356	44.5
	Chromium (Cr)-Total (mg/L)	0.00036	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.0020
	Cobalt (Co)-Total (mg/L)	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}	
	Copper (Cu)-Total (mg/L)	0.0036	0.0035	0.0035	<0.0010
	Iron (Fe)-Total (mg/L)	0.095	0.137	0.056	<0.030
	Lead (Pb)-Total (mg/L)	0.00051	0.00180	0.00055	0.00071
	Lithium (Li)-Total (mg/L)	0.0107	0.0094	0.0093	
	Magnesium (Mg)-Total (mg/L)	97.7	95.4	95.4	19.6
	Manganese (Mn)-Total (mg/L)	0.106	0.238	0.117	<0.0020

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1421859-1 Surface Water 12-FEB-14 12:00 0167-140212-016	L1421859-2 Surface Water 12-FEB-14 12:00 0167-140212-017	L1421859-3 Surface Water 12-FEB-14 12:00 0167-140212-018	L1421859-4 Surface Water 12-FEB-14 12:00 0167-140212-019
Grouping	Analyte				
WATER					
Total Metals	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.00020
	Molybdenum (Mo)-Total (mg/L)	0.00015	0.00011	0.00015	
	Nickel (Ni)-Total (mg/L)	<0.0010 ^{DLA}	<0.0010 ^{DLA}	<0.0010 ^{DLA}	
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	
	Potassium (K)-Total (mg/L)	3.97	3.91	3.98	0.86
	Selenium (Se)-Total (mg/L)	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.0010
	Silicon (Si)-Total (mg/L)	3.64	3.55	3.57	
	Silver (Ag)-Total (mg/L)	<0.000020 ^{DLA}	0.000025	<0.000020 ^{DLA}	
	Sodium (Na)-Total (mg/L)	14.2	14.0	13.8	4.8
	Strontium (Sr)-Total (mg/L)	1.22	1.19	1.16	
	Sulfur (S)-Total (mg/L)	369	368	363	
	Thallium (Tl)-Total (mg/L)	0.000075	0.000071	0.000072	
	Tin (Sn)-Total (mg/L)	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}	
	Titanium (Ti)-Total (mg/L)	<0.020 ^{DLA}	<0.020 ^{DLA}	<0.020 ^{DLA}	
	Uranium (U)-Total (mg/L)	0.00468	0.00468	0.00455	0.00176
	Vanadium (V)-Total (mg/L)	<0.0020 ^{DLA}	<0.0020 ^{DLA}	<0.0020 ^{DLA}	
	Zinc (Zn)-Total (mg/L)	0.549	0.535	0.521	<0.050
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	<0.0020 ^{DLA}	<0.0020 ^{DLA}	<0.0020 ^{DLA}	
	Antimony (Sb)-Dissolved (mg/L)	0.00368	0.00267	0.00376	
	Arsenic (As)-Dissolved (mg/L)	0.00884	0.00842	0.00881	
	Barium (Ba)-Dissolved (mg/L)	0.0121	0.0101	0.0126	
	Beryllium (Be)-Dissolved (mg/L)	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}	
	Bismuth (Bi)-Dissolved (mg/L)	<0.0010 ^{DLA}	<0.0010 ^{DLA}	<0.0010 ^{DLA}	
	Boron (B)-Dissolved (mg/L)	<0.020 ^{DLA}	<0.020 ^{DLA}	<0.020 ^{DLA}	
	Cadmium (Cd)-Dissolved (mg/L)	0.00397	0.00412	0.00379	
	Calcium (Ca)-Dissolved (mg/L)	366	357	364	
	Chromium (Cr)-Dissolved (mg/L)	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}	
	Cobalt (Co)-Dissolved (mg/L)	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}	
	Copper (Cu)-Dissolved (mg/L)	0.00252	0.00204	0.00234	
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)	<0.00010 ^{DLA}	<0.00010 ^{DLA}	<0.00010 ^{DLA}	
	Lithium (Li)-Dissolved (mg/L)	0.0098	0.0091	0.0090	
	Magnesium (Mg)-Dissolved (mg/L)	94.5	95.3	97.0	
	Manganese (Mn)-Dissolved (mg/L)	0.0856	0.188	0.101	
	Mercury (Hg)-Dissolved (mg/L)	<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 Description Sampled Date Sampled Time Client ID	L1421859-1 Surface Water 12-FEB-14 12:00 0167-140212-016	L1421859-2 Surface Water 12-FEB-14 12:00 0167-140212-017	L1421859-3 Surface Water 12-FEB-14 12:00 0167-140212-018	L1421859-4 Surface Water 12-FEB-14 12:00 0167-140212-019	
Grouping	Analyte				
WATER					
Dissolved Metals	Molybdenum (Mo)-Dissolved (mg/L)	0.00015	0.00011	0.00014	
	Nickel (Ni)-Dissolved (mg/L)	<0.0010 ^{DLA}	<0.0010 ^{DLA}	<0.0010 ^{DLA}	
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	
	Potassium (K)-Dissolved (mg/L)	4.08	3.98	4.05	
	Selenium (Se)-Dissolved (mg/L)	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}	
	Silicon (Si)-Dissolved (mg/L)	3.67	3.46	3.60	
	Silver (Ag)-Dissolved (mg/L)	<0.000020 ^{DLA}	<0.000020 ^{DLA}	<0.000020 ^{DLA}	
	Sodium (Na)-Dissolved (mg/L)	13.7	13.7	13.6	
	Strontium (Sr)-Dissolved (mg/L)	1.19	1.13	1.14	
	Sulfur (S)-Dissolved (mg/L)	353	359	362	
	Thallium (Tl)-Dissolved (mg/L)	0.000072	0.000068	0.000070	
	Tin (Sn)-Dissolved (mg/L)	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}	
	Titanium (Ti)-Dissolved (mg/L)	<0.020 ^{DLA}	<0.020 ^{DLA}	<0.020 ^{DLA}	
	Uranium (U)-Dissolved (mg/L)	0.00448	0.00451	0.00444	
	Vanadium (V)-Dissolved (mg/L)	<0.0020 ^{DLA}	<0.0020 ^{DLA}	<0.0020 ^{DLA}	
	Zinc (Zn)-Dissolved (mg/L)	0.544	0.517	0.513	

