

June 25, 2015

EDI Project No: 15Y0146

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: Erik Pit, Type II Project Manager

**RE: Mount Nansen Water Resources Investigations – Monthly Report: April 2015
(Revised)**

Trip dates:	April 20-21, 2015
EDI field staff:	Joel MacFabe, Brett Pagacz and Danny Skookum
Weather during trip:	Weather conditions were mostly cloudy, with light winds and temperatures above zero (up to 4°C).

The following monthly report includes a summary of site conditions and data collected during EDI's April 2015 trip to Mount Nansen as part of the 2015/16 Water Resources Investigations. See Table 1 for a summary of data included in this report.

Table 1. Summary of information provided in this monthly report.

Report Section	Description
Site Conditions	<ul style="list-style-type: none"> • Summary of weather and general site conditions
Meteorology	<ul style="list-style-type: none"> • Statement on station status and identification of any data gaps or QA/QC issues
Hydrology	<ul style="list-style-type: none"> • Discussion of noteworthy hydrology observations • Statement of QA/QC for the data collected this month
Water Quality	<ul style="list-style-type: none"> • Summary of noteworthy water quality observations • Statement on QA/QC sample results
Program Recommendations	<ul style="list-style-type: none"> • Program recommendations for meteorological, hydrology and water quality programs
Additional Trip Information	<ul style="list-style-type: none"> • Project Safety Concerns • Wildlife sightings • Budget and schedule considerations
List of Attachments	<ul style="list-style-type: none"> • Site and station photos • Data Tables – hydrology and water quality • Lab Result Reports



SITE CONDITIONS

The April 2015 trip represents late-winter conditions transitioning to spring, however; many stations and sites are still frozen to substrate. Ice on upper Victoria Creek has melted and water levels are higher than the previous March 2015 trip. Snow around the Mount Nansen Site has also melted significantly from the previous trip. The Diversion Channel was flowing, while other sites on Dome Creek remain frozen to substrate and not suitable for sampling. The H/WQ-BC area is still covered in thick ice; however, some melt water from Back Creek upstream of the site/station is entering Victoria Creek, upstream of the regular confluence (upstream and downstream of the WQ-VC-U site). Water is flowing across the Mount Nansen Road crossing of Victoria Creek and through the secondary culvert, with water collecting in the parking area and entering the creek at the H-VC-R station.

METEOROLOGY

Meteorological data was collected at the ATM-ROAD station throughout the month of April. Northern Avcom informed AAM that the modem was deactivated on April 21, 2015 and that a new telemetry system will be installed likely mid-June. In the meantime, AAM is downloading the data manually when on site. No data gaps were identified. Meteorological data will be summarized and analyzed following the completion of the open-water season, in the October 2015 Monthly Report. This will include data from April 1, 2015 to October 15, 2015 with plots and tables.

HYDROLOGY

Discharge measurements were collected at all stations with suitable conditions. Continuous logger data is available for four stations: H-DC-M WP, H-VC-DBC, H-VC-UMN and H-VC-R. See attached data tables for a summary of conditions and hydrometric monitoring tasks completed at each station and for a summary of discharge measurement results for the April 20-21, 2015 period. Quality control and quality assurance for the hydrometric data was conducted on the instantaneous and continuous data. Noteworthy observations are included below.

Noteworthy Observations:

- Discharge measurements were collected with an ADV at H-VC-U, H-VC-DBC and H-VC-R – with discharge values ranging from 0.130 – 0.192 m³/s, much higher than the previous discharge results for March 2015, ranging from 0.002 to 0.010 m³/s.
- A discharge measurement was collected with an ADV at H-VC-UMN, but the data was discarded due to backwater conditions associated with ice accumulation downstream at the Mount Nansen Road.
- A portion of Victoria Creek is flowing across the Mount Nansen Road and through the secondary culvert, with water collecting in the parking area near the H-VC-R station and entering the creek at the stations' stilling well.



- A salt tracer test was conducted at H-DC-B which was flowing for the first time since October 2014 (after which the channel froze to substrate).
- H-DC-DX+105 station remains frozen to substrate (since March 2015 trip).

WATER QUALITY

Water quality samples were collected at nine sites during the April 2015 trip, as many sites remain frozen to substrate from the winter period. See attached data tables for a summary of conditions at each site and a record of where samples were collected during the trip. In situ and laboratory results summary tables are also attached. Parameters that exceeded CCME-AL guidelines and/or the Mount Nansen EQS criteria are highlighted. The lab certificates of analysis are also attached. Many results are similar to previous results for the program - noteworthy observations and comments on sample QA/QC are included in the subsections below.

Noteworthy Observations:

- The tailings pond was not sampled this trip due to safety concerns relayed to crew by AAM and DES, as the ice surface had collapsed.
- Concentrations of total aluminum has increased at most sites across the study area and are likely related to spring melt and surface runoff; including all sites on Victoria Creek. The highest aluminum concentrations on Victoria Creek were at the WQ-VC-U and WQ-VC-DBC sites (which may be related to Back Creek).
- Iron was above CCME-AL and EQS at WQ-VC-U and WQ-VC-DBC (likely also related to spring runoff from Back Creek).
- Total zinc at WQ-SEEP continues to exceed the CCME-AL guideline, with a value of 0.0627 mg/L, which is slightly higher than during the March 2015 trip. Of note the dissolved zinc concentration has decreased from the previous trip (0.05 mg/L to 0.02 mg/L).
- WQ-MS-S-03 continues to have high metals concentrations that exceed guidelines and/or standards for many parameters (fluoride, aluminum, arsenic, cadmium, copper, iron, lead, manganese, silver and zinc). The sample did have high TSS that exceeded the Mount Nansen EQS, which could also contribute high metal concentrations.
- The WQ-SEEP 96-hour LC50 rainbow trout acute toxicity test result was greater than 100% (undiluted sample), with 100% survival. The LT50 result for comparison was >96 hours (test passed). These results indicate that conditions may have improved compared to results from January and March 2015, when the LT50 tests passed, but there were trout mortalities (only 70 and 60% survival).
- Field measured pH for two sites was outside of range and was flagged as erroneous data, therefore there is no pH field data reported for WQ-VC-UMN and WQ-VC-R+150.



QA/QC Samples

Travel Blank Sample – all parameters were below detection limits – no contamination suspected from travel or storage

Field Blank Sample – all parameters were below detection limits – no contamination suspected from sample handling or processing.

Replicate Sample(s) – the average relative percent difference (RPD) between the replicate sample (WQ-VC-UMN-r) and the regular set (WQ-VC-UMN) was 5%, which is considered ‘adequately precise’. The average RPD for total metals was 8%, while the average RPD for dissolved metals was 3%. Two individual parameters were flagged for having RPD>20% (dissolved zinc) and RPD>50% (total chromium). RPD values greater than 20% indicate that there is some level of imprecision in the data reported or that there is intrinsically high variability within the sample. RPD values greater than 50% may indicate an error or problem with the results; however total chromium values are within the range of samples collected at sites up and downstream of WQ-VC-UMN, so it is likely still related to highly variable conditions at the site.

PROGRAM RECOMMENDATIONS

- Re-install continuous monitoring stations at H-VC-U, H-DC-R, H-DC-B, H-PC-DSP, and H-BC as conditions allow over the May 2015 freshet trips (2 scheduled). These continuous stations had been deactivated through the winter months.
- The ATM-VC5 barometric logger should be re-installed within a white PVC pipe for more accurate temperature readings.
- Prepare for freshet sampling in May 2015 (two trips) – many sites will be flowing and sampling will include opportunistic seep sampling around the waste rock and mill areas.
- For water quality at the Victoria Creek at Road area, sampling should shift from the WQ-VC-R+150 (winter location) to the WQ-VC-R open-water location once conditions are suitable.
- Continue to monitor the WQ-SEEP (regular standard sampling package and LC50). Conditions may be improving.

ADDITIONAL TRIP INFORMATION

Any changes to project scope (i.e. additional sites sampled):	All sampling and monitoring was conducted within scope.
Any alterations to sample scheduling:	None.
Any events resulting in changes to budget:	None



Additional Comments:	Conditions were transitioning from winter to spring. Ice on upper Victoria Creek had melted and water levels were higher than the previous March 2015 trip. Snow around the Mount Nansen Site had also melted significantly from the previous trip. The Diversion Channel was flowing, while other sites on Dome Creek remained frozen to substrate and were not suitable for sampling. Water is flowing across the Mount Nansen Road crossing of Victoria Creek and through the second culvert, with water collecting in the parking area near the H-VC-R station. The Back Creek area was still covered in over 1 m of ice. Some of the ice was still extending towards Victoria Creek at the WQ-VC-U site.
Wildlife Sightings:	None
Site concerns (safety):	None

LIST OF ATTACHMENTS

The following information is attached to this monthly report:

- Site and Station Photos from the trip
- Data Tables
 - Hydrology – Site Conditions, Tasks Completed, Discharge Measurement Summaries
 - Water Quality – Site Conditions and Samples Collected
 - Water Quality – Summary Table of In Situ Parameters and Lab Results
- Water Quality – Copies of Lab Certificate of Analysis (COA)
- Water Quality – Copy of Yukon Environmental Health Services Bacteriological Results



Dome Creek Sites/Stations



**Photo 1. WQ-DC-DX+105, looking upstream
(April 21, 2015).**



**Photo 2. WQ-DC-R, looking upstream
(April 20, 2015).**



**Photo 3. H-DC-R, looking upstream
(April 20, 2015).**

No Photo Taken

Photo 4. WQ-MS-S-03 – photo missing.



