

January 22, 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: January 13-15, 2014

Trip Dates:	January 13-15, 2014
EDI Field Staff:	Laura Grieve, 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 January 13 to January 15, 2014. Air temperatures during the trip ranged from -2°C to -32°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 90 cm. Some sampling sites still have open leads. There was between 20 cm and 40 cm of snow on the ground during the site visit. Water levels across most of the sites/stations were low to moderate.

Several changes to the project scope were made following discussion with AAM. This included removing H-DX, H-DC-U1, H/WQ-DC-U2, H/WQ-MN, WQ-PW, and WQ-DRY from the monitoring network.

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, and YG Environmental Health Services bacteriological analysis results for the previous trip (December 16-18, 2013) (Appendix A, B, C). 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 D for reference.



1. Hydrology

All hydrometric stations were visited and station conditions documented, excluding sites that were frozen to substrate on the last trip. Stream discharge measurements were collected at each hydrometric station that was not frozen or dry using the mid-section method, volumetric method, and/or the salt tracer method using a salt slug injection. Level loggers were downloaded at each of the four continuous monitoring stations (H-VC-R, H-VC-DBC, H-VC-U and H-DC-M), with the exception of the H-VC-R station which had problems downloading.

Water levels at all stations were typical of the mid-winter period, with discharges ranging from low to moderate. In general, ice thickness ranged from approximately 5 cm to 90 cm across the Mount Nansen Site. Table 1 summarizes the hydrometric monitoring program measurements completed at each station and any additional relevant station details.

Table 1. Hydrometric program details.

Hydrology program dates:		January 13-14, 2014
Weather at time of monitoring:		Weather conditions were typically clear and calm, with temperatures between -2°C to -32°C.
Station	Hydrometric Measurement Type	Notes & Comments
ATM-DC2/DC4	None	Both atmospheric barologgers were downloaded.
H-DC-DX	None	REMOVED FROM SCOPE
H-DC-DX+105	Salt slug	Water levels moderate. Salt tracer method used to measure stream discharge. Ice and snow covered.
H-DC-D1b	None	Frozen to substrate.
H-DC-U1	None	REMOVED FROM SCOPE
H-DC-U2	None	REMOVED FROM SCOPE
H-DC-B	None	Flow between layers of ice and saturated snow, not suitable for discharge measurements (Photo 1).
H-DC-M	Salt Slug	Water level low, channel snow and ice (12 cm thick) covered. Salt tracer used to estimate stream discharge. Logger downloaded (Photo 3).
H-DC-R	None	Frozen to substrate. Overflow ice and thick ice conditions were not conducive for hydrometric sampling (Photo 2).
H-VC-REF	Salt Slug	Flow levels low and water clear. Salt tracer used to estimate stream discharge. Channel snow and ice covered (photo 5).
H-VC-U	Salt Slug/mid-section method	Water level moderate and clear. Discharge measurement completed using salt tracer and mid-section method. Logger downloaded. Ice cover on majority of the channel, however there are still open leads.
H-BC	None	Frozen to substrate.
H-VC-DBC	Salt Slug/mid-	Water level moderate and water was clear. Salt tracer and mid-section method used to measure discharge. The logger was



Station	Hydrometric Measurement Type	Notes & Comments
	section method	downloaded. Channel is snow and ice covered. Ice ~ 5 cm.
H-VC-UMN	Salt Slug/Mid-section method	Salt tracer and mid-section method used to measure discharge. Water level was moderate and turbidity was clear. Channel snow and ice covered with an open lead upstream of the well site.
H-MN	None	REMOVED FROM SCOPE
H-VC-R	Salt Slug	Water level low and water relatively clear. Salt tracer used to estimate discharge. Logger download was unable to complete. Crew inspected cables and found no visible signs of damage suspect direct read cable damaged by elevated ice levels (Photo 4). Channel snow and ice covered with small open leads in thalweg. Lots of overflow has developed resulting in ice 90 cm thick near the well site.
H-SEEP	Volumetric	A volumetric measurement was made at the pipe discharge. Flow rate and total volume was recorded from the flow meter. No staff gauge reading taken due to ice cover.
H-TP	None	No staff gauge reading taken due to ice cover.
H-PC-U	None	No hydrometric measurement taken, site frozen to substrate.
H-PC-DSP	None	No hydrometric measurement taken, site frozen to substrate.

2. Water Quality

Water quality samples were collected from all monitoring sites with the exception of those that were either removed from the program (see Section 4.0), dry or had unsuitable conditions for sampling and were considered frozen to substrate. Water levels were moderate to low at all sites, with most creek sites having ice cover across the channel with the exception of open leads. Table 2 summarizes the water quality sampling conditions at each site. All water quality samples were delivered to ALS on Wednesday, January 15, 2014.

This memo includes analytical results from samples collected during the December 16-18, 2013 trip (Appendix A, C) as well as copies of the ALS Certificate of Analysis (Appendix B).

Table 2. Water quality sampling program details.

WQ Sampling dates:	January 13-14, 2014	
Weather at time of sampling:	Weather conditions were typically clear and calm. Period gusts of wind occurred throughout the sampling event and temperatures between -2°C to -32°C.	
Site	Sampled? (Yes/No)	Notes / Explanations
WQ-PIT1	Yes	Samples taken from just below the ice. Water level was a total depth of 7.5 meters.
WQ-PIT2	Yes	Samples taken from 3 m depth.



Site	Sampled? (Yes/No)	Notes / Explanations
WQ-PIT3	Yes	Samples taken from 7 m depth.
WQ-SEEP	Yes	Conditions normal for this time of year. Ice build-up around pipe and barrel at the site.
WQ-TP	Yes	Ice thickness 50 cm.
WQ-DC-DX	No	No water samples taken, site frozen to substrate.
WQ-DC-DX+105	Yes	Water levels were moderate.
WQ-DC-D1b	No	No water samples taken, site frozen to substrate.
WQ-DC-U1	No	No water samples taken, site frozen to substrate.
WQ-DC-U2	No	REMOVED FROM SCOPE
WQ-DC-U	Yes	Water levels were low. Sample collected at regular location. Ice cover over whole channel (Photo 3).
WQ-DC-R	No	No water samples taken, site frozen to substrate. Overflow conditions.
WQ-VC-REF	Yes	Water levels were low. Whole site ice covered (Photo 5).
WQ-VC-U	Yes	Water levels were low. Area of open water just below sample site. Sample collected at regular location.
WQ-BC	No	No water samples taken, site frozen to substrate.
WQ-VC-DBC	Yes	Water levels were low. Sample taken from regular sample location.
WQ-VC-UMN	Yes	Water levels were low. Water quality samples were collected within an open water section at the regular sampling location.
WQ-MN	No	REMOVED FROM SCOPE
WQ-VC-R+150	Yes	Sampled taken from regular winter sampling location, 150 m downstream of regular open-water sampling location. Water levels were low. No open water (Photo 4).
WQ-PW	No	REMOVED FROM SCOPE
WQ-PC-U	No	No water samples taken, site frozen to substrate.
WQ-PC-D	No	No water samples taken, site frozen to substrate.
WQ-ADIT-SEEP	No	No water samples taken, site frozen to substrate.
WQ-MS-S-03	Yes	Water levels were moderate. Channel snow covered with thin ice.
WQ-DRY	No	REMOVED FROM SCOPE
Quality Assurance/Quality Control Samples		
Field Replicate A	Yes	Collected from WQ-VC-REF.
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 with flow between layers of ice and saturated snow preventing discharge measurements, January 14, 2014



Photo 2. H/WQ-DC-R – thick overflow conditions resulted in no sampling at this site January 14, 2014, looking downstream to hydrometric station.



Photo 3. H-DC-M/WQ-DC-U – looking upstream showing snow and ice covered conditions.



Photo 4. H-VC-R – looking downstream, showing thick overflow conditions nearly covering stilling well and logger.



Photo 5. H/WQ-VC-REF – looking downstream showing ice and snow covered conditions.

4. Additional Trip Information/Comments

Any changes to project scope (i.e. additional sites sampled):	Several changes to the project scope were made following discussion with AAM. This included removing: H-DX, H-DC-U1, H/WQ-DC-U2, H/WQ-MN, WQ-PW, and WQ-DRY from the monitoring network. Many of these sites are frozen to substrate at this point in the winter season except for the pump house well where drinking water samples are taken year round. Therefore should not be any significant changes to the projected budget.
Any alterations to sample scheduling:	None
Any events resulting in changes to budget:	See scope change above.
Additional Comments:	None
Wildlife Sightings:	None
Site concerns including safety concerns:	None