* 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	Antimony (Sb)-Dissolved	DLA	L1421859-1, -2, -3
Duplicate	Beryllium (Be)-Dissolved	DLA	L1421859-1, -2, -3
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1421859-1, -2, -3
Duplicate	Boron (B)-Dissolved	DLA	L1421859-1, -2, -3
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1421859-1, -2, -3
Duplicate	Chromium (Cr)-Dissolved	DLA	L1421859-1, -2, -3
Duplicate	Copper (Cu)-Dissolved	DLA	L1421859-1, -2, -3
Duplicate	Lithium (Li)-Dissolved	DLA	L1421859-1, -2, -3
Duplicate	Nickel (Ni)-Dissolved	DLA	L1421859-1, -2, -3
Duplicate	Selenium (Se)-Dissolved	DLA	L1421859-1, -2, -3
Duplicate	Silver (Ag)-Dissolved	DLA	L1421859-1, -2, -3
Duplicate	Thallium (Tl)-Dissolved	DLA	L1421859-1, -2, -3
Duplicate	Tin (Sn)-Dissolved	DLA	L1421859-1, -2, -3
Duplicate	Titanium (Ti)-Dissolved	DLA	L1421859-1, -2, -3
Duplicate	Vanadium (V)-Dissolved	DLA	L1421859-1, -2, -3
Duplicate	Zinc (Zn)-Dissolved	DLA	L1421859-1, -2, -3
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1421859-1, -2, -3
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1421859-1, -2, -3
Matrix Spike	Boron (B)-Dissolved	MS-B	L1421859-1, -2, -3
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1421859-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1421859-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1421859-1, -2, -3
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1421859-1, -2, -3
Matrix Spike	Sulfate (SO4)	MS-B	L1421859-1, -2, -3, -4
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1421859-1, -2, -3
Matrix Spike	Cadmium (Cd)-Dissolved	MS-B	L1421859-1, -2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1421859-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1421859-1, -2, -3