Photo 5. H-DC-B station location, looking downstream (April 21, 2015).



Photo 6. WQ-DC-B, looking upstream (April 21, 2015).



Photo 7. H-DC-M WP, looking upstream (April 20, 2015).



Photo 8. WQ-DC-U, looking upstream – thick overflow ice conditions (April 20, 2015).



Victoria Creek Sites/Stations



**Photo 9. H-VC-U, looking upstream
(April 20, 2015).**



**Photo 10. WQ-VC-U, looking downstream
towards Back Creek confluence
(April 20, 2015).**



**Photo 11. H-VC-DBC, looking upstream
(April 20, 2015).**



**Photo 12. WQ-VC-DBC, looking upstream
(April 20, 2015).**



**Photo 13. H-VC-UMN, looking downstream
(April 20, 2015).**



**Photo 14. WQ-VC-UMN, looking upstream
(April 20, 2015).**



Photo 15. H-VC-R from road. Water flowing out of second culvert, ponding in parking area.



Photo 16: H-VC-R stilling well, with water from parking lot flowing into creek at location.



Photo 17. H-VC-R, winter ADV location (April 20, 2015).

Photo 18. WQ-VC-R+150, looking downstream (April 20, 2015).



Photo 19. Overview of Vicotira Creek at Road (WQ-VC-R in background) showing overflow ice conditions, and secondary culvert in foreground.



Back Creek Sites/Stations



Photo 20. H/WQ-BC, looking upstream, showing overflow conditions (April 20, 2015).

Pit Lake/Tailings Pond/Seepage Pond Discharge



Photo 21. H/WQ-SEEP (April 20, 2015).



Photo 22. H/WQ-TP (April 20, 2015).



**Photo 23. WQ-PIT sampling location
(April 21, 2015)**



**Photo 24. WQ-PIT sampling location, showing
collapsed overflow ice
(April 21, 2015).**

Pump House Well



**Photo 25. WQ-PW
(April 21, 2015).**

Measurement ID	Hydrometric Identifier (HID)	Measurement Date	Measurement Time	Discharge Measurement Method	Discharge (m ³ /s)	Discharge Data Flag	Surveyed Water Elevation (m)	Survey Data Flag	Comments
253	ATM-VC5	17/04/2015	13:59	N	-	-	-	N	Installed new Edge logger to replace Solinst Gold Unit (ATMDC4) that was located at a higher elevation.
258	ATM-VC5	20/04/2015	17:15	N	-	-	-	N	Data logger requires white pipe for more accurate temperature logging. Barometric units changed from mbar to Kpa.
263	H-BC	20/04/2015	17:51	N	-	X	-	N	Channel frozen to bed and overflow ice is exceeding bankfull elevation. The top of the stilling well is under ice.
278	H-DC-B	21/04/2015	9:45	SS	0.009	-	-	N	Salt tracer was performed downstream of bridge just after right bend in channel.
259	H-DC-B	21/04/2015	9:45	SS	-	B	-	N	Salt tracer was conducted downstream of bridge and around the meander bend. Mixing length was relatively short. Second trial was stopped after CF.T test completed, time-series may need to be shortened.
260	H-DC-M WP	20/04/2015	18:20	N	-	X	-	N	Unsuitable site for discharge measurement; no measurement obtained. Overflow ice is melting and the tops of vertical iron anchors from weir and stilling well are now visible.
266	H-PW	20/04/2015	17:50	V	0.003		-	N	Volumetric measurement at outlet pipe.
267	H-SEEP	20/04/2015	18:57	V	0.004		-	N	Site maintenance (DES) noted that the seepage pump rate fluctuated to accommodate seasonal flows. Flow rate measured at the pumphouse = 250.616 L/min
262	H-VC-DBC	20/04/2015	16:23	ADV-MID	0.192	B	-	N	Ice present in channel.
265	H-VC-R	20/04/2015	13:03	ADV-MID	0.145	B	-	N	Winter ice conditions associated with extensive icing at the road/culverts required discharge measurement to be obtained 150 m downstream of typical measurement location.
261	H-VC-U	20/04/2015	17:25	ADV-MID	0.130	B	-	N	Water temperature = -0.1 C (from ADV). No stilling well installed presently. Re-installation will occur in May 2015.
264	H-VC-UMN	20/04/2015	14:43	N	-	X,B	-	N	Anchor ice present on right bank and backwater effects are present. Staff gauge and data logger readings do not reflect open water conditions. Backwater effects may be a result of extensive ice still present downstream at H-VC-R. Discharge measurement was collected using ADV-MID , but data was discarded due to backwater conditions.

Discharge Measurement Method Legend

Measurement Method ID	Measurement Method	Measurement Description
ADV-MID	Mid Section Method - Acoustic Doppler Velocimeter	Cross-sectional velocity using an ADV, mid-section method.
SS	Brine Salt Slug Tracer	Salt dilution gauging using a brine salt slug.
V	Volumetric	Volumetric measurement obtained by filling a graduated contained at a culvert, pipe outlet or weir.
W	Weir	Measurement obtained by a rated structure (v-notch weir).
N	None	No measurement could be obtained.
SD	Dry Salt Slug Tracer	Salt dilution gauging using a dry salt slug.
HWM	High Water Mark - Indirect Method	Indirect method using high water mark in the slope-area calculation for estimating high discharges.
ADCP	Acoustic Doppler Current Profiler	Cross-sectional velocity using an ADCP, mid-section method.
SC	Constant Rate Salt Tracer	Salt dilution gauging using the constant rate method.
CM-MID	Mid Section Method - Current Meter	Cross-sectional velocity using a velocimeter (Swoffer or Pygmy AA)

Hydrometric Stations

Hydrometric ID	Hydrometric Stations
ATM-VC5	Atmospheric Barologger (5) at Victoria Creek
H-BC	Back Creek
H-DC-B	Diversion Channel at Bridge
H-DC-D1B	Dome Creek at D1b
H-DC-DX	Dome Creek at DX
H-DC-DX+105	Dome Creek at DX+105
H-DC-M-WP	Middle Dome Creek at Weir Pond
H-DC-R	Dome Creek at Road
H-PC-DSP	Pony Creek Downstream of Pit
H-SEEP	Seepage Pond Outflow
H-TP	Tailings Pond
H-VC-DBC	Victoria Creek Downstream of Back Creek
H-VC-R	Victoria Creek at Road
H-VC-U	Upper Victoria Creek
H-VC-UMN	Victoria Creek Upstream of Minnesota Creek

Discharge Data Flag Legend

Discharge Data Flag	Discharge Data Flag Description
E	Estimated value
B	Backwater effects (ice related)
F	Instrument malfunction
M	Manual measurement
A	Automated measurement (logged)
ML	Missing length data
MD	Missing depth data
MW	Missing width data
O	Outside of measurement reporting range
S	Suspect data
X	Poor channel conditions for discharge measurement
MI	Missing Data
SH-L	Data logger Shift
SH-SG	Staff Gauge Shift
UR	Under review

Survey Data Flag Legend

Survey Flag	Survey Flag Description
S	Suspect data
MI	Missing data
UR	Under review
F	Instrument Malfunction
O	Outside measurement Accuracy (+/-0.003 m)
N	No survey conducted

Water Quality Site	Sample Collected? (Y/N)	Measurement Date	Comments
WQ-PIT-1	Y	2015.04.21	Total depth at sampling location 4.3 m, ice 1.11 m thick. Took top sample from below bottom of ice surface using Kemmerer sampler (0.30 m).
WQ-PIT-2	Y	2015.04.21	Took middle sample from 2.0 m below bottom of ice surface using Kemmerer sampler.
WQ-PIT-3	Y	2015.04.21	Took bottom sample from 4.0 m below bottom of ice surface using Kemmerer sampler.
WQ-SEEP	Y	2015.04.20	Conditions normal, water free flowing from pipe outlet. Water also collected for LC50 and LT50 tests.
WQ-TP	N	-	The pond is covered in ice with some melt water on the surface. AAM requested that EDI remain off the pond due to safety concerns.
WQ-DC-DX	N	-	Frozen to substrate (typical of the winter season).
WQ-DC-DX+105	N	-	Creek frozen to substrate.
WQ-MS-S-03	Y	2015.04.21	Open water at site. Ice 2-10 cm thick. Some turbidity.
WQ-DC-D1b	N	-	Frozen to substrate with overflow ice (typical of the winter season).
WQ-DC-B	Y	2015.04.21	A stream channel was flowing on top of ice surface. Conditions were suitable for sample collection.
WQ-DC-U	N	-	The water sampling site is completely under ice (old stilling well just barely showing). There is some water from the diversion channel and seepage discharge is flowing on top of ice, but in multiple braided channels and through various ice layers. Not suitable for measurement.
WQ-DC-R	N	-	Frozen to substrate (typical of the winter season).
WQ-BC	N	-	Significant overflow still covering the entire channel (stilling well completely under ice, actual stream channel undefined) and extending laterally into the surrounding forest towards both parking area and Victoria Creek. No flow heard or observed – no sampling.
WQ-VC-U	Y	2015.04.20	Sample collected from regular location. Flow levels have increased from the previous trip. Ice on banks is approximately 5 cm. Water light grey in colour.
WQ-VC-DBC	Y	2015.04.20	Sample collected from regular location. More open water and higher water levels than March 2015 trip. Water light grey in colour.
WQ-VC-UMN	Y	2015.04.20	Sample collected from regular location. Water flowing over top of ice. Water more clear than upstream sites.
WQ-VC-R	N	-	Winter samples are collected from the WQ-VC-R+150 site due to thick overflow ice at the WQ-VC-R site during the winter.
WQ-VC-R+150	Y	2015.04.20	Samples were collected from the regular winter sampling location - WQ-VC-R+150 (downstream of road crossing ~150 m). Flow levels had increased from the previous trip. Ice was 3-5 cm thick at sampling location. Water clear.
WQ-PW	Y	2015.04.21	Drinking water samples and bacteriological samples collected.
WQ-PC-U	N	-	Frozen to substrate (typical of the winter season).