Appendix A:
Water Quality Parameter Guideline Exceedances
December 16-18, 2013



Table A1. Water Quality Results for the December 16-18, 2013 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-131217-009 WQ-SEEP-r 12/17/2013	0167-131217-007 WQ-SEEP 12/17/2013	0167-131217-008 WQ-DC-U-r 12/17/2013	0167-131217-012 WQ-DC-U 12/17/2013	0167-131217-011 WQ-MS-DX+105 12/17/2013	0167-131216-014 WQ-MS-S-03 12/16/2013	0167-131216-013 WQ-TP 12/16/2013	0167-131216-010 WQ-VC-R+150 12/16/2013	0167-131217-004 WQ-VC-UMN 12/17/2013
Temperature (in-situ)	°C	-	-	-	-	0.6	-	0.3	0.4	0.5	0.9	0.0	0.0
Specific Conductivity (in-situ)	µS/cm	-	-	-	-	1871.0	-	2011.0	1195.0	1198.0	1972.0	230.0	233.5
pH (in-situ)	-	6.5 - 9.0	6.0 - 8.5	-	-	7.20	-	7.29	7.22	7.28	7.32	7.42	7.52
Turbidity (In-situ)	NTU	-	-	-	-	37.80	-	23.00	2.3	1.78	8.07	0.31	0.42
Dissolved Oxygen (in-situ)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Colour, True	CU	15	-	5	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	2	1780	1790	1880	1870	1160	1180	1920	228	231
Hardness (as CaCO3)	mg/L	-	-	0.5	1040	1010	1140	1140	703	704	1150	115	118
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	7.56	7.54	7.82	7.88	7.85	7.86	7.93	7.81	7.83
Total Suspended Solids	mg/L	-	50	3	26	22.7	10	18	67.3	13.3	16.7	<3.0	<3.0
Total Dissolved Solids	mg/L	-	-	1	1460	1450	1540	1510	849	850	1640	124	127
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	251	251	275	275	273	272	157	90.1	92.8
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	251	251	275	275	273	272	157	90.1	92.8
Ammonia, Total (as N)	mg/L	0.75	-	0.005	4.14	4.12	3.48	3.67	0.036	0.0371	0.32	<0.0050	<0.0050
Chloride (Cl)	mg/L	120	-	0.5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Fluoride (F)	mg/L	0.12	-	0.02	0.34	0.3	0.21	0.21	0.29	0.29	0.55	0.052	0.051
Nitrate (as N)	mg/L	13	-	0.005	1.35	1.36	0.849	0.822	<0.050	<0.050	0.253	0.116	0.118
Nitrite (as N)	mg/L	0.06	-	0.001	0.038	0.039	0.027	0.028	<0.010	<0.010	<0.010	<0.0010	<0.0010
Sulfate (SO4)	mg/L	-	-	0.5	870	877	931	904	434	433	1080	26.3	26.3
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	0.0101	<0.0050	0.0095	0.0096	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	-	0.3	0.005	0.0614	0.0187	0.0399	0.0386	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanate	mg/L	-	-	0.2	<2.0	<2.0	1.56	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Thiocyanate (SCN)	mg/L	-	-	0.5	2.38	2.46	1.06	1.07	<0.50	<0.50	<0.50	<0.50	<0.50
Aluminum (Al)-Total	mg/L	0.1	-	0.003	0.0143	0.0134	0.0441	0.0456	0.34	0.0733	0.148	0.0256	0.0238
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	0.00067	0.00068	0.00101	0.00098	0.0116	0.0152	0.0567	0.00036	0.00032
Arsenic (As)-Total	mg/L	0.005	-	0.0001	0.0449	0.0473	0.0575	0.0476	0.176	0.102	0.225	0.00127	0.00111
Barium (Ba)-Total	mg/L	-	1	0.00005	0.0598	0.061	0.0767	0.0743	0.0148	0.0168	0.0205	0.072	0.0724
Beryllium (Be)-Total	mg/L	-	-	0.0001	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010
Bismuth (Bi)-Total	mg/L	-	-	0.0005	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050
Boron (B)-Total	mg/L	-	-	0.01	0.071	0.076	0.057	0.056	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total	mg/L	0.000033	0.02	0.00001	0.000778	0.000769	0.00052	0.000442	0.00951	0.0029	0.00196	0.00002	0.00002
Calcium (Ca)-Total	mg/L	-	-	0.05	288	288	293	290	172	178	332	28.9	29
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	0.0004	0.00051	0.00058	0.00048	0.00053	0.00021	0.0003	0.00015	0.00016
Cobalt (Co)-Total	mg/L	-	-	0.0001	0.00753	0.0076	0.00525	0.00517	0.00074	0.00108	0.00111	<0.00010	<0.00010
Copper (Cu)-Total	mg/L	0.002	0.2	0.0005	0.0043	0.00427	0.00329	0.00315	0.00209	0.00136	0.0323	0.00131	0.0012
Iron (Fe)-Total	mg/L	0.3	1	0.01	9.64	9.78	9.45	7.15	2.13	2.46	0.952	0.06	0.048
Lead (Pb)-Total	mg/L	0.003	0.1	0.00005	<0.00010	0.000079	0.000089	0.000086	0.00231	0.00958	0.0366	0.00007	0.000068
Lithium (Li)-Total	mg/L	-	-	0.0005	0.0016	0.00111	0.002	0.00184	0.00851	0.0091	0.0115	0.00131	0.00115
Magnesium (Mg)-Total	mg/L	-	-	0.1	71.3	70.7	94.4	92.6	59.9	61	72.8	9.85	9.88
Manganese (Mn)-Total	mg/L	-	0.5	0.00005	6.38	6.3	4.66	4.7	1.2	1.32	0.897	0.0276	0.0408
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000014	<0.000010	<0.000010
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	0.00108	0.00111	0.000873	0.000905	0.000396	0.000361	0.00207	0.000391	0.000373
Nickel (Ni)-Total	mg/L	0.1	0.3	0.0005	0.0027	0.00277	0.00228	0.00231	0.00182	0.00193	0.002	<0.00050	<0.00050
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total	mg/L	-	-	0.1	6.66	6.7	6.18	6.13	3.72	3.61	20.5	0.74	0.72
Selenium (Se)-Total	mg/L	0.001	-	0.0001	0.00023	0.00022	0.00019	0.00022	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010
Silicon (Si)-Total	mg/L	-	-	0.05	6.7	6.71	7.95	7.72	6.93	6.38	2.98	5.89	5.89
Silver (Ag)-Total	mg/L	0.0001	0.1	0.00001	0.000046	0.000041	0.000025	0.000023	0.000035	0.000085	0.000657	<0.000010	<0.000010
Sodium (Na)-Total	mg/L	-	-	0.05	36.8	35.7	29.3	30.3	4.81	4.78	27.6	3.1	2.97
Strontium (Sr)-Total	mg/L	-	-	0.0002	0.845	0.865	0.921	0.949	0.408	0.432	0.879	0.303	0.311
Sulfur (S)-Total	mg/L	-	-	0.5	282	282	300	296	137	143	347	8.64	8.6
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	<0.000020	<0.000010	<0.000010	<0.000010	0.000126	0.00009	0.000287	<0.000010	<0.000010
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.01	<0.020	<0.010	<0.010	<0.010	0.02	<0.010	<0.020	<0.010	<0.010
Uranium (U)-Total	mg/L	0.015	-	0.00001	0.00353	0.00362	0.00343	0.00342	0.00431	0.00379	0.0017	0.000568	0.000603
Vanadium (V)-Total	mg/L	-	-	0.001	<0.0020	0.0017	0.0017	0.0015	0.002	<0.0010	<0.0020	<0.0010	<0.0010
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	0.0072	0.0082	0.0128	0.0125	0.681	0.866	0.204	<0.0030	<0.0030
Dissolved Metals Filtration Location		-	-	n/a	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved	mg/L	0.005	-	0.001	0.0118	0.0092	0.0078	0.0063	<0.0010	0.0016	<0.0020	0.0086	0.0083
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	0.00061	0.00062	0.00093	0.00092	0.011	0.0143	0.0494	0.00034	0.00029
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	0.033	0.0337	0.0259	0.0252	0.0112	0.0744	0.117	0.0011	0.00091
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.0611	0.0627	0.0713	0.0722	0.0108	0.016	0.0175	0.0737	0.0774
Beryllium (Be)-Dissolved	mg/L	-	-	0.0001	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010
Bismuth (Bi)-Dissolved	mg/L	-	-	0.0005	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050
Boron (B)-Dissolved	mg/L	-	-	0.01	0.07	0.068	0.052	0.048	<0.010	<0.010	0.132	<0.010	<0.010
Cadmium (Cd)-Dissolved	mg/L	0.000033	-	0.00001	0.0004	0.000381	0.000263	0.000238	0.00155	0.000472	0.00155	0.000022	0.00002
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	295	285	294	295	177	179	335	29.7	30.5
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	<0.00020	<0.00010	0.00017	0.00013	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	0.00777	0.00758	0.00523	0.00509	0.00047	0.00101	<0.0010	<0.00010	<0.00010
Copper (Cu)-Dissolved	mg/L	0.002	-	0.0002	0.00187	0.00186	0.0018	0.00144	<0.00020	<0.00020	0.0219	0.00138	0.00127
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	6.99	6.74	2.72	2.74	0.057	2.09	0.043	0.023	0.017
Lead (Pb)-Dissolved	mg/L	0.001	-	0.00005	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	0.000188	0.00041	<0.000050	<0.000050
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	0.0015	0.00101	0.00186	0.00168	0.00892	0.0094	0.0111	0.00118	0.00117
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	73.2	71.6	98.1	97.3	63.2	62.6	76.5	9.93	10.2
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	6.35	6.34	4.8	4.73	1.13	1.36	0.791	0.025	0.0377
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved	mg/L	0.073	-	0.00005	0.00106	0.000999	0.000829	0.00075	0.000406	0.000344	0.00203	0.000359	0.000361



Table A1. Water Quality Results for the December 16-18, 2013 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-131217-009 WQ-SEEP-r 12/17/2013	0167-131217-007 WQ-SEEP 12/17/2013	0167-131217-008 WQ-DC-U-r 12/17/2013	0167-131217-012 WQ-DC-U 12/17/2013	0167-131217-011 WQ-DC-DX+105 12/17/2013	0167-131216-014 WQ-MS-S-03 12/16/2013	0167-131216-013 WQ-TP 12/16/2013	0167-131216-010 WQ-VC-R+150 12/16/2013	0167-131217-004 WQ-VC-UMN 12/17/2013
Nickel (Ni)-Dissolved	mg/L	0.1	-	0.0005	0.0027	0.00289	0.00229	0.0022	0.00158	0.00182	0.0019	<0.00050	<0.00050
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	-	-	0.1	6.98	6.7	6.4	6.26	3.68	3.48	19.6	0.79	0.75
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	0.00024	0.00021	0.00017	0.00018	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010
Silicon (Si)-Dissolved	mg/L	-	-	0.05	6.9	6.71	7.72	7.69	6.41	6.27	2.36	6.13	6.12
Silver (Ag)-Dissolved	mg/L	0.0001	-	0.00001	<0.000020	0.000015	<0.000010	<0.000010	<0.000010	<0.000010	<0.000020	<0.000010	<0.000010
Sodium (Na)-Dissolved	mg/L	-	-	0.05	36.9	36.5	31	29.8	4.95	4.97	27.6	3.1	3.16
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	0.87	0.851	0.945	0.883	0.438	0.426	0.889	0.289	0.313
Sulfur (S)-Dissolved	mg/L	-	-	0.5	277	272	294	295	139	142	348	8.68	8.77
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	<0.000020	<0.000010	<0.000010	<0.000010	0.000095	0.000075	0.000263	<0.000010	<0.000010
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010
Titanium (Ti)-Dissolved	mg/L	-	-	0.01	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.00364	0.0035	0.00344	0.00332	0.00457	0.00378	0.00167	0.000571	0.000618
Vanadium (V)-Dissolved	mg/L	-	-	0.001	<0.0020	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	0.0068	0.0079	0.012	0.0099	0.624	0.867	0.165	0.0031	0.0034