Qualifiers for Individual Parameters Listed:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-MAN-WR	Water	Alkalinity by Manual Titration	APHA 2320
<p>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.</p>			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"
<p>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.</p>			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity
<p>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.</p>			
ANIONS-CL-IC-WR	Water	Chloride by Ion Chromatography	EPA 300.1
<p>This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.</p>			
ANIONS-F-IC-WR	Water	Fluoride by Ion Chromatography	EPA 300.1
<p>This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.</p>			
ANIONS-NO2-IC-WR	Water	Nitrite Nitrogen by Ion Chromatography	EPA 300.1

Reference Information

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

ANIONS-NO3-IC-WR Water Nitrate Nitrogen by Ion Chromatography EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-WR Water Sulphate by Ion Chromatography EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

COLOUR-TRUE-WR Water Colour (True) by Spectrometer APHA 2120

"This analysis is carried out using procedures adapted from APHA Method 2120 "Color". Colour (True Colour) is determined by filtering a sample through a 0.45 micron membrane filter followed by analysis of the filtrate using the platinum-cobalt colourimetric method. Aparent Colour is determined without prior sample filtration. Colour is pH dependent. Unless otherwise indicated, reported colour results pertain to the pH of the sample as received, to within +/- 1 pH unit."

EC-MAN-WR Water Conductivity by Meter APHA 2510 (B)

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

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-CVAFS-VA Water Total Mercury in Water by CVAFS 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).

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

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

IONBALANCE-VA Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

$$\text{Ion Balance (\%)} = [\text{Cation Sum} - \text{Anion Sum}] / [\text{Cation Sum} + \text{Anion Sum}]$$

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

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

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

Reference Information

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

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS 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-ICP-VA Water Total Metals 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 (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

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).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/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 either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

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-MAN-WR Water pH by Meter APHA 4500-H (B)

"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."

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

Reference Information

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-CALC-VA Water TDS (Calculated) APHA 1030E (20TH EDITION)

This analysis is carried out using procedures adapted from APHA 1030E "Checking Correctness of Analyses".

TSS-MAN-WR Water Total Suspended Solids by Gravimetric APHA 2540 D

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

TURBIDITY-WR Water Turbidity by Nephelometer APHA 2130

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

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

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

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

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

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

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

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

Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company: EDI	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)
Contact: Meghan Marjanovic	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address: 2195 - 2nd Ave Y1A 3A2	Email 1: mmarianovic@edynamics.com	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Phone: 867-393-4882 Fax:	Email 2:	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
	Email 3:	Analysis Request

Invoice To Same as Report? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Client / Project Information	Please indicate below Filtered, Preserved or both (F, P, F/P)																	
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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																		

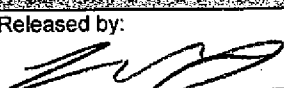
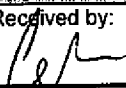
Lab Work Order # (lab use only)	L1421859	ALS Contact:	Sampler:
---------------------------------	----------	--------------	----------

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	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
	0167-1402 12-016	12-FEB-2014		Water	X	X	X	X	X	X	X	X								6
	0167-1402 12-017	12-FEB-2014		Water	X	X	X	X	X	X	X	X								6
	0167-1402 12-018	12-FEB-2014		Water	X	X	X	X	X	X	X	X								6
	0167-1402 12-019	12-FEB-2014		Water															X	3



Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AI)

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
	12-FEB-14	1300		12-FEB-14	2:25	4.8, 5.2, 3.7 °C				



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

Date Received: 12-FEB-14
Report Date: 24-FEB-14 17:22 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1421869
Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 13-Y-0167
C of C Numbers: 1
Legal Site Desc:

Comments: The bioassay analysis was subcontracted to Nautilus Environmental Ltd. in Burnaby, BC. Refer for their report appended for detail.