Water Quality Site	Sample Collected? (Y/N)	Measurement Date	Comments
WQ-PC-D	N	-	Frozen to substrate (typical of the winter season).
Field Replicate 1	Y	2015.04.20	Sample collected from WQ-VC-UMN (called WQ-VC-UMN-r)
Field Blank	Y	2015.04.21	Sample bottles filled with deionized water supplied by ALS. Filtered and preserved as instructed.
Travel Blank	Y	-	Samples provided by lab and were transported to and from site.

Summary of Water Quality Results for the April 20-21, 2015 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0146-150420-002 WQ-VC-U 20-Apr-15	0146-150420-001 WQ-VC-DBC 20-Apr-15	0146-150420-011 WQ-VC-UMN ** 20-Apr-15	0146-150420-010 WQ-VC-UMN-r 20-Apr-15	QA/QC WQ-VC-UMN Replicate Analysis RPD	0146-150420-009 WQ-VC-R-150 ** 20-Apr-15	0146-150421-005 WQ-MS-S-03 21-Apr-15	0146-150421-008 WQ-DC-B 21-Apr-15	0146-150420-003 WQ-SEEP 20-Apr-15
Temperature (in-situ)	°C	-	-	-	-0.2	-0.2	-0.2	-	-	0.1	0.4	-0.3	1.7
Specific Conductivity (in-situ)	µS/cm	-	-	-	219.1	220.9	461.6	-	-	467	1164	1608	1330
pH (in-situ)	pH	6.5 - 9.0	6.0 - 8.5	-	7.68	7.45	n/a	-	-	n/a	7.20	7.87	7.41
Turbidity (In-situ)	NTU	-	-	-	24.70	24.60	4.64	-	-	4.13	37.40	19.03	124.00
Dissolved Oxygen (in-situ - Pit only)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Colour, True	CU	15	-	5	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	2	219	201	454	444	2%	461	995	1410	1200
Hardness (as CaCO3)	mg/L	-	-	0.5	115	117	242	242	0%	251	708	1030	726
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	8.07	8.12	8.17	8.17	0%	8.15	8.06	8.18	7.89
Total Suspended Solids	mg/L	-	50	3	4	<3.0	<3.0	<3.0	<DL	6	78.7	21.3	96
Total Dissolved Solids	mg/L	-	-	1	120	125	284	284	0%	295	837	1270	998
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	84	92.1	103	108	5%	118	265	234	155
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<DL	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<DL	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	84	92.1	103	108	5%	118	265	234	155
Ammonia, Total (as N)	mg/L	0.75	-	0.005	<0.0050	<0.0050	0.033	0.0365	10%	0.0148	0.0303	0.0667	3.2
Chloride (Cl)	mg/L	120	-	0.5	<0.50	<0.50	<0.50	<0.50	<DL	<0.50	<1.0	<2.5	1.6
Fluoride (F)	mg/L	0.12	-	0.02	0.055	0.056	0.064	0.054	<2xDL	0.063	0.152	0.1	0.058
Nitrate (as N)	mg/L	13	-	0.005	0.0315	0.034	0.0327	0.0314	4%	0.0336	0.013	<0.025	0.414
Nitrite (as N)	mg/L	0.06	-	0.001	<0.0010	<0.0010	0.0014	0.0015	<2xDL	0.0014	<0.0020	<0.0050	0.0154
Sulfate (SO4)	mg/L	-	-	0.5	25.4	25.3	132	128	3%	421	130	769	588
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<DL	<0.0050	<0.0050	<0.0050	0.0107
Cyanide, Total	mg/L	-	0.3	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<DL	<0.0050	<0.0050	<0.0050	0.0696
Cyanate	mg/L	-	-	0.2	<0.20	<0.20	<0.20	<0.20	<DL	<0.20	<0.20	<0.20	<0.20
Thiocyanate (SCN)	mg/L	-	-	0.5	<0.50	<0.50	<0.50	<0.50	<DL	<0.50	<0.50	<0.50	2.72
Aluminum (Al)-Total	mg/L	0.1	-	0.003	0.876	0.802	0.182	0.172	6%	0.134	0.393	0.293	1.85
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	0.0003	0.00029	0.00037	0.00035	<2xDL	0.00038	0.0231	0.00344	0.00764
Arsenic (As)-Total	mg/L	0.005	-	0.0001	0.0045	0.00419	0.00419	0.00421	0%	0.00357	0.137	0.0169	0.0948
Barium (Ba)-Total	mg/L	-	1.0	0.0005	0.0804	0.0802	0.0798	0.0782	2%	0.0918	0.0236	0.0518	0.0935
Beryllium (Be)-Total	mg/L	-	-	0.0001	0.000027	0.000027	<0.000020	<0.000020	<DL	<0.000020	0.000022	<0.000020	0.000089
Bismuth (Bi)-Total	mg/L	-	-	0.0005	<0.000050	<0.000050	<0.000050	<0.000050	<DL	<0.000050	0.000129	<0.000050	0.000559
Boron (B)-Total	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.010	<DL	<0.010	<0.010	0.014	0.052
Cadmium (Cd)-Total (Lab Result)	mg/L	0.00009	0.02	0.00001	0.000112	0.000104	0.000117	0.000108	8%	0.000111	0.00466	0.000164	0.00116
Cadmium (Cd)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.00001	0.000178	0.000181	0.00033	0.00033	-	0.00034	0.00037	0.00037	0.00037
Calcium (Ca)-Total	mg/L	-	-	0.05	28.5	28.6	59.3	59.2	0%	57.6	176	227	203
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	0.0011	0.001	0.00088	0.00037	82%	0.00037	0.00063	0.00071	0.00455
Cobalt (Co)-Total	mg/L	-	-	0.0001	0.00036	0.00033	0.00039	0.00039	<2xDL	0.00047	0.00134	0.00062	0.00785
Copper (Cu)-Total (Lab Result)	mg/L	0.002	0.2	0.0005	0.00216	0.00226	0.0013	0.00109	<2xDL	0.00124	0.00571	0.00145	0.0186
Copper (Cu)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.00266	0.00270	0.00400	0.00400	-	0.00400	0.00400	0.00400	0.00400
Iron (Fe)-Total	mg/L	0.3	1.0	0.01	1.07	1.02	0.247	0.228	8%	0.267	2.74	4.07	16.2
Lead (Pb)-Total (Lab Result)	mg/L	0.001	0.1	0.00005	0.00303	0.00297	0.000604	0.000543	11%	0.000331	0.0436	0.000624	0.0339
Lead (Pb)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.00005	0.00380	0.00389	0.00700	0.00700	-	0.00700	0.00700	0.00700	0.00700
Lithium (Li)-Total	mg/L	-	-	0.0005	<0.0010	<0.0010	<0.0010	0.001	<DL	0.0011	0.00097	0.00064	0.0018
Magnesium (Mg)-Total	mg/L	-	-	0.1	9.25	9.23	21.2	21.1	0%	20.5	59.2	98.8	44.1
Manganese (Mn)-Total	mg/L	-	0.5	0.00005	0.172	0.162	0.26	0.26	0%	0.231	1.45	1.46	5.25
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.00001	0.00001	0.0000115	0.0000068	<0.0000050	<DL	<0.0000050	0.0000139	0.0000057	0.0000116
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	0.000504	0.000477	0.000412	0.000369	2%	0.000389	0.000288	0.000288	0.00117
Nickel (Ni)-Total (Lab Result)	mg/L	0.025	0.3	0.0005	0.00092	0.00092	0.00072	0.00061	<2xDL	0.00084	0.00258	0.00108	0.00618
Nickel (Ni)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.10629	0.10769	0.15000	0.15000	-	0.15000	0.15000	0.15000	0.15000
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	<DL	<0.050	<0.050	<0.050	0.096
Potassium (K)-Total	mg/L	-	-	0.1	1.22	1.23	1.99	2.04	2%	2.21	3.38	5.2	5.66
Selenium (Se)-Total	mg/L	0.001	-	0.0001	<0.000050	0.000053	<0.000050	<0.000050	<DL	0.000067	<0.000050	0.000075	0.000227
Silicon (Si)-Total	mg/L	-	-	0.05	6.9	6.95	6.57	6.59	0%	6.4	7.21	7.25	10.4
Silver (Ag)-Total	mg/L	0.0001	0.1	0.00001	0.000061	0.000054	0.000015	0.000013	<2xDL	<0.000010	0.000505	0.000016	0.00068
Sodium (Na)-Total	mg/L	-	-	0.05	2.67	2.53	5.66	5.45	4%	5.87	4.68	9.74	25.3
Strontium (Sr)-Total	mg/L	-	-	0.0002	0.27	0.269	0.373	0.368	1%	0.369	0.407	0.77	0.592
Sulfur (S)-Total	mg/L	-	-	0.5	8.78	8.6	46.5	45	3%	43.2	145	249	196
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	0.000015	0.000016	<0.000010	<0.000010	<DL	<0.000010	0.000127	0.000013	0.000059
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<DL	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.01	0.022	0.0209	0.00582	0.00491	<2xDL	0.00564	0.018	0.0154	0.0768
Uranium (U)-Total	mg/L	0.015	-	0.00001	0.000699	0.000716	0.00085	0.000807	5%	0.000794	0.00383	0.00321	0.00135
Vanadium (V)-Total	mg/L	-	-	0.001	0.00212	0.00198	0.00072	0.00064	<2xDL	0.00072	0.00216	0.00186	0.0089
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	0.0104	0.0099	0.0101	0.0096	<2xDL	0.0101	1.26	0.0229	0.0627
Dissolved Metals Filtration Location				n/a	FIELD	FIELD	FIELD	FIELD		FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved	mg/L	0.1	-	0.001	0.0066	0.007	0.0039	0.0038	<2xDL	0.0045	0.0027	0.0048	0.0135
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	0.0003	0.00031	<2xDL	0.00032	0.0174	0.00342	0.00127
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	0.00059	0.00058	0.00331	0.00336	1%	0.00282	0.0695	0.0119	0.0285
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.0709	0.0726	0.0772	0.0766	1%	0.0926	0.016	0.0467	0.0632
Beryllium (Be)-Dissolved	mg/L	-	-	0.0001	<0.000020	<0.000020	<0.000020	<0.000020	<DL	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Dissolved	mg/L	-	-	0.0005	<0.000050	<0.000050	<0.000050	<0.000050	<DL	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.010	<DL	<0.010	<0.010	0.014	0.052
Cadmium (Cd)-Dissolved (Lab Result)	mg/L	0.00009	-	0.00001	0.0000468	0.0000606	0.000103	0.000105	2%	0.000098	0.00125	0.0000712	0.000543
Cadmium (Cd)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.00001	0.000178	0.000181	0.00033	0.00033	-	0.00034	0.00037	0.00037	0.00037
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	30.2	30.7	61.1	61.3	0%	63.5	185	241	215
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<DL	0.0001	<0.00010	<0.00010	0.00031
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	0.00032	0.00033	<2xDL	0.0004	0.00104	0.00049	0.00664
Copper (Cu)-Dissolved (Lab Result)	mg/L	0.002	-	0.0002	0.00083	0.00092	0.00083	0.0008	<2xDL	0.00099	0.0003	0.00041	0.0015