Table A1. Water Quality Results for the December 16-18, 2013 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-131217-003 WQ-VC-DBC 12/17/2013	0167-131217-001 WQ-VC-U 12/17/2013	0167-131217-016 WQ-VC-REF 12/17/2013	0167-131218-020 WQ-PIT-3 12/18/2013	0167-131218-021 WQ-VC-REF 12/18/2013	0167-131218-022 WQ-PIT-1 12/18/2013	0167-131218-023 WQ-PW 12/18/2013	0167-131217-TRAVEL-BLANK TRAVEL BLANK 11/06/2013
Temperature (in-situ)	°C	-	-	-	0.0	0.0	0.0	5.6	1.8	0.1	0.1	-
Specific Conductivity (in-situ)	µS/cm	-	-	-	215.9	217.3	219.8	2650.0	1973.0	1994.0	391.7	-
pH (in-situ)	-	6.5 - 9.0	6.0 - 8.5	-	7.47	8.04	7.53	7.04	7.70	7.85	7.87	-
Turbidity (In-situ)	NTU	-	-	-	0.01	0.13	0.00	36.70	6.97	0.75	0.00	-
Dissolved Oxygen (in-situ)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Colour, True	CU	15	-	5	-	-	-	-	-	-	<5.0	-
Conductivity	µS/cm	-	-	2	217	218	217	2520	1960	1950	354	<2.0
Hardness (as CaCO3)	mg/L	-	-	0.5	116	112	114	1710	1230	1250	181	<0.50
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	7.84	7.88	7.91	7.66	8.03	8.03	8.13	5.75
Total Suspended Solids	mg/L	-	50	3	4	<3.0	<3.0	56.7	<3.0	4	-	<3.0
Total Dissolved Solids	mg/L	-	-	1	120	119	120	2400	1650	1650	225	<1.0
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	95	95.8	96.5	220	193	194	-	<1.0
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	95	95.8	96.5	220	193	194	166	<1.0
Ammonia, Total (as N)	mg/L	0.75	-	0.005	<0.0050	<0.0050	<0.0050	0.046	<0.0050	<0.0050	-	<0.0050
Chloride (Cl)	mg/L	120	-	0.5	<0.50	<0.50	<0.50	<10	<5.0	<5.0	<0.50	<0.50
Fluoride (F)	mg/L	0.12	-	0.02	0.05	0.05	0.05	<0.40	0.44	0.34	0.116	<0.020
Nitrate (as N)	mg/L	13	-	0.005	0.119	0.119	0.124	<0.10	<0.050	<0.050	0.149	<0.0050
Nitrite (as N)	mg/L	0.06	-	0.001	<0.0010	<0.0010	<0.0010	<0.020	<0.010	<0.010	<0.0010	<0.0010
Sulfate (SO4)	mg/L	-	-	0.5	19.2	19.3	18.6	1640	1090	1080	33.1	<0.50
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	<0.0050	<0.0050	<0.0050	-	-	-	-	<0.0050
Cyanide, Total	mg/L	-	0.3	0.005	<0.0050	<0.0050	<0.0050	-	-	-	-	<0.0050
Cyanate	mg/L	-	-	0.2	<0.20	<0.20	<0.20	-	-	-	-	<0.20
Thiocyanate (SCN)	mg/L	-	-	0.5	<0.50	<0.50	<0.50	-	-	-	-	<0.50
Aluminum (Al)-Total	mg/L	0.1	-	0.003	0.0222	0.0205	0.0297	0.862	0.007	0.008	<0.010	<0.0030
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	0.00013	0.00013	0.00012	0.00597	0.00391	0.00369	<0.00050	<0.00010
Arsenic (As)-Total	mg/L	0.005	-	0.0001	0.00049	0.00047	0.00044	0.0845	0.0114	0.011	0.00043	<0.00010
Barium (Ba)-Total	mg/L	-	1	0.00005	0.0774	0.076	0.076	0.0208	0.012	0.0117	0.078	<0.000050
Beryllium (Be)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00020	<0.00020	<0.00020	-	<0.00010
Bismuth (Bi)-Total	mg/L	-	-	0.0005	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	-	<0.00050
Boron (B)-Total	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.020	<0.020	<0.020	<0.10	<0.010
Cadmium (Cd)-Total	mg/L	0.000033	0.02	0.00001	0.000023	0.000022	0.000017	0.0082	0.00332	0.00342	<0.00020	<0.000010
Calcium (Ca)-Total	mg/L	-	-	0.05	28.4	28	28	485	339	331	41.6	<0.050
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	0.00017	0.00014	0.00016	0.00069	<0.00020	0.00026	<0.0020	<0.00010
Cobalt (Co)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	0.00219	<0.00020	<0.00020	-	<0.00010
Copper (Cu)-Total	mg/L	0.002	0.2	0.0005	0.00114	0.00106	0.001	0.0269	0.003	0.0031	<0.0010	<0.00050
Iron (Fe)-Total	mg/L	0.3	1	0.01	0.043	0.043	0.053	2.38	0.056	0.066	<0.030	<0.010
Lead (Pb)-Total	mg/L	0.003	0.1	0.00005	0.000071	<0.000050	<0.000050	0.0341	0.00054	0.00068	0.0007	<0.000050
Lithium (Li)-Total	mg/L	-	-	0.0005	0.00075	0.0007	0.00111	0.0131	0.0096	0.0089	-	<0.00050
Magnesium (Mg)-Total	mg/L	-	-	0.1	9.62	9.56	9.72	127	93.2	93.6	18.8	<0.10
Manganese (Mn)-Total	mg/L	-	0.5	0.00005	0.0447	0.0436	0.0335	2.21	0.0979	0.113	<0.0020	<0.000050
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.00001	<0.000010	<0.000010	<0.000010	0.000016	<0.000010	<0.000010	<0.00020	<0.000010
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	0.000351	0.000351	0.000367	0.00013	0.00017	0.00016	-	<0.000050
Nickel (Ni)-Total	mg/L	0.1	0.3	0.0005	<0.00050	<0.00050	<0.00050	0.0018	<0.0010	<0.0010	-	<0.00050
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	0.65	0.66	0.63	5.71	3.83	3.83	0.85	<0.10
Selenium (Se)-Total	mg/L	0.001	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00020	<0.00020	<0.00020	<0.0010	<0.00010
Silicon (Si)-Total	mg/L	-	-	0.05	5.96	5.95	5.94	6.59	3.2	3.19	-	<0.050
Silver (Ag)-Total	mg/L	0.0001	0.1	0.00001	<0.000010	<0.000010	<0.000010	0.000636	<0.000020	<0.000020	-	<0.000010
Sodium (Na)-Total	mg/L	-	-	0.05	2.78	2.69	2.62	14.8	12.4	12.1	4.7	<0.050
Strontium (Sr)-Total	mg/L	-	-	0.0002	0.297	0.313	0.305	1.39	1.13	1.1	-	<0.00020
Sulfur (S)-Total	mg/L	-	-	0.5	6.4	6.38	6.18	505	348	349	-	<0.50
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	<0.000010	<0.000010	<0.000010	0.00013	0.00007	0.000071	-	<0.000010
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00040	<0.00020	<0.00020	-	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.020	<0.020	<0.020	-	<0.010
Uranium (U)-Total	mg/L	0.015	-	0.00001	0.000608	0.000576	0.000604	0.00441	0.00465	0.00457	0.00194	<0.000010
Vanadium (V)-Total	mg/L	-	-	0.001	<0.0010	<0.0010	<0.0010	0.0022	<0.0020	<0.0020	-	<0.0010
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	<0.0030	<0.0030	<0.0030	0.838	0.402	0.397	<0.050	<0.0030
Dissolved Metals Filtration Location		-	-	n/a	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	-	-
Aluminum (Al)-Dissolved	mg/L	0.005	-	0.001	0.0072	0.0075	0.0083	<0.0020	<0.0020	<0.0020	-	-
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	0.00069	0.00368	0.0037	-	-
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	0.00029	0.00029	0.00029	0.0254	0.00864	0.00833	-	-
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.0817	0.081	0.0796	0.00805	0.0117	0.0121	-	-
Beryllium (Be)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00020	<0.00020	<0.00020	-	-
Bismuth (Bi)-Dissolved	mg/L	-	-	0.0005	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	-	-
Boron (B)-Dissolved	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.020	<0.020	<0.020	-	-
Cadmium (Cd)-Dissolved	mg/L	0.000033	-	0.00001	0.00002	0.000021	0.000019	0.00376	0.00327	0.00328	-	-
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	30	28.9	29.2	474	337	339	-	-
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00020	<0.00020	<0.00020	-	-
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	0.00179	<0.00020	<0.00020	-	-
Copper (Cu)-Dissolved	mg/L	0.002	-	0.0002	0.00098	0.00104	0.00099	0.00054	0.00217	0.00237	-	-
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	0.014	0.016	0.018	0.538	<0.010	<0.010	-	-
Lead (Pb)-Dissolved	mg/L	0.001	-	0.00005	<0.000050	<0.000050	<0.000050	0.00014	<0.00010	<0.00010	-	-
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	0.00109	0.0011	0.00129	0.0114	0.0092	0.0084	-	-
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	9.93	9.73	10	129	95.7	96.6	-	-
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	0.0449	0.0435	0.0331	2.06	0.0919	0.11	-	-
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	0.000358	0.000352	0.000381	<0.00010	0.00015	0.00015	-	-



Table A1. Water Quality Results for the December 16-18, 2013 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-131217-003 WQ-VC-DBC 12/17/2013	0167-131217-001 WQ-VC-U 12/17/2013	0167-131217-016 WQ-VC-REF 12/17/2013	0167-131218-020 WQ-PIT-3 12/18/2013	0167-131218-021 WQ-PIT-2 12/18/2013	0167-131218-022 WQ-PIT-1 12/18/2013	0167-131218-023 WQ-PW 12/18/2013	0167-131217-TRAVEL-BLANK TRAVEL BLANK 11/06/2013
Nickel (Ni)-Dissolved	mg/L	0.1	-	0.0005	<0.00050	<0.00050	<0.00050	0.0012	<0.0010	<0.0010	-	-
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	0.67	0.66	0.64	4.96	3.83	3.81	-	-
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00020	<0.00020	<0.00020	-	-
Silicon (Si)-Dissolved	mg/L	-	-	0.05	6.27	6.17	6.23	3.54	3.21	3.24	-	-
Silver (Ag)-Dissolved	mg/L	0.0001	-	0.00001	<0.000010	<0.000010	<0.000010	<0.000020	<0.000020	<0.000020	-	-
Sodium (Na)-Dissolved	mg/L	-	-	0.05	2.91	2.8	2.87	14.2	12.1	13.5	-	-
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	0.335	0.314	0.334	1.32	1.1	1.17	-	-
Sulfur (S)-Dissolved	mg/L	-	-	0.5	6.62	6.47	6.35	487	343	344	-	-
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	<0.000010	<0.000010	<0.000010	0.00003	0.000067	0.000071	-	-
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00020	<0.00020	<0.00020	-	-
Titanium (Ti)-Dissolved	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.020	<0.020	<0.020	-	-
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.000608	0.000593	0.000653	0.004	0.0044	0.00468	-	-
Vanadium (V)-Dissolved	mg/L	-	-	0.001	<0.0010	<0.0010	<0.0010	<0.0020	<0.0020	<0.0020	-	-
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	0.0012	0.0015	0.0024	0.684	0.396	0.422	-	-