Can Dang
Senior Account Manager

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

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



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

Report Date: February 21, 2014
Work Order: 14062

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 (hours)
L1421869-1 (0167-140211-005)	February 12, 2014 @ 1420	>96

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:
Armando Tang, B.Sc., R.P.Bio.
Senior Reviewer

Rainbow Trout Summary Sheet

Client: ALS

Start Date/Time: February 17/14 @ 1130

Work Order No.: 14062

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: L1421869-1 (0167-140211-005)
Sample Date: February 12/14 @ 1420
Date Received: February 14/14 @ 1330
Sample Volume: 1 x 20L
Other: N/A

Test Validity Criteria:

≥ 90% control survival

WQ Ranges:

T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Dilution Water:

Type: Dechlorinated Municipal Tap Water
Hardness (mg/L CaCO₃): 11
Alkalinity (mg/L CaCO₃): 8

Test Organism Information:

Batch No.: 010914
Source: Miracle Springs
No. Fish/Volume (L): 10/12
Loading Density: 0.44
Mean Length ± SD (mm): 40 ± 4 Range: 34 - 45
Mean Weight ± SD (g): 0.53 ± 0.11 Range: 0.35 - 0.70

NaNO₂ Reference Toxicant Results:

Reference Toxicant ID: RTNE54
Stock Solution ID: 13NE02
Date Initiated: January 24/14
96-h LC₅₀ (95% CL): 4.3 (3.1-6.1) mg/L NaNO₂

Reference Toxicant Mean and Historical Range: 5.6 (2.3 - 13.6) mg/L NaNO₂
Reference Toxicant CV (%): 57

Test Results: The 96-h LT50 is > 96-hours.

Reviewed by: A. Terry

Date reviewed: February 21, 2014

96-Hour Rainbow Trout Toxicity Test Data Sheet

Client/Project#: SBF-EPI ALS Number Fish/Volume: 10/12 L
 Sample I.D. (0167-14021-005) L1421869-1 7-d % Mortality: 0.0
 W.O. # 14062 Total Pre-aeration Time (mins): 30
 RBT Batch #: 010914 Aeration rate adjusted to 6.5 ± 1 mL/min/L? (Y/N): Y
 Date Collected/Time: Feb. 12/14 @ 1420h
 Date Setup/Time: Feb 17/14 @ 1130
 Sample Setup By: YMB

D.O. meter: DO-1/2/3
 pH meter: pH-1/2/3
 Cond. Meter: CI-1/2/3

Undiluted Sample WQ		
Parameters	Initial WQ	Adjustment
Temp °C	14.0	14.0
pH	6.8	6.9
D.O. (mg/L)	8.5	9.0
Cond. (µS/cm)	1752	1774

Concentration	# Survivors									Temperature (°C)			Dissolved Oxygen (mg/L)			pH			Conductivity (µS/cm)					
	1	2	4	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96					
(% v/v)																								
Control	10	10	10	10	10	10	10	14.0	14.5	14.0	14.5	14.5	10.2	9.8	9.4	9.7	9.8	7.1	6.9	7.0	7.0	32	38	
100	10	10	10	10	10	10	10	14.0	14.5	14.0	14.5	14.5	9.0	9.7	9.8	9.7	9.9	6.9	8.1	8.1	8.2	1774	1789	
Initials	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM

WQ Ranges: T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Sample Description/Comments: yellow-orange colour, opaque
 Fish Description at 96 h: All fish appear OK Number of Stressed Fish at 96 h: 0

Other Observations:
 Reviewed by: A. Teng Date Reviewed: February 24, 2014



L1421869

VANCOUVER

Subcontract Request Form

Subcontract To:

NAUTILUS ENVIRONMENTAL

8664 COMMERCE COURT
BURNABY, BC V5A 4N7

NOTES: Please reference on final report and invoice: PO# L1421869
ALS requires QC data to be provided with your final results.