Summary of Water Quality Results for the April 20-21, 2015 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0146-150420-002 WQ-VC-U 20-Apr-15	0146-150420-001 WQ-VC-DBC 20-Apr-15	0146-150420-011 WQ-VC-UMN ** 20-Apr-15	0146-150420-010 WQ-VC-UMN-r 20-Apr-15	QA/QC WQ-VC-UMN Replicate Analysis RPD	0146-150420-009 WQ-VC-R+150 ** 20-Apr-15	0146-150421-005 WQ-MS-S-03 21-Apr-15	0146-150421-008 WQ-DC-B 21-Apr-15	0146-150420-003 WQ-SEEP 20-Apr-15
Copper (Cu)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.00200	0.00266	0.00270	0.00400	0.00400	-	0.00400	0.00400	0.00400	0.00400
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	0.018	0.019	0.021	0.022	<2xDL	0.043	1.39	2.45	11.1
Lead (Pb)-Dissolved (Lab Result)	mg/L	0.001	-	0.00005	<0.000050	0.000056	<0.000050	<0.000050	<DL	<0.000050	0.000639	<0.000050	0.00011
Lead (Pb)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.00005	0.00380	0.00389	0.00700	0.00700	-	0.00700	0.00700	0.00700	0.00700
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<DL	0.0011	0.0092	0.0064	<0.0010
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	9.69	9.68	21.7	21.6	0%	22.5	59.8	105	45.8
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	0.148	0.147	0.249	0.255	2%	0.232	1.41	1.48	5.29
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.00001	0.0000059	<0.0000050	0.0000062	<0.0000050	<DL	<0.0000050	<0.0000050	<0.0000050	0.0000068
Molybdenum (Mo)-Dissolved	mg/L	0.0073	-	0.00005	0.000441	0.000448	0.000377	0.000372	1%	0.000359	0.000366	0.000278	0.000926
Nickel (Ni)-Dissolved (Lab Result)	mg/L	0.025	-	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<DL	0.00075	0.00214	0.00069	0.00254
Nickel (Ni)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.10629	0.10769	0.15000	0.15000	-	0.15000	0.15000	0.15000	0.15000
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	<DL	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	-	-	0.1	1.08	1.08	2.01	2.03	1%	2.39	3.48	5.52	5.44
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	<0.000050	<0.000050	<0.000050	<0.000050	<DL	0.000069	<0.000050	<0.000050	0.000195
Silicon (Si)-Dissolved	mg/L	-	-	0.05	5.28	5.41	6.11	6.12	0%	6.53	6.49	6.91	6.02
Silver (Ag)-Dissolved	mg/L	0.0001	-	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<DL	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved	mg/L	-	-	0.05	2.65	2.59	5.43	5.41	0%	6.03	4.57	10	25.8
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	0.271	0.272	0.366	0.361	1%	0.379	0.414	0.785	0.593
Sulfur (S)-Dissolved	mg/L	-	-	0.5	8.84	8.89	45.6	44.1	3%	45.2	143	255	196
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<DL	<0.000010	0.000088	<0.000010	<0.000010
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<DL	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	mg/L	-	-	0.01	<0.00030	<0.00030	<0.00030	<0.00030	<DL	<0.00030	<0.00030	<0.00030	0.00053
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.000671	0.000685	0.000816	0.000798	2%	0.000789	0.00379	0.00328	0.00126
Vanadium (V)-Dissolved	mg/L	-	-	0.001	<0.00050	<0.00050	<0.00050	<0.00050	<DL	<0.00050	<0.00050	<0.00050	0.00101
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	0.0026	0.0023	0.0084	0.0109	26%	0.0089	1.15	0.0176	0.02

Applied Guidelines: *Federal CCME Canadian Environmental Quality Guidelines (January 2015), CCME: Freshwater Aquatic Life 'Mount Nansen Effluent Discharge Standards

COLOUR KEY:
Exceeds CCME Guideline
Exceeds MN Effluent Discharge Standards
Exceeds both CCME and MN Standards
Exceeds Hardness Dependent Calculated Guideline (CCME)
Data flag for Detection Limit Adjustment --> Please refer to the lab COA report and lab excel report for more info
QA/QC Codes: RPD - Relative Percent Difference, <DL - below detection limit, and <2XDL - less than two times the detection limit.

Notes:

* WQ-PW is a drinking water sample and the analysis package has different detection limits than all other samples. The results are also compared to the Guidelines for Canadian Drinking Water Quality (Health Canada, October 2014) versus the CCME or MN Effluent Quality Standards.

** Field measured pH for WQ-VC-UMN and WQ-VC-R+150 was outside of QA/QC bounds and flagged as erroneous.

QA/QC - the average RPD of the replicate sample (WQ-VC-UMN-r) was 5% with a difference 3% difference for dissolved and a 8% difference for total metals. Total chromium and dissolved zinc had RPD greater than >50 % and >20%, respectively, indicating error or problems and imprecise/intrinsically high variability). See methodology document for details on QA/QC methods.