Table A1. Water Quality Results for the December 16-18, 2013 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-131217-FIELD-BLANK FIELD BLANK 12/17/2013
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
Hardness (as CaCO3)	mg/L	-	-	0.5	<0.50
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	5.65
Total Suspended Solids	mg/L	-	50	3	<3.0
Total Dissolved Solids	mg/L	-	-	1	<1.0
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	<1.0
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	1	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	<1.0
Ammonia, Total (as N)	mg/L	0.75	-	0.005	<0.0050
Chloride (Cl)	mg/L	120	-	0.5	<0.50
Fluoride (F)	mg/L	0.12	-	0.02	<0.020
Nitrate (as N)	mg/L	13	-	0.005	<0.0050
Nitrite (as N)	mg/L	0.06	-	0.001	<0.0010
Sulfate (SO4)	mg/L	-	-	0.5	<0.50
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	<0.0050
Cyanide, Total	mg/L	-	0.3	0.005	<0.0050
Cyanate	mg/L	-	-	0.2	<0.20
Thiocyanate (SCN)	mg/L	-	-	0.5	<0.50
Aluminum (Al)-Total	mg/L	0.1	-	0.003	<0.0030
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	<0.00010
Arsenic (As)-Total	mg/L	0.005	-	0.0001	<0.00010
Barium (Ba)-Total	mg/L	-	1	0.00005	<0.000050
Beryllium (Be)-Total	mg/L	-	-	0.0001	<0.00010
Bismuth (Bi)-Total	mg/L	-	-	0.0005	<0.00050
Boron (B)-Total	mg/L	-	-	0.01	<0.010
Cadmium (Cd)-Total	mg/L	0.000033	0.02	0.00001	<0.000010
Calcium (Ca)-Total	mg/L	-	-	0.05	<0.050
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	<0.00010
Cobalt (Co)-Total	mg/L	-	-	0.0001	<0.00010
Copper (Cu)-Total	mg/L	0.002	0.2	0.0005	<0.00050
Iron (Fe)-Total	mg/L	0.3	1	0.01	<0.010
Lead (Pb)-Total	mg/L	0.003	0.1	0.00005	<0.000050
Lithium (Li)-Total	mg/L	-	-	0.0005	<0.00050
Magnesium (Mg)-Total	mg/L	-	-	0.1	<0.10
Manganese (Mn)-Total	mg/L	-	0.5	0.00005	<0.000050
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.00001	<0.000010
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	<0.000050
Nickel (Ni)-Total	mg/L	0.1	0.3	0.0005	<0.00050
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050
Potassium (K)-Total	mg/L	-	-	0.1	<0.10
Selenium (Se)-Total	mg/L	0.001	-	0.0001	<0.00010
Silicon (Si)-Total	mg/L	-	-	0.05	<0.050
Silver (Ag)-Total	mg/L	0.0001	0.1	0.00001	<0.000010
Sodium (Na)-Total	mg/L	-	-	0.05	<0.050
Strontium (Sr)-Total	mg/L	-	-	0.0002	<0.00020
Sulfur (S)-Total	mg/L	-	-	0.5	<0.50
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	<0.000010
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.01	<0.010
Uranium (U)-Total	mg/L	0.015	-	0.00001	<0.000010
Vanadium (V)-Total	mg/L	-	-	0.001	<0.0010
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	<0.0030
Dissolved Metals Filtration Location		-	-	n/a	FIELD
Aluminum (Al)-Dissolved	mg/L	0.005	-	0.001	<0.0010
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

Applied - Federal CCME Canadian Environmental Quality Guidelines
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 December 16-18, 2013 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0167-131217-FIELD-BLANK FIELD BLANK 12/17/2013
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
December 16-18, 2013



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

Date Received: 18-DEC-13
Report Date: 06-JAN-14 10:57 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1405081
Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 13-Y-0167
C of C Numbers: 1, 2
Legal Site Desc:

Comments:

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 ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1405081-1 Water 17-DEC-13 10:15 0167-131217-009	L1405081-2 Water 17-DEC-13 10:15 0167-131217-007	L1405081-3 Water 17-DEC-13 09:15 0167-131217-008	L1405081-4 Water 17-DEC-13 09:10 0167-131217-012	L1405081-5 Water 17-DEC-13 11:15 0167-131217-011
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	1780	1790	1880	1870	1160
	Hardness (as CaCO3) (mg/L)	1040	1010	1140	1140	703
	pH (pH)	7.56	7.54	7.82	7.88	7.85
	Total Suspended Solids (mg/L)	26.0	22.7	10.0	18.0	67.3
	Total Dissolved Solids (mg/L)	1460	1450	1540	1510	849
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	251	251	275	275	273
	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)	251	251	275	275	273
	Ammonia, Total (as N) (mg/L)	4.14	4.12	3.48	3.67	0.036
	Chloride (Cl) (mg/L)	<5.0 ^{DLA}	<5.0 ^{DLA}	<5.0 ^{DLA}	<5.0 ^{DLA}	<5.0 ^{DLA}
	Fluoride (F) (mg/L)	0.34	0.30	0.21	0.21	0.29
	Nitrate (as N) (mg/L)	1.35	1.36	0.849	0.822	<0.050 ^{DLA}
	Nitrite (as N) (mg/L)	0.038	0.039	0.027	0.028	<0.010 ^{DLA}
	Sulfate (SO4) (mg/L)	870	877	931	904	434
	Anion Sum (meq/L)	23.2	23.4	25.0	24.4	14.5
	Cation Sum (meq/L)	23.4	22.7	24.8	24.7	14.4
	Cation - Anion Balance (%)	0.4	-1.4	-0.2	0.7	-0.3
Cyanides	Cyanide, Weak Acid Diss (mg/L)	0.0101	<0.0050	0.0095	0.0096	<0.0050
	Cyanide, Total (mg/L)	0.0614	0.0187	0.0399	0.0386	<0.0050
	Cyanate (mg/L)	<2.0 ^{DLIS}	<0.20	2.10	1.56	<0.20
	Thiocyanate (SCN) (mg/L)	2.38	2.46	1.06	1.07	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0143	0.0134	0.0441	0.0456	0.340
	Antimony (Sb)-Total (mg/L)	0.00067	0.00068	0.00101	0.00098	0.0116
	Arsenic (As)-Total (mg/L)	0.0449	0.0473	0.0575	0.0476	0.176
	Barium (Ba)-Total (mg/L)	0.0598	0.0610	0.0767	0.0743	0.0148
	Beryllium (Be)-Total (mg/L)	<0.00020 ^{DLA}	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.0010 ^{DLA}	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	0.071	0.076	0.057	0.056	<0.010
	Cadmium (Cd)-Total (mg/L)	0.000778	0.000769	0.000520	0.000442	0.00951
	Calcium (Ca)-Total (mg/L)	288	288	293	290	172
	Chromium (Cr)-Total (mg/L)	0.00040	0.00051	0.00058	0.00048	0.00053
	Cobalt (Co)-Total (mg/L)	0.00753	0.00760	0.00525	0.00517	0.00074
	Copper (Cu)-Total (mg/L)	0.0043	0.00427	0.00329	0.00315	0.00209
	Iron (Fe)-Total (mg/L)	9.64	9.78	9.45	7.15	2.13
	Lead (Pb)-Total (mg/L)	<0.00010 ^{DLA}	0.000079	0.000089	0.000086	0.00231
	Lithium (Li)-Total (mg/L)	0.0016	0.00111	0.00200	0.00184	0.00851

* 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		L1405081-6 Water 16-DEC-13 19:08 0167-131216-014	L1405081-7 Water 16-DEC-13 18:10 0167-131216-013	L1405081-8 Water 06-NOV-13 09:00 0167-131106-ALS TRAVEL BLANK	L1405081-9 Water 17-DEC-13 19:58 0167-131217-ALS FIELD BLANK	L1405081-10 Water 16-DEC-13 17:00 0167-131216-010
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	1180	1920	<2.0	<2.0	228
	Hardness (as CaCO3) (mg/L)	704	1150	<0.50	<0.50	115
	pH (pH)	7.86	7.93	5.75	5.65	7.81
	Total Suspended Solids (mg/L)	13.3	16.7	<3.0	<3.0	<3.0
	Total Dissolved Solids (mg/L)	850	1640	<1.0	<1.0	124
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	272	157	<1.0	<1.0	90.1
	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)	272	157	<1.0	<1.0	90.1
	Ammonia, Total (as N) (mg/L)	0.0371	0.320	<0.0050	<0.0050	<0.0050
	Chloride (Cl) (mg/L)	<5.0 ^{DLA}	<5.0 ^{DLA}	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.29	0.55	<0.020	<0.020	0.052
	Nitrate (as N) (mg/L)	<0.050 ^{DLA}	0.253	<0.0050	<0.0050	0.116
	Nitrite (as N) (mg/L)	<0.010 ^{DLA}	<0.010 ^{DLA}	<0.0010	<0.0010	<0.0010
	Sulfate (SO4) (mg/L)	433	1080	<0.50	<0.50	26.2
	Anion Sum (meq/L)	14.5	25.7	<0.10	<0.10	2.36
	Cation Sum (meq/L)	14.6	24.8	<0.10	<0.10	2.46
	Cation - Anion Balance (%)	0.4	-1.8	0.0	0.0	2.1
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanate (mg/L)	<0.20	<0.20	<0.20 ^{PEHT}	<0.20	<0.20
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0733	0.148	<0.0030	<0.0030	0.0256
	Antimony (Sb)-Total (mg/L)	0.0152	0.0567	<0.00010	<0.00010	0.00036
	Arsenic (As)-Total (mg/L)	0.102	0.225	<0.00010	<0.00010	0.00127
	Barium (Ba)-Total (mg/L)	0.0168	0.0205	<0.000050	<0.000050	0.0720
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00020 ^{DLA}	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.0010 ^{DLA}	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	<0.010	0.140	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	0.00290	0.00196	<0.000010	<0.000010	0.000020
	Calcium (Ca)-Total (mg/L)	178	332	<0.050	<0.050	28.9
	Chromium (Cr)-Total (mg/L)	0.00021	0.00030	<0.00010	<0.00010	0.00015
	Cobalt (Co)-Total (mg/L)	0.00108	0.00111	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00136	0.0323	<0.00050	<0.00050	0.00131
	Iron (Fe)-Total (mg/L)	2.46	0.952	<0.010	<0.010	0.060
	Lead (Pb)-Total (mg/L)	0.00958	0.0366	<0.000050	<0.000050	0.000070
	Lithium (Li)-Total (mg/L)	0.00910	0.0115	<0.00050	<0.00050	0.00131