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

SAMPLE NUMBER	CLIENT ID	ANALYTICAL REQUIRED	DATE SAMPLED	PRIORITY FLAG
L1421869-1	0167-140211-005	Special Request- Nautilus Environmental (SPECIAL REQUEST-NL 14)	2/ 12/ 2014 2/20/2014	

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

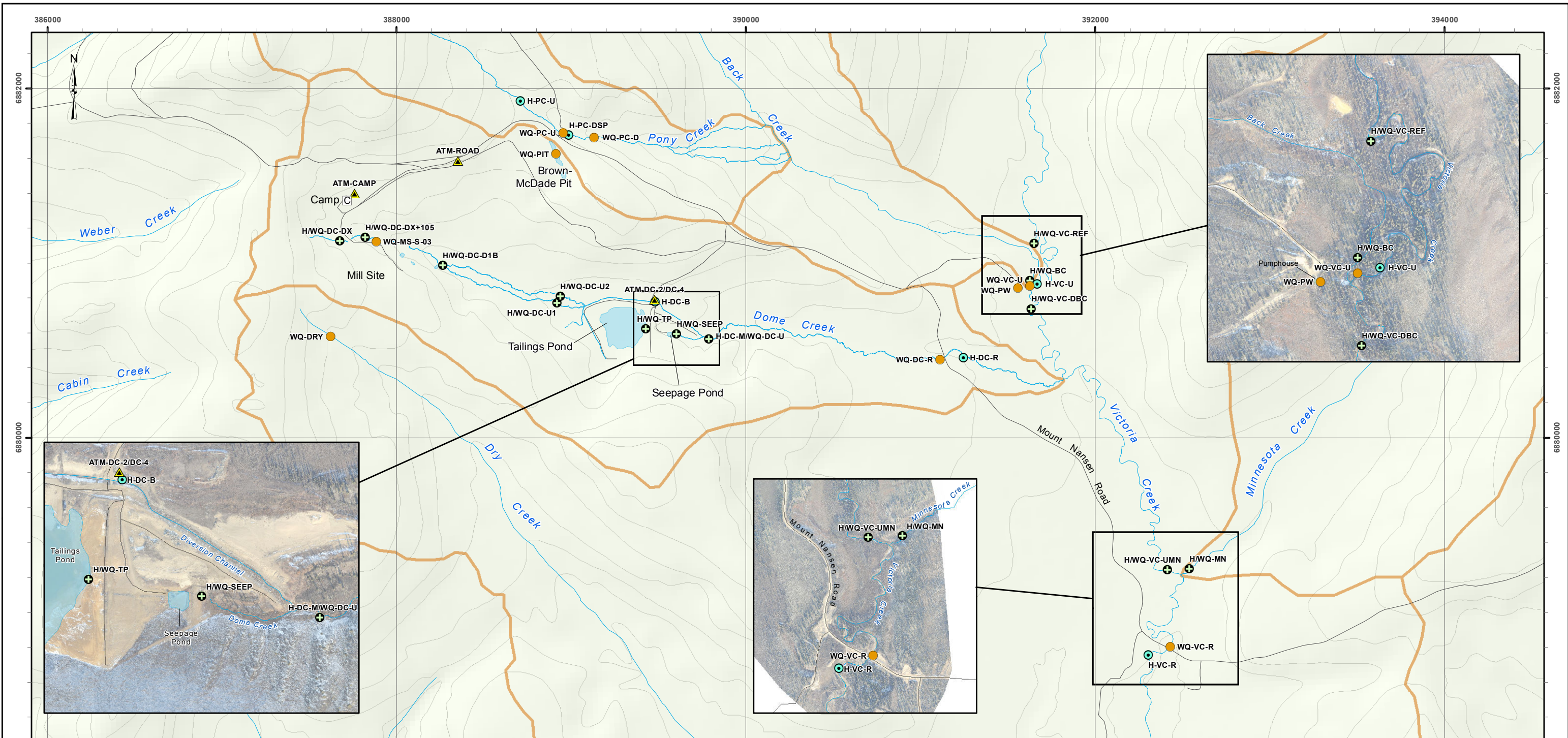
Shipped By: _____ Date Shipped: _____
 Received By: [Signature] Date Received: February 14/14 @ 1330
 Verified By: _____ Date Verified: _____
 Temperature: 6.0°C

Sample Integrity Issues: _____

LT50 Rainbow Trout .
WO:14062



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)

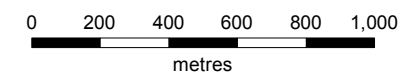
1:50,000 and 1:250,000 Topographic Spatial Data provided by Geomatics - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

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.



Map Scale = 1:22,000 (printed on 11 x 17)
Map Projection: North American Datum 1983 UTM Zone 8N

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