Summary of Water Quality Results for the April 20-21, 2015 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0146-150421-016 WQ-PIT-1 (Top) 21-Apr-15 Depth: 0.3 m	0146-150421-018 WQ-PIT-2 (Middle) 21-Apr-15 Depth: 2.0 m	0146-150421-017 WQ-PIT-3 (Bottom) 21-Apr-15 Depth: 4.0 m	0146-150421-019 WQ-PW * 20-Apr-15	0146-150420-007 FIELD BLANK 20-Apr-15	0146-150420-TRAVEL BLANK TRAVEL BLANK n/a
Temperature (in-situ)	°C	-	-	-	-0.3	-0.4	2.4	0.8	-	-
Specific Conductivity (in-situ)	µS/cm	-	-	-	2022	1997	2053	405.2	-	-
pH (in-situ)	pH	6.5 - 9.0	6.0 - 8.5	-	7.41	7.35	6.75	8.02	-	-
Turbidity (In-situ)	NTU	-	-	-	0.86	0.75	2.44	109.00	-	-
Dissolved Oxygen (in-situ - Pit only)	mg/L	-	-	-	6.02	4.91	1.77	-	-	-
Colour, True	CU	15	-	5	-	-	-	<5.0	-	-
Conductivity	µS/cm	-	-	2	2000	1770	1910	372	<2.0	<2.0
Hardness (as CaCO3)	mg/L	-	-	0.5	1350	1310	1300	198	<0.50	-
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	8.12	8.13	8.09	7.66	5.78	5.37
Total Suspended Solids	mg/L	-	50	3	<3.0	<3.0	3.3	-	<3.0	<3.0
Total Dissolved Solids	mg/L	-	-	1	1720	1680	1700	218	<1.0	<1.0
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	218	237	235	-	<1.0	<1.0
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<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
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	218	237	235	181	<1.0	<1.0
Ammonia, Total (as N)	mg/L	0.75	-	0.005	<0.0050	<0.0050	<0.0050	-	<0.0050	<0.0050
Chloride (Cl)	mg/L	120	-	0.5	<2.5	<2.5	<2.5	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.12	-	0.02	0.3	0.26	0.24	0.092	<0.020	<0.020
Nitrate (as N)	mg/L	13	-	0.005	0.106	0.096	0.079	0.135	<0.0050	<0.0050
Nitrite (as N)	mg/L	0.06	-	0.001	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010	<0.0010
Sulfate (SO4)	mg/L	-	-	0.5	1090	1060	1080	37	<0.30	<0.30
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	-	-	-	-	<0.0050	<0.0050
Cyanide, Total	mg/L	-	0.3	0.005	-	-	-	-	<0.0050	<0.0050
Cyanate	mg/L	-	-	0.2	-	-	-	-	<0.20	<0.20
Thiocyanate (SCN)	mg/L	-	-	0.5	-	-	-	-	<0.50	<0.50
Aluminum (Al)-Total	mg/L	0.1	-	0.003	0.0109	<0.0060	0.0112	<0.010	<0.0030	<0.0030
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	0.00338	0.00319	0.00297	<0.00050	<0.00010	<0.00010
Arsenic (As)-Total	mg/L	0.005	-	0.0001	0.0101	0.00768	0.0117	0.00043	<0.00010	<0.00010
Barium (Ba)-Total	mg/L	-	1.0	0.0005	0.0154	0.0153	0.014	0.089	<0.000050	<0.000050
Beryllium (Be)-Total	mg/L	-	-	0.0001	<0.000040	<0.000040	<0.000040	-	<0.000020	<0.000020
Bismuth (Bi)-Total	mg/L	-	-	0.0005	<0.00010	<0.00010	<0.00010	-	<0.000050	<0.000050
Boron (B)-Total	mg/L	-	-	0.01	<0.020	<0.020	<0.020	<0.10	<0.010	<0.010
Cadmium (Cd)-Total (Lab Result)	mg/L	0.00009	0.02	0.00001	0.00402	0.00362	0.00424	<0.00020	<0.000050	<0.000050
Cadmium (Cd)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.00001	0.00037	0.00037	0.00037	0.00028	0.00037	0.00037
Calcium (Ca)-Total	mg/L	-	-	0.05	373	347	352	46.3	<0.050	<0.050
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	<0.00020	<0.00020	<0.00020	<0.0020	<0.00010	<0.00010
Cobalt (Co)-Total	mg/L	-	-	0.0001	<0.00020	<0.00020	0.00029	-	<0.00010	<0.00010
Copper (Cu)-Total (Lab Result)	mg/L	0.002	0.2	0.0005	0.0036	0.0028	0.0033	<0.0010	<0.00050	<0.00050
Copper (Cu)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.00400	0.00400	0.00400	0.00400	0.00400	0.00400
Iron (Fe)-Total	mg/L	0.3	1.0	0.01	0.03	0.029	0.05	<0.030	<0.010	<0.010
Lead (Pb)-Total (Lab Result)	mg/L	0.001	0.1	0.00005	0.00025	<0.00010	0.00032	0.00061	<0.000050	<0.000050
Lead (Pb)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.00005	0.00700	0.00700	0.00700	0.00700	0.00700	0.00700
Lithium (Li)-Total	mg/L	-	-	0.0005	0.0112	0.0104	0.0105	-	<0.0010	<0.0010
Magnesium (Mg)-Total	mg/L	-	-	0.1	97.6	95.4	95.1	20	<0.10	<0.10
Manganese (Mn)-Total	mg/L	-	0.5	0.00005	0.133	0.107	0.328	<0.0020	<0.00010	<0.00010
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.00001	<0.0000050	<0.0000050	<0.0000050	<0.00020	<0.0000050	<0.0000050
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	0.00014	0.00013	0.00015	-	<0.000050	<0.000050
Nickel (Ni)-Total (Lab Result)	mg/L	0.025	0.3	0.0005	<0.0010	<0.0010	<0.0010	-	<0.00050	<0.00050
Nickel (Ni)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.15000	0.15000	0.15000	-	0.15000	0.15000
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050	<0.050	<0.050	-	<0.050	<0.050
Potassium (K)-Total	mg/L	-	-	0.1	4.35	4.12	3.96	0.92	<0.10	<0.10
Selenium (Se)-Total	mg/L	0.001	-	0.0001	<0.00010	<0.00010	<0.00010	<0.0010	<0.000050	<0.000050
Silicon (Si)-Total	mg/L	-	-	0.05	4.61	4.3	4.17	-	<0.050	<0.050
Silver (Ag)-Total	mg/L	0.0001	0.1	0.00001	<0.000020	<0.000020	<0.000020	-	<0.000010	<0.000010
Sodium (Na)-Total	mg/L	-	-	0.05	15.6	14.4	14.5	4.8	<0.050	<0.050
Strontium (Sr)-Total	mg/L	-	-	0.0002	1.32	1.28	1.3	-	<0.00020	<0.00020
Sulfur (S)-Total	mg/L	-	-	0.5	370	353	355	-	<0.50	<0.50
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	0.000073	0.000067	0.000069	-	<0.000010	<0.000010
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00020	<0.00020	<0.00020	-	<0.00010	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.01	<0.00060	<0.00060	<0.00060	-	<0.00030	<0.00030
Uranium (U)-Total	mg/L	0.015	-	0.00001	0.0051	0.00495	0.00488	0.00192	<0.000010	<0.000010
Vanadium (V)-Total	mg/L	-	-	0.001	<0.0010	<0.0010	<0.0010	-	<0.00050	<0.00050
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	0.646	0.595	0.608	<0.050	<0.0030	<0.0030
Dissolved Metals Filtration Location				n/a	FIELD	FIELD	FIELD		FIELD	
Aluminum (Al)-Dissolved	mg/L	0.1	-	0.001	<0.0020	0.0028	0.0027	-	<0.0010	-
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	0.00313	0.00321	0.00289	-	<0.00010	-
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	0.00771	0.00769	0.00833	-	<0.00010	-
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.0148	0.0149	0.0138	-	<0.000050	-
Beryllium (Be)-Dissolved	mg/L	-	-	0.0001	<0.000040	<0.000040	<0.000040	-	<0.000020	-
Bismuth (Bi)-Dissolved	mg/L	-	-	0.0005	<0.00010	<0.00010	<0.00010	-	<0.000050	-
Boron (B)-Dissolved	mg/L	-	-	0.01	<0.020	<0.020	<0.020	-	<0.010	-
Cadmium (Cd)-Dissolved (Lab Result)	mg/L	0.00009	-	0.00001	0.00357	0.00364	0.00416	-	<0.000050	-
Cadmium (Cd)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.00001	0.00037	0.00037	0.00037	-	0.00037	-
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	378	361	354	-	<0.050	-
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	<0.00020	<0.00020	<0.00020	-	<0.00010	-
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	<0.00020	<0.00020	0.00022	-	<0.00010	-
Copper (Cu)-Dissolved (Lab Result)	mg/L	0.002	-	0.0002	0.00296	0.00293	0.00276	-	<0.00020	-

Summary of Water Quality Results for the April 20-21, 2015 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	0146-150421-016 WQ-PIT-1 (Top) 21-Apr-15 Depth: 0.3 m	0146-150421-018 WQ-PIT-2 (Middle) 21-Apr-15 Depth: 2.0 m	0146-150421-017 WQ-PIT-3 (Bottom) 21-Apr-15 Depth: 4.0 m	0146-150421-019 WQ-PW * 20-Apr-15	0146-150420-007 FIELD BLANK 20-Apr-15	0146-150420-TRAVEL BLANK TRAVEL BLANK n/a
<i>Copper (Cu)-Diss. (Hardness Adjusted Guideline)</i>	mg/L	-	-	0.00200	0.00400	0.00400	0.00400	-	0.00400	-
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	<0.010	<0.010	<0.010	-	<0.010	-
Lead (Pb)-Dissolved (Lab Result)	mg/L	0.001	-	0.00005	<0.00010	<0.00010	<0.00010	-	<0.000050	-
<i>Lead (Pb)-Diss. (Hardness Adjusted Guideline)</i>	mg/L	-	-	0.00005	0.00700	0.00700	0.00700	-	0.00700	-
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	0.0105	0.0111	0.0102	-	<0.0010	-
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	99.5	98.5	101	-	<0.10	-
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	0.112	0.107	0.282	-	<0.00010	-
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.00001	<0.0000050	<0.0000050	<0.0000050	-	<0.0000050	-
Molybdenum (Mo)-Dissolved	mg/L	0.0073	-	0.00005	0.00014	0.00014	0.00013	-	<0.000050	-
Nickel (Ni)-Dissolved (Lab Result)	mg/L	0.025	-	0.0005	<0.0010	<0.0010	<0.0010	-	<0.00050	-
<i>Nickel (Ni)-Diss. (Hardness Adjusted Guideline)</i>	mg/L	-	-	0.0005	0.15000	0.15000	0.15000	-	0.15000	-
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050	<0.050	<0.050	-	<0.050	-
Potassium (K)-Dissolved	mg/L	-	-	0.1	4.43	4.17	4.03	-	<0.10	-
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	<0.00010	<0.00010	<0.00010	-	<0.000050	-
Silicon (Si)-Dissolved	mg/L	-	-	0.05	4.66	4.47	4.22	-	<0.050	-
Silver (Ag)-Dissolved	mg/L	0.0001	-	0.00001	<0.000020	<0.000020	<0.000020	-	<0.000010	-
Sodium (Na)-Dissolved	mg/L	-	-	0.05	15.1	14.3	14.1	-	<0.050	-
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	1.21	1.29	1.24	-	<0.00020	-
Sulfur (S)-Dissolved	mg/L	-	-	0.5	358	343	358	-	<0.50	-
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	0.000066	0.000065	0.000072	-	<0.000010	-
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00020	<0.00020	<0.00020	-	<0.00010	-
Titanium (Ti)-Dissolved	mg/L	-	-	0.01	<0.00060	<0.00060	<0.00060	-	<0.00030	-
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.00491	0.00495	0.00498	-	<0.000010	-
Vanadium (V)-Dissolved	mg/L	-	-	0.001	<0.0010	<0.0010	<0.0010	-	<0.00050	-
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	0.592	0.597	0.593	-	<0.0010	-

Applied Guidelines: *Federal CCME Canadian Environmental Quality Guidelines (January 2015), CCME: Freshwater Aquatic Life 'Mount Nansen Effluent Discharge Standards

COLOUR KEY:
<i>Exceeds CCME Guideline</i>
<i>Exceeds MN Effluent Discharge Standards</i>
<i>Exceeds both CCME and MN Standards</i>
<i>Exceeds Hardness Dependent Calculated Guideline (CCME)</i>
Data flag for Detection Limit Adjustment --> Please refer to the lab COA report and lab excel report for more info
QA/QC Codes: RPD - Relative Percent Difference, <DL - below detection limit, and <2XDL - less than two times the detection limit.