* 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		L1405081-11 Water 17-DEC-13 13:21 0167-131217-004	L1405081-12 Water 17-DEC-13 15:40 0167-131217-003	L1405081-13 Water 17-DEC-13 15:50 0167-131217-001	L1405081-14 Water 17-DEC-13 17:57 0167-131217-016	
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	231	217	218	217	
	Hardness (as CaCO3) (mg/L)	118	116	112	114	
	pH (pH)	7.83	7.84	7.88	7.91	
	Total Suspended Solids (mg/L)	<3.0	4.0	<3.0	<3.0	
	Total Dissolved Solids (mg/L)	127	120	119	120	
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	92.8	95.0	95.8	96.5	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	92.8	95.0	95.8	96.5	
	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	
	Fluoride (F) (mg/L)	0.051	0.050	0.050	0.050	
	Nitrate (as N) (mg/L)	0.118	0.119	0.119	0.124	
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Sulfate (SO4) (mg/L)	26.3	19.2	19.3	18.6	
	Anion Sum (meq/L)	2.41	2.31	2.33	2.33	
	Cation Sum (meq/L)	2.52	2.46	2.38	2.43	
	Cation - Anion Balance (%)	2.2	3.2	1.2	2.1	
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
	Cyanate (mg/L)	<0.20	<0.20	<0.20	<0.20	
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	
Total Metals	Aluminum (Al)-Total (mg/L)	0.0238	0.0222	0.0205	0.0297	
	Antimony (Sb)-Total (mg/L)	0.00032	0.00013	0.00013	0.00012	
	Arsenic (As)-Total (mg/L)	0.00111	0.00049	0.00047	0.00044	
	Barium (Ba)-Total (mg/L)	0.0724	0.0774	0.0760	0.0760	
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Cadmium (Cd)-Total (mg/L)	0.000020	0.000023	0.000022	0.000017	
	Calcium (Ca)-Total (mg/L)	29.0	28.4	28.0	28.0	
	Chromium (Cr)-Total (mg/L)	0.00016	0.00017	0.00014	0.00016	
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Copper (Cu)-Total (mg/L)	0.00120	0.00114	0.00106	0.00100	
	Iron (Fe)-Total (mg/L)	0.048	0.043	0.043	0.053	
	Lead (Pb)-Total (mg/L)	0.000068	0.000071	<0.000050	<0.000050	
	Lithium (Li)-Total (mg/L)	0.00115	0.00075	0.00097	0.00111	

* 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		L1405081-1 Water 17-DEC-13 10:15 0167-131217-009	L1405081-2 Water 17-DEC-13 10:15 0167-131217-007	L1405081-3 Water 17-DEC-13 09:15 0167-131217-008	L1405081-4 Water 17-DEC-13 09:10 0167-131217-012	L1405081-5 Water 17-DEC-13 11:15 0167-131217-011
Grouping	Analyte					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)	71.3	70.7	94.4	92.6	59.9
	Manganese (Mn)-Total (mg/L)	6.38	6.30	4.66	4.70	1.20
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.00108	0.00111	0.000873	0.000905	0.000396
	Nickel (Ni)-Total (mg/L)	0.0027	0.00277	0.00228	0.00231	0.00182
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	6.66	6.70	6.18	6.13	3.72
	Selenium (Se)-Total (mg/L)	0.00023	0.00022	0.00019	0.00022	<0.00010
	Silicon (Si)-Total (mg/L)	6.70	6.71	7.95	7.72	6.93
	Silver (Ag)-Total (mg/L)	0.000046	0.000041	0.000025	0.000023	0.000035
	Sodium (Na)-Total (mg/L)	36.8	35.7	29.3	30.3	4.81
	Strontium (Sr)-Total (mg/L)	0.845	0.865	0.921	0.949	0.408
	Sulfur (S)-Total (mg/L)	282	282	300	296	137
	Thallium (Tl)-Total (mg/L)	<0.000020 ^{DLA}	<0.000010	<0.000010	<0.000010	0.000126
	Tin (Sn)-Total (mg/L)	<0.00020 ^{DLA}	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.020 ^{DLA}	<0.010	<0.010	<0.010	0.020
	Uranium (U)-Total (mg/L)	0.00353	0.00362	0.00343	0.00342	0.00431
	Vanadium (V)-Total (mg/L)	<0.0020 ^{DLA}	0.0017	0.0017	0.0015	0.0020
	Zinc (Zn)-Total (mg/L)	0.0072	0.0082	0.0128	0.0125	0.681
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)	0.0118	0.0092	0.0078	0.0063	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	0.00061	0.00062	0.00093	0.00092	0.0110
	Arsenic (As)-Dissolved (mg/L)	0.0330	0.0337	0.0259	0.0252	0.0112
	Barium (Ba)-Dissolved (mg/L)	0.0611	0.0627	0.0713	0.0722	0.0108
	Beryllium (Be)-Dissolved (mg/L)	<0.00020 ^{DLA}	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.0010 ^{DLA}	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	0.070	0.068	0.052	0.048	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	0.000400	0.000381	0.000263	0.000238	0.00155
	Calcium (Ca)-Dissolved (mg/L)	295	285	294	295	177
	Chromium (Cr)-Dissolved (mg/L)	<0.00020 ^{DLA}	<0.00010	0.00017	0.00013	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00777	0.00758	0.00523	0.00509	0.00047
	Copper (Cu)-Dissolved (mg/L)	0.00187	0.00186	0.00180	0.00144	<0.00020
	Iron (Fe)-Dissolved (mg/L)	6.99	6.74	2.72	2.74	0.057
	Lead (Pb)-Dissolved (mg/L)	<0.00010 ^{DLA}	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0015	0.00101	0.00186	0.00168	0.00892
	Magnesium (Mg)-Dissolved (mg/L)	73.2	71.6	98.1	97.3	63.2

* 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		L1405081-6 Water 16-DEC-13 19:08 0167-131216-014	L1405081-7 Water 16-DEC-13 18:10 0167-131216-013	L1405081-8 Water 06-NOV-13 09:00 0167-131106-ALS TRAVEL BLANK	L1405081-9 Water 17-DEC-13 19:58 0167-131217-ALS FIELD BLANK	L1405081-10 Water 16-DEC-13 17:00 0167-131216-010
Grouping	Analyte					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)	61.0	72.8	<0.10	<0.10	9.85
	Manganese (Mn)-Total (mg/L)	1.32	0.897	<0.000050	<0.000050	0.0276
	Mercury (Hg)-Total (mg/L)	<0.000010	0.000014	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000361	0.00207	<0.000050	<0.000050	0.000391
	Nickel (Ni)-Total (mg/L)	0.00193	0.0020	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	3.61	20.5	<0.10	<0.10	0.74
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00020 ^{DLA}	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	6.38	2.98	<0.050	<0.050	5.98
	Silver (Ag)-Total (mg/L)	0.000085	0.000657	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	4.78	27.6	<0.050	<0.050	3.10
	Strontium (Sr)-Total (mg/L)	0.432	0.879	<0.00020	<0.00020	0.303
	Sulfur (S)-Total (mg/L)	143	347	<0.50	<0.50	8.64
	Thallium (Tl)-Total (mg/L)	0.000090	0.000287	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00020 ^{DLA}	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.020 ^{DLA}	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00379	0.00170	<0.000010	<0.000010	0.000568
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0020 ^{DLA}	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	0.866	0.204	<0.0030	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD		FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD		FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0016	<0.0020 ^{DLA}		<0.0010	0.0086
	Antimony (Sb)-Dissolved (mg/L)	0.0143	0.0494		<0.00010	0.00034
	Arsenic (As)-Dissolved (mg/L)	0.0744	0.117		<0.00010	0.00110
	Barium (Ba)-Dissolved (mg/L)	0.0160	0.0175		<0.000050	0.0737
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00020 ^{DLA}		<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.0010 ^{DLA}		<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	0.132		<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	0.000472	0.00155		<0.000010	0.000022
	Calcium (Ca)-Dissolved (mg/L)	179	335		<0.050	29.7
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00020 ^{DLA}		<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00101	0.00101		<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.0219		<0.00020	0.00138
	Iron (Fe)-Dissolved (mg/L)	2.09	0.043		<0.010	0.023
	Lead (Pb)-Dissolved (mg/L)	0.000188	0.00041		<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.00940	0.0111		<0.00050	0.00118
	Magnesium (Mg)-Dissolved (mg/L)	62.6	76.5		<0.10	9.93

* 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		L1405081-11 Water 17-DEC-13 13:21 0167-131217-004	L1405081-12 Water 17-DEC-13 15:40 0167-131217-003	L1405081-13 Water 17-DEC-13 15:50 0167-131217-001	L1405081-14 Water 17-DEC-13 17:57 0167-131217-016	
Grouping	Analyte					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)	9.88	9.62	9.56	9.72	
	Manganese (Mn)-Total (mg/L)	0.0408	0.0447	0.0436	0.0335	
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Molybdenum (Mo)-Total (mg/L)	0.000373	0.000351	0.000351	0.000367	
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Potassium (K)-Total (mg/L)	0.72	0.65	0.66	0.63	
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Silicon (Si)-Total (mg/L)	5.89	5.96	5.95	5.94	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	2.97	2.78	2.69	2.62	
	Strontium (Sr)-Total (mg/L)	0.311	0.297	0.313	0.305	
	Sulfur (S)-Total (mg/L)	8.60	6.40	6.38	6.18	
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	0.000603	0.000608	0.000576	0.000604	
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	0.0083	0.0072	0.0075	0.0083	
	Antimony (Sb)-Dissolved (mg/L)	0.00029	<0.00010	<0.00010	<0.00010	
	Arsenic (As)-Dissolved (mg/L)	0.00091	0.00029	0.00029	0.00029	
	Barium (Ba)-Dissolved (mg/L)	0.0774	0.0817	0.0810	0.0796	
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Cadmium (Cd)-Dissolved (mg/L)	0.000020	0.000020	0.000021	0.000019	
	Calcium (Ca)-Dissolved (mg/L)	30.5	30.0	28.9	29.2	
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Copper (Cu)-Dissolved (mg/L)	0.00127	0.00098	0.00104	0.00099	
	Iron (Fe)-Dissolved (mg/L)	0.017	0.014	0.016	0.018	
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	0.00117	0.00109	0.00110	0.00129	
	Magnesium (Mg)-Dissolved (mg/L)	10.2	9.93	9.73	10.0	

* 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		L1405081-1 Water 17-DEC-13 10:15 0167-131217-009	L1405081-2 Water 17-DEC-13 10:15 0167-131217-007	L1405081-3 Water 17-DEC-13 09:15 0167-131217-008	L1405081-4 Water 17-DEC-13 09:10 0167-131217-012	L1405081-5 Water 17-DEC-13 11:15 0167-131217-011
Grouping	Analyte					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	6.35	6.34	4.80	4.73	1.13
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.00106	0.000999	0.000829	0.000750	0.000406
	Nickel (Ni)-Dissolved (mg/L)	0.0027	0.00289	0.00229	0.00220	0.00158
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	6.98	6.70	6.40	6.26	3.68
	Selenium (Se)-Dissolved (mg/L)	0.00024	0.00021	0.00017	0.00018	<0.00010
	Silicon (Si)-Dissolved (mg/L)	6.90	6.71	7.72	7.69	6.41
	Silver (Ag)-Dissolved (mg/L)	<0.000020 ^{DLA}	0.000015	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	36.9	36.5	31.0	29.8	4.95
	Strontium (Sr)-Dissolved (mg/L)	0.870	0.851	0.945	0.883	0.438
	Sulfur (S)-Dissolved (mg/L)	277	272	294	295	139
	Thallium (Tl)-Dissolved (mg/L)	<0.000020 ^{DLA}	<0.000010	<0.000010	<0.000010	0.000095
	Tin (Sn)-Dissolved (mg/L)	<0.00020 ^{DLA}	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.020 ^{DLA}	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00364	0.00350	0.00344	0.00332	0.00457
	Vanadium (V)-Dissolved (mg/L)	<0.0020 ^{DLA}	0.0011	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.0068	0.0079	0.0120	0.0099	0.624

* 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		L1405081-6 Water 16-DEC-13 19:08 0167-131216-014	L1405081-7 Water 16-DEC-13 18:10 0167-131216-013	L1405081-8 Water 06-NOV-13 09:00 0167-131106-ALS TRAVEL BLANK	L1405081-9 Water 17-DEC-13 19:58 0167-131217-ALS FIELD BLANK	L1405081-10 Water 16-DEC-13 17:00 0167-131216-010
Grouping	Analyte					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	1.36	0.791		<0.000050	0.0250
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010		<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000344	0.00203		<0.000050	0.000359
	Nickel (Ni)-Dissolved (mg/L)	0.00182	0.0019		<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050		<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	3.48	19.6		<0.10	0.79
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00020 ^{DLA}		<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	6.27	2.36		<0.050	6.13
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000020 ^{DLA}		<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	4.97	27.6		<0.050	3.10
	Strontium (Sr)-Dissolved (mg/L)	0.426	0.889		<0.00020	0.289
	Sulfur (S)-Dissolved (mg/L)	142	348		<0.50	8.68
	Thallium (Tl)-Dissolved (mg/L)	0.000075	0.000263 ^{DLA}		<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00020 ^{DLA}		<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.020 ^{DLA}		<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00378	0.00167 ^{DLA}		<0.000010	0.000571
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0020 ^{DLA}		<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.867	0.165		<0.0010	0.0031

* 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		L1405081-11 Water 17-DEC-13 13:21 0167-131217-004	L1405081-12 Water 17-DEC-13 15:40 0167-131217-003	L1405081-13 Water 17-DEC-13 15:50 0167-131217-001	L1405081-14 Water 17-DEC-13 17:57 0167-131217-016	
Grouping	Analyte					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	0.0377	0.0449	0.0435	0.0331	
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Molybdenum (Mo)-Dissolved (mg/L)	0.000361	0.000358	0.000352	0.000381	
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Potassium (K)-Dissolved (mg/L)	0.75	0.67	0.66	0.64	
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Silicon (Si)-Dissolved (mg/L)	6.12	6.27	6.17	6.23	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	3.16	2.91	2.80	2.87	
	Strontium (Sr)-Dissolved (mg/L)	0.313	0.335	0.314	0.334	
	Sulfur (S)-Dissolved (mg/L)	8.77	6.62	6.47	6.35	
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.000618	0.000608	0.000593	0.000653	
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Zinc (Zn)-Dissolved (mg/L)	0.0034	0.0012	0.0015	0.0024	

* 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	Aluminum (Al)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Antimony (Sb)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Arsenic (As)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Beryllium (Be)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Bismuth (Bi)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Boron (B)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Cadmium (Cd)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Cobalt (Co)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Copper (Cu)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Manganese (Mn)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Nickel (Ni)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Silver (Ag)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Titanium (Ti)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Uranium (U)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Vanadium (V)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Zinc (Zn)-Total	DLA	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Duplicate	Cyanate	DLIS	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Total	MS-B	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Matrix Spike	Boron (B)-Total	MS-B	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Matrix Spike	Manganese (Mn)-Total	MS-B	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Matrix Spike	Sodium (Na)-Total	MS-B	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Total	MS-B	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7
Matrix Spike	Tin (Sn)-Total	MS-B	L1405081-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7

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.
PEHT	Parameter Exceeded Recommended Holding Time Prior to Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ANIONS-CL-IC-WR	Water	Chloride by Ion Chromatography	EPA 300.1
This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.			
ANIONS-F-IC-WR	Water	Fluoride by Ion Chromatography	EPA 300.1
This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.			
ANIONS-NO2-IC-WR	Water	Nitrite Nitrogen by Ion Chromatography	EPA 300.1
This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.			
ANIONS-NO3-IC-WR	Water	Nitrate Nitrogen by Ion Chromatography	EPA 300.1

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-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

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

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

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

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

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

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

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

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

HARDNESS-CALC-VA Water Hardness APHA 2340B

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

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

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

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

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

IONBALANCE-VA Water Ion Balance Calculation APHA 1030E

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

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

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

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

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

Reference Information

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

Chain of Custody Numbers:

1

2

Reference Information

GLOSSARY OF REPORT TERMS

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

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

mg/kg ww - 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.

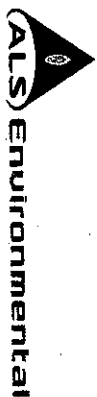
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

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				☒ Standard ☐ Other				☒ Regular (Standard Turnaround Times - Business Days)											
Contact: Meghan Marjanovic				☒ PDF ☒ Excel ☐ Digital ☐ Fax				☐ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT											
Address: 2195 - 2nd Ave				Email 1: mmarjanovic@edynamics.com				☐ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT											
Y1A 3T8				Email 2:				☐ Same Day or Weekend Emergency - Contact ALS to Confirm TAT											
Phone: 867-393-4882				Fax:				Analysis Request											
Invoice To: Same as Report?				☐ Yes ☒ No				Please indicate below Filtered, Preserved or both (F, P, F/P)											
Handcopy of Invoice with Report?				☐ Yes ☒ No															
Company: Environmental Dynamics Inc				Job #: Mount Nansen 13-Y-0167															
Contact: Shannon Jenner sjenner@edynamics.com				PO / A/E:															
Address: 2195 - 2nd Ave, Y1A 3T8				LSD:															
Phone: 867-393-4882				Fax:															
Lab Work Order #				Quote #: Q38399															
(lab use only)				ALS Contact:				Sampler: DH + JM											
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	ALP-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			
0167-1312 17-009		17-Dec-13	10:15	Water	X	X	X	X	X	X	X	X	X	X	X	9			
0167-1312 17-007		17-Dec-13	10:15	Water	X	X	X	X	X	X	X	X	X	X	X	9			
0167-1312 17-008		17-Dec-13	09:15	Water	X	X	X	X	X	X	X	X	X	X	X	9			
0167-1312 17-012		17-Dec-13	09:10	Water	X	X	X	X	X	X	X	X	X	X	X	9			
0167-1312 17-011		17-Dec-13	11:15	Water	X	X	X	X	X	X	X	X	X	X	X	9			
0167-1312 16-014		16-Dec-13	19:08	Water	X	X	X	X	X	X	X	X	X	X	X	9			
0167-1312 16-013		16-Dec-13	18:10	Water	X	X	X	X	X	X	X	X	X	X	X	9			
Special Instructions / Regulations with water or tank 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)				Observations:							
Released by:	Date (dd-mm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	If Yes add SIF									
Donner	18-Dec-13	10:06	Donner	18-Dec-13	2:30	13.10 °C													



ALS Environmental

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

COC #

Page _____ of _____

Report To				Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)							
Company: EDI				☒ Standard ☐ Other				☒ Regular (Standard Turnaround Times - Business Days)							
Contact: Meghan Marjanovic				☒ PDF ☒ Excel ☐ Digital ☐ Fax				☐ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT							
Address: 2195 - 2nd Ave				Email 1: mmarjanovic@edynamics.com				☐ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT							
Y1A 3T8				Email 2:				☐ Same Day or Weekend Emergency - Contact ALS to Confirm TAT							
Phone: 867-393-4882				Fax:				Analysis Request							
Invoice To: Same as Report?				☐ Yes ☒ No				Please indicate below Filtered, Preserved or both (F, P, F/P)							
Hardcopy of invoice with Report?				☐ Yes ☒ No											
Company: Environmental Dynamics Inc				Job #: Mount Nansen 13-Y-0167											
Contact: Shannon Jenner sjenner@edynamics.com				PO / A/E:											
Address: 2195 - 2nd Ave, Y1A 3T8				LSD:											
Phone: 867-393-4882				Fax:											
Lab Work Order #				Quote #: Q38399											
(lab use only)				ALS Contact:				Sampler: DH + SM							
Sample Identification (This description will appear on the report)				Date (dd-mm-yy)				Time (hh:mm)				Sample Type			
0167-1311 06 - ALS Travel Blank				06 Dec-13								Water			
0167-1312 17 - ALS Field Blank				17 Dec-13				14:58				Water			
0167-1312 16 - 010				16 Dec-13				13:00				Water			
0167-1312 17 - 004				17 Dec-13				13:21				Water			
0167-1312 17 - 003				17 Dec-13				15:40				Water			
0167-1312 17 - 001				17 Dec-13				15:50				Water			
0167-1312 17 - 016				17 Dec-13				17:57				Water			
Special Instructions / Reg															



L1405081-COFC

CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc / Hazardous Details

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)

Released by: *Shannon Jenner* Date (dd-mm-yy): 18-Dec-13 Time (hh-mm): 10:15 Received by: *[Signature]* Date: 18-Dec-13 Time: 2:30 Temperature: °C

SHIPMENT RECEPTION (lab use only)

SHIPMENT VERIFICATION (lab use only)