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

Date Received: 21-APR-15
Report Date: 30-APR-15 17:41 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1601887
Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 15-Y-0146
C of C Numbers: 1, 2
Legal Site Desc:

Can Dang
Senior Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

30-APR-15 17:41 (MT)

Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1601887-1 Water 20-APR-15 16:35 0146-150420-001	L1601887-2 Water 20-APR-15 18:40 0146-150420-003	L1601887-3 Water 20-APR-15 08:00 0146-150420-007	L1601887-4 Water 20-APR-15 14:55 0146-150420-010	L1601887-5 Water 21-APR-15 13:10 0146-150421-008
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	201	1200	<2.0	444	1410
	Hardness (as CaCO3) (mg/L)	117	726	<0.50	242	1030
	pH (pH)	8.12	7.89	5.78	8.17	8.18
	Total Suspended Solids (mg/L)	<3.0	96.0	<3.0	<3.0	21.3
	Total Dissolved Solids (mg/L)	125	998	<1.0	284	1270
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	92.1	155	<1.0	108	234
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	92.1	155	<1.0	108	234
	Ammonia, Total (as N) (mg/L)	<0.0050	3.20	<0.0050	0.0365	0.0667
	Chloride (Cl) (mg/L)	<0.50	1.6	<0.50	<0.50	<2.5 ^{DLA}
	Fluoride (F) (mg/L)	0.056	0.058	<0.020	0.054	0.10
	Nitrate (as N) (mg/L)	0.0340	0.414	<0.0050	0.0314	<0.025 ^{DLA}
	Nitrite (as N) (mg/L)	<0.0010	0.0154	<0.0010	0.0015	<0.0050 ^{DLA}
	Sulfate (SO4) (mg/L)	25.3	588	<0.30	128	769
	Anion Sum (meq/L)	2.37	15.4	<0.10	4.84	20.7
	Cation Sum (meq/L)	2.48	16.8	<0.10	5.14	21.4
	Cation - Anion Balance (%)	2.1	4.2	0.0	3.0	1.7
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	0.0107	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	0.0696	<0.0050	<0.0050	<0.0050
	Cyanate (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
	Thiocyanate (SCN) (mg/L)	<0.50	2.72	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.802	1.85	<0.0030	0.172	0.293
	Antimony (Sb)-Total (mg/L)	0.00029	0.00764	<0.00010	0.00035	0.00344
	Arsenic (As)-Total (mg/L)	0.00419	0.0948	<0.00010	0.00421	0.0169
	Barium (Ba)-Total (mg/L)	0.0802	0.0935	<0.000050	0.0782	0.0518
	Beryllium (Be)-Total (mg/L)	0.000027	0.000089	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	0.000559	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	0.052	<0.010	<0.010	0.014
	Cadmium (Cd)-Total (mg/L)	0.000104	0.00116	<0.000050	0.000108	0.000164
	Calcium (Ca)-Total (mg/L)	28.6	203	<0.050	59.2	227
	Chromium (Cr)-Total (mg/L)	0.00100	0.00455	<0.00010	0.00037	0.00071
	Cobalt (Co)-Total (mg/L)	0.00033	0.00785	<0.00010	0.00039	0.00062
	Copper (Cu)-Total (mg/L)	0.00226	0.0186	<0.00050	0.00109	0.00145
	Iron (Fe)-Total (mg/L)	1.02	16.2	<0.010	0.228	4.07
	Lead (Pb)-Total (mg/L)	0.00297	0.0339	<0.000050	0.000543	0.000624
	Lithium (Li)-Total (mg/L)	<0.0010	0.0018	<0.0010	0.0010	0.0064

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

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	Sample ID Description Sampled Date Sampled Time Client ID	L1601887-6 Water 21-APR-15 11:40 0146-150421-005	L1601887-7 Water 0146-1504 - TRAVEL BLANK	L1601887-8 Water 20-APR-15 13:07 0146-150420-009	L1601887-9 Water 20-APR-15 14:25 0146-150420-011	L1601887-10 Water 20-APR-15 16:55 0146-150420-002
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	995	<2.0	461	454	219
	Hardness (as CaCO3) (mg/L)	708		251	242	115
	pH (pH)	8.06	5.37	8.15	8.17	8.07
	Total Suspended Solids (mg/L)	78.7	<3.0	6.0	<3.0	4.0
	Total Dissolved Solids (mg/L)	837	<1.0	295	284	120
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	265	<1.0	118	103	84.0
	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)	265	<1.0	118	103	84.0
	Ammonia, Total (as N) (mg/L)	0.0303	<0.0050	0.0148	0.0330	<0.0050
	Chloride (Cl) (mg/L)	<1.0 ^{DLA}	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.152	<0.020	0.063	0.064	0.055
	Nitrate (as N) (mg/L)	0.013	<0.0050	0.0336	0.0327	0.0315
	Nitrite (as N) (mg/L)	<0.0020 ^{DLA}	<0.0010	0.0014	0.0014	<0.0010
	Sulfate (SO4) (mg/L)	421	<0.30	130	132	25.4
	Anion Sum (meq/L)	14.1	<0.10	5.06	4.79	2.21
	Cation Sum (meq/L)	14.6	<0.10	5.35	5.13	2.45
	Cation - Anion Balance (%)	1.8	0.0	2.8	3.4	5.1
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanate (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.393	<0.0030	0.134	0.182	0.876
	Antimony (Sb)-Total (mg/L)	0.0231	<0.00010	0.00038	0.00037	0.00030
	Arsenic (As)-Total (mg/L)	0.137	<0.00010	0.00357	0.00419	0.00450
	Barium (Ba)-Total (mg/L)	0.0236	<0.000050	0.0918	0.0798	0.0804
	Beryllium (Be)-Total (mg/L)	0.000022	<0.000020	<0.000020	<0.000020	0.000027
	Bismuth (Bi)-Total (mg/L)	0.000129	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	0.00466	<0.000050	0.000111	0.000117	0.000112
	Calcium (Ca)-Total (mg/L)	176	<0.050	57.6	59.3	28.5
	Chromium (Cr)-Total (mg/L)	0.00063	<0.00010	0.00037	0.00088	0.00110
	Cobalt (Co)-Total (mg/L)	0.00134	<0.00010	0.00047	0.00039	0.00036
	Copper (Cu)-Total (mg/L)	0.00571	<0.00050	0.00124	0.00130	0.00216
	Iron (Fe)-Total (mg/L)	2.74	<0.010	0.267	0.247	1.07
	Lead (Pb)-Total (mg/L)	0.0436	<0.000050	0.000331	0.000604	0.00303
	Lithium (Li)-Total (mg/L)	0.0097	<0.0010	0.0011	<0.0010	<0.0010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1601887-1 Water 20-APR-15 16:35 0146-150420-001	L1601887-2 Water 20-APR-15 18:40 0146-150420-003	L1601887-3 Water 20-APR-15 08:00 0146-150420-007	L1601887-4 Water 20-APR-15 14:55 0146-150420-010	L1601887-5 Water 21-APR-15 13:10 0146-150421-008
Grouping	Analyte					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)	9.23	44.1	<0.10	21.1	98.8
	Manganese (Mn)-Total (mg/L)	0.162	5.25	<0.00010	0.260	1.46
	Mercury (Hg)-Total (mg/L)	0.0000115	0.0000116	<0.0000050	<0.0000050	0.0000057
	Molybdenum (Mo)-Total (mg/L)	0.000477	0.00117	<0.000050	0.000412	0.000288
	Nickel (Ni)-Total (mg/L)	0.00092	0.00618	<0.00050	0.00061	0.00108
	Phosphorus (P)-Total (mg/L)	<0.050	0.096	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	1.23	5.66	<0.10	2.04	5.20
	Rubidium (Rb)-Total (mg/L)	0.00183	0.00411	<0.00020	0.00136	0.00391
	Selenium (Se)-Total (mg/L)	0.000053	0.000227	<0.000050	<0.000050	0.000075
	Silicon (Si)-Total (mg/L)	6.95	10.4	<0.050	6.59	7.25
	Silver (Ag)-Total (mg/L)	0.000054	0.000680	<0.000010	0.000013	0.000016
	Sodium (Na)-Total (mg/L)	2.53	25.3	<0.050	5.45	9.74
	Strontium (Sr)-Total (mg/L)	0.269	0.592	<0.00020	0.368	0.770
	Sulfur (S)-Total (mg/L)	8.60	196	<0.50	45.0	249
	Thallium (Tl)-Total (mg/L)	0.000016	0.000059	<0.000010	<0.000010	0.000013
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	0.0209	0.0768	<0.00030	0.00491	0.0154
	Uranium (U)-Total (mg/L)	0.000716	0.00135	<0.000010	0.000807	0.00321
	Vanadium (V)-Total (mg/L)	0.00198	0.00890	<0.00050	0.00064	0.00186
	Zinc (Zn)-Total (mg/L)	0.0099	0.0627	<0.0030	0.0096	0.0229
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)	0.0070	0.0135	<0.0010	0.0038	0.0048
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	0.00127	<0.00010	0.00031	0.00342
	Arsenic (As)-Dissolved (mg/L)	0.00058	0.0285	<0.00010	0.00336	0.0119
	Barium (Ba)-Dissolved (mg/L)	0.0726	0.0632	<0.000050	0.0766	0.0467
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	0.052	<0.010	<0.010	0.014
	Cadmium (Cd)-Dissolved (mg/L)	0.0000606	0.000543	<0.0000050	0.000105	0.0000712
	Calcium (Ca)-Dissolved (mg/L)	30.7	215	<0.050	61.3	241
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00031	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	0.00664	<0.00010	0.00033	0.00049
	Copper (Cu)-Dissolved (mg/L)	0.00092	0.00150	<0.00020	0.00080	0.00041
	Iron (Fe)-Dissolved (mg/L)	0.019	11.1	<0.010	0.022	2.45
	Lead (Pb)-Dissolved (mg/L)	0.000056	0.000110	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0064

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

30-APR-15 17:41 (MT)

Version: FINAL

Sample ID	Description	Sampled Date	Sampled Time	Client ID	L1601887-6	L1601887-7	L1601887-8	L1601887-9	L1601887-10
					L1601887-6 Water 21-APR-15 11:40 0146-150421-005	L1601887-7 Water 0146-1504 - TRAVEL BLANK	L1601887-8 Water 20-APR-15 13:07 0146-150420-009	L1601887-9 Water 20-APR-15 14:25 0146-150420-011	L1601887-10 Water 20-APR-15 16:55 0146-150420-002
Grouping	Analyte								
WATER									
Total Metals	Magnesium (Mg)-Total (mg/L)	59.2	<0.10	20.5	21.2	9.25			
	Manganese (Mn)-Total (mg/L)	1.45	<0.00010	0.231	0.260	0.172			
	Mercury (Hg)-Total (mg/L)	0.0000139	<0.0000050	<0.0000050	0.0000068	0.0000100			
	Molybdenum (Mo)-Total (mg/L)	0.000389	<0.000050	0.000369	0.000402	0.000504			
	Nickel (Ni)-Total (mg/L)	0.00258	<0.00050	0.00084	0.00072	0.00092			
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050			
	Potassium (K)-Total (mg/L)	3.38	<0.10	2.21	1.99	1.22			
	Rubidium (Rb)-Total (mg/L)	0.00567	<0.00020	0.00154	0.00146	0.00193			
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	0.000067	<0.000050	<0.000050			
	Silicon (Si)-Total (mg/L)	7.21	<0.050	6.40	6.57	6.89			
	Silver (Ag)-Total (mg/L)	0.000505	<0.000010	<0.000010	0.000015	0.000061			
	Sodium (Na)-Total (mg/L)	4.68	<0.050	5.87	5.66	2.67			
	Strontium (Sr)-Total (mg/L)	0.407	<0.00020	0.369	0.373	0.270			
	Sulfur (S)-Total (mg/L)	145	<0.50	43.2	46.5	8.78			
	Thallium (Tl)-Total (mg/L)	0.000127	<0.000010	<0.000010	<0.000010	0.000015			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	0.0180	<0.00030	0.00564	0.00582	0.0220			
	Uranium (U)-Total (mg/L)	0.00383	<0.000010	0.000794	0.000850	0.000699			
	Vanadium (V)-Total (mg/L)	0.00216	<0.00050	0.00072	0.00072	0.00212			
	Zinc (Zn)-Total (mg/L)	1.26	<0.0030	0.0101	0.0101	0.0104			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD		FIELD	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD		FIELD	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	0.0027		0.0045	0.0039	0.0066			
	Antimony (Sb)-Dissolved (mg/L)	0.0174		0.00032	0.00030	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.0695		0.00282	0.00331	0.00059			
	Barium (Ba)-Dissolved (mg/L)	0.0160		0.0926	0.0772	0.0709			
	Beryllium (Be)-Dissolved (mg/L)	<0.000020		<0.000020	<0.000020	<0.000020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050		<0.000050	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	<0.010		<0.010	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (mg/L)	0.00125		0.0000998	0.000103	0.0000468			
	Calcium (Ca)-Dissolved (mg/L)	185		63.5	61.1	30.2			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010		0.00010	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	0.00104		0.00040	0.00032	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.00030		0.00099	0.00083	0.00083			
	Iron (Fe)-Dissolved (mg/L)	1.39		0.043	0.021	0.018			
	Lead (Pb)-Dissolved (mg/L)	0.000639		<0.000050	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0092		0.0011	<0.0010	<0.0010			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1601887-1 Water 20-APR-15 16:35 0146-150420-001	L1601887-2 Water 20-APR-15 18:40 0146-150420-003	L1601887-3 Water 20-APR-15 08:00 0146-150420-007	L1601887-4 Water 20-APR-15 14:55 0146-150420-010	L1601887-5 Water 21-APR-15 13:10 0146-150421-008
Grouping	Analyte					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	9.68	45.8	<0.10	21.6	105
	Manganese (Mn)-Dissolved (mg/L)	0.147	5.29	<0.00010	0.255	1.48
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	0.0000068	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000448	0.000926	<0.000050	0.000372	0.000278
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00254	<0.00050	<0.00050	0.00069
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	1.08	5.44	<0.10	2.03	5.52
	Selenium (Se)-Dissolved (mg/L)	<0.000050	0.000195	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	5.41	6.02	<0.050	6.12	6.91
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	2.59	25.8	<0.050	5.41	10.0
	Strontium (Sr)-Dissolved (mg/L)	0.272	0.593	<0.00020	0.361	0.785
	Sulfur (S)-Dissolved (mg/L)	8.89	196	<0.50	44.1	255
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	0.00053	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000685	0.00126	<0.000010	0.000798	0.00328
	Vanadium (V)-Dissolved (mg/L)	<0.00050	0.00101	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0023	0.0200	<0.0010	0.0109	0.0176

* 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	L1601887-6 Water 21-APR-15 11:40 0146-150421-005	L1601887-7 Water 0146-1504 - TRAVEL BLANK	L1601887-8 Water 20-APR-15 13:07 0146-150420-009	L1601887-9 Water 20-APR-15 14:25 0146-150420-011	L1601887-10 Water 20-APR-15 16:55 0146-150420-002	
Grouping	Analyte					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	59.8		22.5	21.7	9.69
	Manganese (Mn)-Dissolved (mg/L)	1.41		0.232	0.249	0.148
	Mercury (Hg)-Dissolved (mg/L)	<0.000050		<0.000050	0.000062	0.000059
	Molybdenum (Mo)-Dissolved (mg/L)	0.000366		0.000359	0.000377	0.000441
	Nickel (Ni)-Dissolved (mg/L)	0.00214		0.00075	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050		<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	3.48		2.39	2.01	1.08
	Selenium (Se)-Dissolved (mg/L)	<0.000050		0.000069	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	6.49		6.53	6.11	5.28
	Silver (Ag)-Dissolved (mg/L)	<0.000010		<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	4.57		6.03	5.43	2.65
	Strontium (Sr)-Dissolved (mg/L)	0.414		0.379	0.366	0.271
	Sulfur (S)-Dissolved (mg/L)	143		45.2	45.6	8.84
	Thallium (Tl)-Dissolved (mg/L)	0.000088		<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010		<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030		<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.00379		0.000789	0.000816	0.000671
	Vanadium (V)-Dissolved (mg/L)	<0.00050		<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	1.15		0.0089	0.0084	0.0026

* 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	Bismuth (Bi)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Boron (B)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Cobalt (Co)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Lead (Pb)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Nickel (Ni)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Selenium (Se)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Silver (Ag)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Tin (Sn)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Titanium (Ti)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Vanadium (V)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9

Qualifiers for Individual Parameters Listed:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-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.			
BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
CL-IC-N-WR	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
CN-CNO-WT	Water	Cyanate	APHA 4500-CN-L
This analysis is carried out using procedures adapted from APHA method 4500-CN "Cyanide". Cyanate is determined by the Cyanate hydrolysis method using an ammonia selective electrode			
CN-SCN-VA	Water	Thiocyanate by Colour	APHA 4500-CN CYANIDE
This analysis is carried out using procedures adapted from APHA Method 4500-CN- M "Thiocyanate" Thiocyanate is determined by the ferric nitrate colourimetric method.			