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: 18-DEC-13

Report Date: 06-JAN-14 10:53 (MT)

Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1405086

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		L1405086-1 Water 18-DEC-13 08:47 0167-131218-020	L1405086-2 Water 18-DEC-13 08:55 0167-131218-021	L1405086-3 Water 18-DEC-13 09:02 0167-131218-022	L1405086-4 Water 18-DEC-13 09:30 0167-131218-023	
Grouping	Analyte					
WATER						
Physical Tests	Colour, True (CU)				<5.0	
	Conductivity (uS/cm)	2520	1960	1950	354	
	Hardness (as CaCO3) (mg/L)	1710	1230	1250	181	
	pH (pH)	7.66	8.03	8.03	8.13	
	Total Suspended Solids (mg/L)	56.7	<3.0	4.0		
	Total Dissolved Solids (mg/L)	2400	1650	1650	225	
	Turbidity (NTU)				0.15	
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	220	193	194		
	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)	220	193	194	166	
	Ammonia, Total (as N) (mg/L)	0.0460	<0.0050	<0.0050		
	Chloride (Cl) (mg/L)	<10 ^{DLA}	<5.0 ^{DLA}	<5.0 ^{DLA}	<0.50	
	Fluoride (F) (mg/L)	<0.40 ^{DLA}	0.44 ^{DLA}	0.34 ^{DLA}	0.116	
	Nitrate (as N) (mg/L)	<0.10 ^{DLA}	<0.050 ^{DLA}	<0.050 ^{DLA}	0.149	
	Nitrite (as N) (mg/L)	<0.020 ^{DLA}	<0.010 ^{DLA}	<0.010 ^{DLA}	<0.0010	
	Sulfate (SO4) (mg/L)	1640	1090	1080	33.1	
	Anion Sum (meq/L)	38.6	26.6	26.3		
	Cation Sum (meq/L)	35.1	25.3	25.6		
	Cation - Anion Balance (%)	-4.7	-2.4	-1.5		
Total Metals	Aluminum (Al)-Total (mg/L)	0.862	0.0070	0.0080	<0.010	
	Antimony (Sb)-Total (mg/L)	0.00597	0.00391	0.00369	<0.00050	
	Arsenic (As)-Total (mg/L)	0.0845	0.0114	0.0110	0.00043	
	Barium (Ba)-Total (mg/L)	0.0208	0.0120	0.0117	0.078	
	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)	0.00820	0.00332	0.00342	<0.00020	
	Calcium (Ca)-Total (mg/L)	485	339	331	41.6	
	Chromium (Cr)-Total (mg/L)	0.00069	<0.00020 ^{DLA}	0.00026 ^{DLA}	<0.0020	
	Cobalt (Co)-Total (mg/L)	0.00219	<0.00020 ^{DLA}	<0.00020 ^{DLA}		
	Copper (Cu)-Total (mg/L)	0.0269	0.0030	0.0031	<0.0010	
	Iron (Fe)-Total (mg/L)	2.38	0.056	0.066	<0.030	
	Lead (Pb)-Total (mg/L)	0.0341	0.00054	0.00068	0.00070	
	Lithium (Li)-Total (mg/L)	0.0131	0.0096	0.0089		
	Magnesium (Mg)-Total (mg/L)	127	93.2	93.6	18.8	
	Manganese (Mn)-Total (mg/L)	2.21	0.0979	0.113	<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		L1405086-1 Water 18-DEC-13 08:47 0167-131218-020	L1405086-2 Water 18-DEC-13 08:55 0167-131218-021	L1405086-3 Water 18-DEC-13 09:02 0167-131218-022	L1405086-4 Water 18-DEC-13 09:30 0167-131218-023	
Grouping	Analyte					
WATER						
Total Metals	Mercury (Hg)-Total (mg/L)	0.000016	<0.000010	<0.000010	<0.00020	
	Molybdenum (Mo)-Total (mg/L)	0.00013	0.00017 ^{DLA}	0.00016 ^{DLA}		
	Nickel (Ni)-Total (mg/L)	0.0018	<0.0010	<0.0010		
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050		
	Potassium (K)-Total (mg/L)	5.71 ^{DLA}	3.83 ^{DLA}	3.83 ^{DLA}	0.85	
	Selenium (Se)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.0010	
	Silicon (Si)-Total (mg/L)	6.59	3.20 ^{DLA}	3.19 ^{DLA}		
	Silver (Ag)-Total (mg/L)	0.000636	<0.000020	<0.000020		
	Sodium (Na)-Total (mg/L)	14.8	12.4	12.1	4.7	
	Strontium (Sr)-Total (mg/L)	1.39	1.13	1.10		
	Sulfur (S)-Total (mg/L)	505	348	349		
	Thallium (Tl)-Total (mg/L)	0.000130 ^{DLB}	0.000070 ^{DLA}	0.000071 ^{DLA}		
	Tin (Sn)-Total (mg/L)	<0.00040 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}		
	Titanium (Ti)-Total (mg/L)	<0.020	<0.020	<0.020		
	Uranium (U)-Total (mg/L)	0.00441	0.00465 ^{DLA}	0.00457 ^{DLA}	0.00194	
	Vanadium (V)-Total (mg/L)	0.0022	<0.0020	<0.0020		
	Zinc (Zn)-Total (mg/L)	0.838	0.402	0.397	<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)	0.00069	0.00368	0.00370		
	Arsenic (As)-Dissolved (mg/L)	0.0254	0.00864	0.00833		
	Barium (Ba)-Dissolved (mg/L)	0.00805	0.0117 ^{DLA}	0.0121 ^{DLA}		
	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)	0.00376	0.00327	0.00328		
	Calcium (Ca)-Dissolved (mg/L)	474 ^{DLA}	337 ^{DLA}	339 ^{DLA}		
	Chromium (Cr)-Dissolved (mg/L)	<0.00020	<0.00020 ^{DLA}	<0.00020 ^{DLA}		
	Cobalt (Co)-Dissolved (mg/L)	0.00179	<0.00020	<0.00020		
	Copper (Cu)-Dissolved (mg/L)	0.00054	0.00217	0.00237		
	Iron (Fe)-Dissolved (mg/L)	0.538	<0.010 ^{DLA}	<0.010 ^{DLA}		
	Lead (Pb)-Dissolved (mg/L)	0.00014	<0.00010	<0.00010		
	Lithium (Li)-Dissolved (mg/L)	0.0114	0.0092	0.0084		
	Magnesium (Mg)-Dissolved (mg/L)	129	95.7	96.6		
	Manganese (Mn)-Dissolved (mg/L)	2.06	0.0919	0.110		
	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		L1405086-1 Water 18-DEC-13 08:47 0167-131218-020	L1405086-2 Water 18-DEC-13 08:55 0167-131218-021	L1405086-3 Water 18-DEC-13 09:02 0167-131218-022	L1405086-4 Water 18-DEC-13 09:30 0167-131218-023	
Grouping	Analyte					
WATER						
Dissolved Metals	Molybdenum (Mo)-Dissolved (mg/L)	^{DLA} <0.00010	0.00015	0.00015		
	Nickel (Ni)-Dissolved (mg/L)	0.0012	^{DLA} <0.0010	^{DLA} <0.0010		
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050		
	Potassium (K)-Dissolved (mg/L)	4.96	3.83	3.81		
	Selenium (Se)-Dissolved (mg/L)	^{DLA} <0.00020	^{DLA} <0.00020	^{DLA} <0.00020		
	Silicon (Si)-Dissolved (mg/L)	3.54	3.21	3.24		
	Silver (Ag)-Dissolved (mg/L)	^{DLA} <0.000020	^{DLA} <0.000020	^{DLA} <0.000020		
	Sodium (Na)-Dissolved (mg/L)	14.2	12.1	13.5		
	Strontium (Sr)-Dissolved (mg/L)	1.32	1.10	1.17		
	Sulfur (S)-Dissolved (mg/L)	487	343	344		
	Thallium (Tl)-Dissolved (mg/L)	0.000030	0.000067	0.000071		
	Tin (Sn)-Dissolved (mg/L)	^{DLA} <0.00020	^{DLA} <0.00020	^{DLA} <0.00020		
	Titanium (Ti)-Dissolved (mg/L)	^{DLA} <0.020	^{DLA} <0.020	^{DLA} <0.020		
	Uranium (U)-Dissolved (mg/L)	0.00400	0.00440	0.00468		
	Vanadium (V)-Dissolved (mg/L)	^{DLA} <0.0020	^{DLA} <0.0020	^{DLA} <0.0020		
	Zinc (Zn)-Dissolved (mg/L)	0.684	0.396	0.422		

* 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	Chromium (Cr)-Total	DLA	L1405086-1
Duplicate	Cobalt (Co)-Total	DLA	L1405086-1
Duplicate	Tin (Sn)-Total	DLA	L1405086-1
Duplicate	Titanium (Ti)-Total	DLA	L1405086-1
Duplicate	Vanadium (V)-Total	DLA	L1405086-1
Duplicate	Aluminum (Al)-Total	DLA	L1405086-2, -3
Duplicate	Antimony (Sb)-Total	DLA	L1405086-2, -3
Duplicate	Arsenic (As)-Total	DLA	L1405086-2, -3
Duplicate	Beryllium (Be)-Total	DLA	L1405086-2, -3
Duplicate	Bismuth (Bi)-Total	DLA	L1405086-2, -3
Duplicate	Boron (B)-Total	DLA	L1405086-2, -3
Duplicate	Cadmium (Cd)-Total	DLA	L1405086-2, -3
Duplicate	Cobalt (Co)-Total	DLA	L1405086-2, -3
Duplicate	Copper (Cu)-Total	DLA	L1405086-2, -3
Duplicate	Manganese (Mn)-Total	DLA	L1405086-2, -3
Duplicate	Nickel (Ni)-Total	DLA	L1405086-2, -3
Duplicate	Silver (Ag)-Total	DLA	L1405086-2, -3
Duplicate	Titanium (Ti)-Total	DLA	L1405086-2, -3
Duplicate	Uranium (U)-Total	DLA	L1405086-2, -3
Duplicate	Vanadium (V)-Total	DLA	L1405086-2, -3
Duplicate	Zinc (Zn)-Total	DLA	L1405086-2, -3
Method Blank	Manganese (Mn)-Total	MB-LOR	L1405086-1
Method Blank	Tin (Sn)-Total	MB-LOR	L1405086-1
Matrix Spike	Sulfate (SO4)	MS-B	L1405086-1, -2, -3, -4
Matrix Spike	Boron (B)-Total	MS-B	L1405086-2, -3, -4
Matrix Spike	Calcium (Ca)-Total	MS-B	L1405086-2, -3, -4
Matrix Spike	Sodium (Na)-Total	MS-B	L1405086-2, -3, -4
Matrix Spike	Barium (Ba)-Total	MS-B	L1405086-2, -3, -4
Matrix Spike	Boron (B)-Total	MS-B	L1405086-2, -3, -4
Matrix Spike	Manganese (Mn)-Total	MS-B	L1405086-2, -3, -4
Matrix Spike	Sodium (Na)-Total	MS-B	L1405086-2, -3, -4
Matrix Spike	Strontium (Sr)-Total	MS-B	L1405086-2, -3, -4
Matrix Spike	Tin (Sn)-Total	MS-B	L1405086-2, -3, -4

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLB	Detection Limit was raised due to detection of analyte at comparable level in Method Blank.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
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-COL-VA	Water	Alkalinity by Colourimetric (Automated)	EPA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
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

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.

ANIONS-F-IC-WR Water Fluoride by Ion Chromatography EPA 300.1

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

ANIONS-NO2-IC-WR Water Nitrite Nitrogen by Ion Chromatography EPA 300.1

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

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

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

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

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

COLOUR-TRUE-VA Water Colour (True) by Spectrometer BCMOE Colour Single Wavelength

This analysis is carried out using procedures adapted from British Columbia Environmental Manual "Colour- Single Wavelength." 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. Apparent 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-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

Reference Information

States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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

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

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

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

MET-TOT-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. Weston 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).

Reference Information

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

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".

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

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

TSS-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-VA Water Turbidity by Meter APHA 2130 "Turbidity"

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

TURBIDITY-VA Water Turbidity by Meter APHA 2130 Turbidity

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 ww - 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.

[illegible]



Appendix C:
YG Bacteriological Results
December 16-18, 2013



Health and Social Services
Santé et Affaires sociales
Environmental Health Services
Service d'hygiène du milieu

BACTERIOLOGICAL ANALYSIS OF DRINKING WATER
ANALYSE BACTÉRIOLOGIQUE DE L'EAU POTABLE

#2 Hospital Road, Whitehorse, Yukon Y1A 3H8 2 Hospital Road, Whitehorse (Yukon) Y1A 3H8
phone : (867) 667-8391 fax : (867) 667-8322 Tél. : 867-667-8391 Téléc. : 867-667-8322
Toll free: 1-800-661-0408 ext.8391 Sans frais au Yukon 1-800-661-0408, poste 8391

Contact Information • Coordonnées de la personne-ressource

Contact Person Meghan Marjanovic Phone 867 393 4882
Personne-ressource 2195 Second Ave Téléphone 867 393 4883
Mailing address Whitehorse YT Fax 867 393 4883
Adresse postale Whitehorse YT Télécopieur 867 393 4883
Postal code Y1A 3E8 Code postal Y1A 3E8

First Nation, Municipal or Business Name
Nom de la Première nation, de la municipalité ou de l'entreprise
Agent
Agent

Sampling Location • Lieu de la prise d'échantillon

Municipal Address Mt Nansen Mine Subdivision
Adresse municipale Mt Nansen Mine Lotissement
Legal Description Lot Quad Plan no.
Désignation officielle Lot Quadrilatère Plan n°
Other Information (e.g., Location, Business / Building Name)
Autres renseignements (ex. : emplacement, nom de l'entreprise, nom de l'édifice) WQ-PW

Sample Collection / Prélèvement de l'échantillon

Sample Collected By JM/DH Date 13/12/18 Time 09:36 am
Échantillon prélevé par JM/DH Date 13/12/18 Heure 09:36 am
YY/MM/DD • AA/MM/JJ

Sampling Site (e.g., kitchen tap) WQ-PW
Point d'échantillonnage (ex. : robinet de cuisine)
Is this a Resample from a Previous Test? ☐ Yes ☒ No Previous Sample Number
Est-ce un deuxième échantillon d'un test antérieur? ☐ Oui ☒ Non Numéro de l'échantillon précédent

Sample Supply / Source d'approvisionnement en eau

☐ Public Supply ☐ Bulk Water Distributor ☒ Business ☐ Private Residence
Municipal – par canalisation Municipal – par camion Privé – entreprise Privé – résidence

Sample Source / Provenance de l'échantillon

☐ Dug Well ☐ Driven Well ☒ Drilled Well Depth of Well
Puits creusé Puits tubulaire Puits foré à la sondeuse Profondeur du puits
☐ Water Holding Tank ☐ Other (explain)
Réservoir d'eau Autre (précisez)

Water Treatment / Traitement de l'eau

Is the Water Chlorinated? ☐ Yes ☒ No Free Available Chlorine p.p.m.
L'eau contient-elle du chlore? ☐ Oui ☒ Non Chlore libre disponible mg/L

Other Treatment Systems (e.g., UV, softener, filter)
Autre dispositif de traitement (ex. : désinfection aux rayons UV, adoucisseur d'eau, filtre)

For Laboratory Use Only / À l'usage du laboratoire seulement

Receipt of Sample Date 13-12-18 Time 230 am By SS
Réception de l'échantillon Date 13-12-18 Heure 230 am Par SS
YY/MM/DD • AA/MM/JJ
Condition of Sample ☒ Satisfactory ☐ Unsatisfactory Details 6.20C
État de l'échantillon ☒ Satisfaisant ☐ Non satisfaisant Précisez 6.20C
Incubation Date 13-12-18 Time 240 am By 8 Incubator 2
Incubation Date 13-12-18 Heure 240 am Par 8 Incubateur 2
YY/MM/DD • AA/MM/JJ
Analysis Completed Date 13-12-19 Time 315 am By SS
Analyse terminée Date 13-12-19 Heure 315 am Par SS
YY/MM/DD • AA/MM/JJ

Results (See Reverse Side for Interpretation)
Résultats (Voir au verso l'interprétation des résultats)

Total Coliforms/Coliformes totaux

☐ Present / Présence ☒ Absent / Absence

E. coli/E. coli

☐ Present / Présence ☒ Absent / Absence

Comments / Commentaires

Report Authorized By SS Position WLT Date 13-12-19
Rapport autorisé par SS Poste WLT Date 13-12-19
YY/MM/DD • AA/MM/JJ

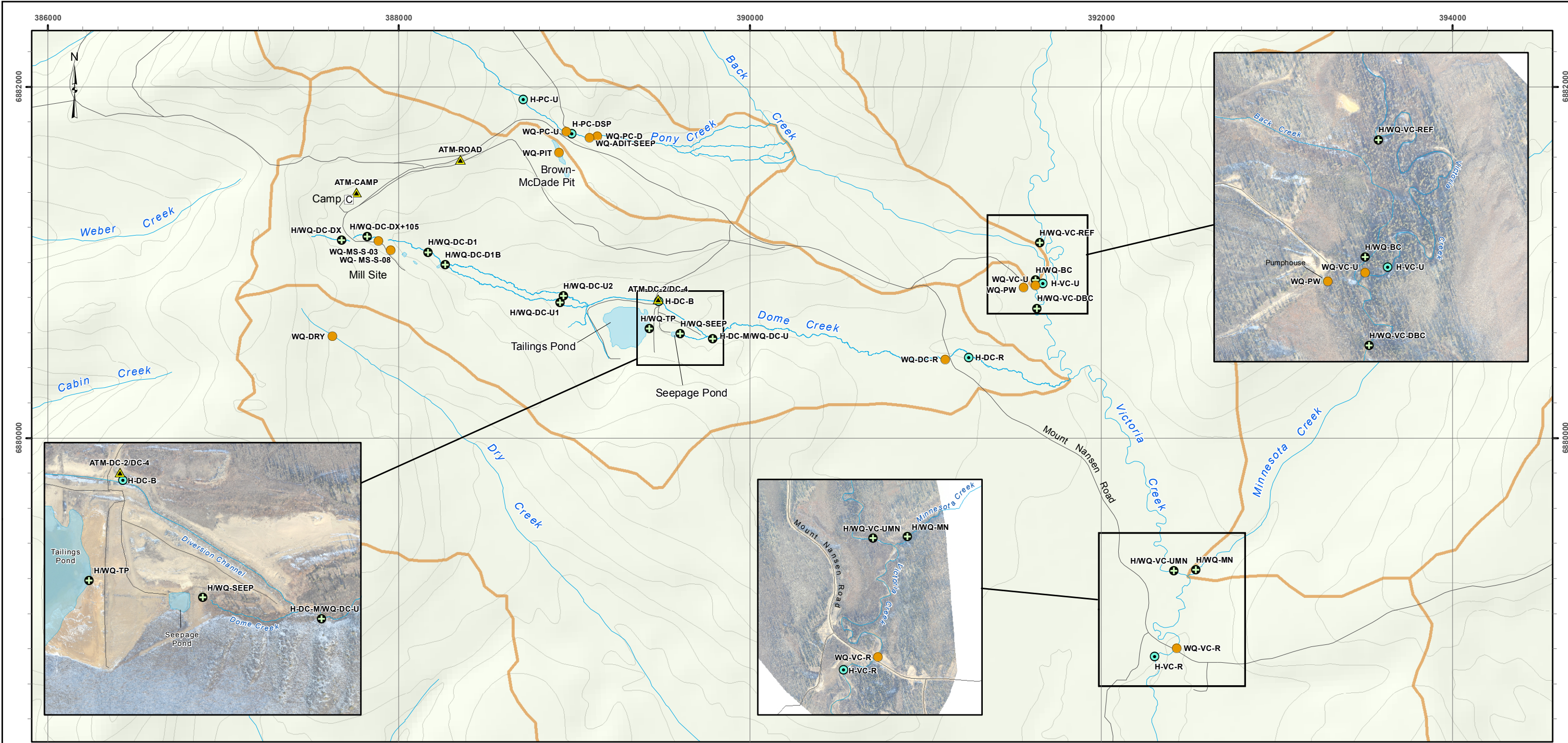
Distribution: White - Chain of Custody Yellow - Client Copy Pink - Lab Copy
Distribution: Blanc - Chaîne de possession Jaune - Client Rose - Laboratoire

YG(4649)NC3 Rev.11/2010

Sample Number : **55091**
Numéro de l'échantillon :



Appendix D:
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)

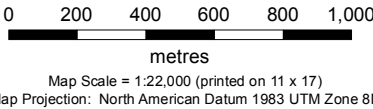
1:50,000 and 1:250,000 Topographic Spatial Data provided by Geomatics - Yukon Government via online source (Corporate Spatial Warehouse) www.geomatics.yukon.ca.

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



Drawn: LG	Checked: MM	FIGURE 1	Date: 28/10/2013
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