Reference Information

CN-T-CFA-VA	Water	Total Cyanide in water by CFA	ISO 14403:2002
This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.			
CN-WAD-CFA-VA	Water	Weak Acid Diss. Cyanide in water by CFA	APHA 4500-CN CYANIDE
This analysis is carried out using procedures adapted from APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by in-line sample distillation with final determination by colourimetric analysis.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
F-IC-N-WR	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)
Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.			
HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.			
IONBALANCE-VA	Water	Ion Balance Calculation	APHA 1030E
Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.			
Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:			
Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]			
MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-DIS-LOW-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-TOT-LOW-ICP-VA	Water	Total Metals in Water by ICPOES	EPA 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2-L-IC-N-WR	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			

Reference Information

NO3-L-IC-N-WR	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode			
It is recommended that this analysis be conducted in the field.			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode			
It is recommended that this analysis be conducted in the field.			
S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.			
S-TOT-ICP-VA	Water	Total Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.			
SO4-IC-N-WR	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
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
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Reference Information

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

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

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

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



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

Date Received: 21-APR-15
Report Date: 01-MAY-15 11:53 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1601895
Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 15-Y-0146
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	L1601895-1 Water 21-APR-15 08:43 0146-150421-016	L1601895-2 Water 21-APR-15 08:50 0146-150421-017	L1601895-3 Water 21-APR-15 09:00 0146-150421-018	L1601895-4 Water 21-APR-15 10:30 0146-150421-019
Grouping	Analyte				
WATER					
Physical Tests	Colour, True (CU)				<5.0
	Conductivity (uS/cm)	2000	1910	1770	372
	Hardness (as CaCO3) (mg/L)	1350	1300	1310	198
	pH (pH)	8.12	8.09	8.13	7.66
	Total Suspended Solids (mg/L)	<3.0	3.3	<3.0	
	Total Dissolved Solids (mg/L)	1720	1700	1680	218
	Turbidity (NTU)				<0.10
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	218	235	237	
	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)	218	235	237	181
	Ammonia, Total (as N) (mg/L)	<0.0050 ^{DLA}	<0.0050 ^{DLA}	<0.0050 ^{DLA}	
	Chloride (Cl) (mg/L)	<2.5 ^{DLA}	<2.5 ^{DLA}	<2.5 ^{DLA}	<0.50
	Fluoride (F) (mg/L)	0.30	0.24	0.26	0.092
	Nitrate (as N) (mg/L)	0.106	0.079	0.096	0.135
	Nitrite (as N) (mg/L)	<0.0050 ^{DLA}	<0.0050 ^{DLA}	<0.0050 ^{DLA}	<0.0010
	Sulfate (SO4) (mg/L)	1090	1080	1060	37.0
	Anion Sum (meq/L)	27.0	27.3	26.8	4.40
	Cation Sum (meq/L)	27.8	26.7	26.9	4.19
	Cation - Anion Balance (%)	1.5	-1.0	0.2 ^{DLA}	-2.5
	Total Metals	Aluminum (Al)-Total (mg/L)	0.0109	0.0112	<0.0060 ^{DLA}
Antimony (Sb)-Total (mg/L)		0.00338	0.00297	0.00319	<0.00050
Arsenic (As)-Total (mg/L)		0.0101	0.0117	0.00768	0.00043
Barium (Ba)-Total (mg/L)		0.0154 ^{DLA}	0.0140 ^{DLA}	0.0153 ^{DLA}	0.089
Beryllium (Be)-Total (mg/L)		<0.000040 ^{DLA}	<0.000040 ^{DLA}	<0.000040 ^{DLA}	
Bismuth (Bi)-Total (mg/L)		<0.00010 ^{DLA}	<0.00010 ^{DLA}	<0.00010 ^{DLA}	
Boron (B)-Total (mg/L)		<0.020 ^{DLA}	<0.020 ^{DLA}	<0.020 ^{DLA}	<0.10
Cadmium (Cd)-Total (mg/L)		0.00402	0.00424	0.00362	<0.00020
Calcium (Ca)-Total (mg/L)		373	352	347	46.3
Chromium (Cr)-Total (mg/L)		<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.0020
Cobalt (Co)-Total (mg/L)		<0.00020 ^{DLA}	0.00029	<0.00020 ^{DLA}	
Copper (Cu)-Total (mg/L)		0.0036	0.0033	0.0028	<0.0010
Iron (Fe)-Total (mg/L)		0.030	0.050	0.029	<0.030
Lead (Pb)-Total (mg/L)		0.00025	0.00032	<0.00010 ^{DLA}	0.00061
Lithium (Li)-Total (mg/L)		0.0112	0.0105	0.0104	
Magnesium (Mg)-Total (mg/L)		97.6	95.1	95.4	20.0
Manganese (Mn)-Total (mg/L)		0.133	0.328	0.107	<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	L1601895-1 Water 21-APR-15 08:43 0146-150421-016	L1601895-2 Water 21-APR-15 08:50 0146-150421-017	L1601895-3 Water 21-APR-15 09:00 0146-150421-018	L1601895-4 Water 21-APR-15 10:30 0146-150421-019	
Grouping	Analyte				
WATER					
Total Metals	Mercury (Hg)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.00020
	Molybdenum (Mo)-Total (mg/L)	0.00014	0.00015	0.00013	
	Nickel (Ni)-Total (mg/L)	<0.0010 ^{DLA}	<0.0010 ^{DLA}	<0.0010 ^{DLA}	
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	
	Potassium (K)-Total (mg/L)	4.35	3.96	4.12	0.92
	Rubidium (Rb)-Total (mg/L)	0.00749	0.00701	0.00698	
	Selenium (Se)-Total (mg/L)	<0.00010 ^{DLA}	<0.00010 ^{DLA}	<0.00010 ^{DLA}	<0.0010
	Silicon (Si)-Total (mg/L)	4.61	4.17	4.30	
	Silver (Ag)-Total (mg/L)	<0.000020 ^{DLA}	<0.000020 ^{DLA}	<0.000020 ^{DLA}	
	Sodium (Na)-Total (mg/L)	15.6	14.5	14.4	4.8
	Strontium (Sr)-Total (mg/L)	1.32	1.30	1.28	
	Sulfur (S)-Total (mg/L)	370	355	353	
	Thallium (Tl)-Total (mg/L)	0.000073	0.000069	0.000067	
	Tin (Sn)-Total (mg/L)	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}	
	Titanium (Ti)-Total (mg/L)	<0.00060 ^{DLA}	<0.00060 ^{DLA}	<0.00060 ^{DLA}	
	Uranium (U)-Total (mg/L)	0.00510	0.00488	0.00495	0.00192
	Vanadium (V)-Total (mg/L)	<0.0010 ^{DLA}	<0.0010 ^{DLA}	<0.0010 ^{DLA}	
	Zinc (Zn)-Total (mg/L)	0.646	0.608	0.595	<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}	0.0027	0.0028	
	Antimony (Sb)-Dissolved (mg/L)	0.00313	0.00289	0.00321	
	Arsenic (As)-Dissolved (mg/L)	0.00771	0.00833	0.00769	
	Barium (Ba)-Dissolved (mg/L)	0.0148	0.0138	0.0149	
	Beryllium (Be)-Dissolved (mg/L)		<0.000040 ^{DLA}	<0.000040 ^{DLA}	
	Bismuth (Bi)-Dissolved (mg/L)	<0.00010 ^{DLA}	<0.00010 ^{DLA}	<0.00010 ^{DLA}	
	Boron (B)-Dissolved (mg/L)	<0.020 ^{DLA}	<0.020 ^{DLA}	<0.020 ^{DLA}	
	Cadmium (Cd)-Dissolved (mg/L)	0.00357	0.00416	0.00364	
	Calcium (Ca)-Dissolved (mg/L)	378	354	361	
	Chromium (Cr)-Dissolved (mg/L)	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}	
	Cobalt (Co)-Dissolved (mg/L)	<0.00020 ^{DLA}	0.00022	<0.00020 ^{DLA}	
	Copper (Cu)-Dissolved (mg/L)	0.00296	0.00276	0.00293	
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)	<0.00010 ^{DLA}	<0.00010 ^{DLA}	<0.00010 ^{DLA}	
	Lithium (Li)-Dissolved (mg/L)	0.0105	0.0102	0.0111	
	Magnesium (Mg)-Dissolved (mg/L)	99.5	101	98.5	
	Manganese (Mn)-Dissolved (mg/L)	0.112	0.282	0.107	

* 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	L1601895-1 Water 21-APR-15 08:43 0146-150421-016	L1601895-2 Water 21-APR-15 08:50 0146-150421-017	L1601895-3 Water 21-APR-15 09:00 0146-150421-018	L1601895-4 Water 21-APR-15 10:30 0146-150421-019	
Grouping	Analyte				
WATER					
Dissolved Metals	Mercury (Hg)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	
	Molybdenum (Mo)-Dissolved (mg/L)	0.00014	0.00013	0.00014	
	Nickel (Ni)-Dissolved (mg/L)	<0.0010 ^{DLA}	<0.0010 ^{DLA}	<0.0010 ^{DLA}	
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	
	Potassium (K)-Dissolved (mg/L)	4.43 ^{DLA}	4.03 ^{DLA}	4.17 ^{DLA}	
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	
	Silicon (Si)-Dissolved (mg/L)	4.66 ^{DLA}	4.22 ^{DLA}	4.47 ^{DLA}	
	Silver (Ag)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	
	Sodium (Na)-Dissolved (mg/L)	15.1	14.1	14.3	
	Strontium (Sr)-Dissolved (mg/L)	1.21	1.24	1.29	
	Sulfur (S)-Dissolved (mg/L)	358	358	343	
	Thallium (Tl)-Dissolved (mg/L)	0.000066 ^{DLA}	0.000072 ^{DLA}	0.000065 ^{DLA}	
	Tin (Sn)-Dissolved (mg/L)	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}	
	Titanium (Ti)-Dissolved (mg/L)	<0.00060	<0.00060	<0.00060	
	Uranium (U)-Dissolved (mg/L)	0.00491	0.00498	0.00495	
	Vanadium (V)-Dissolved (mg/L)	<0.0010 ^{DLA}	<0.0010 ^{DLA}	<0.0010 ^{DLA}	
	Zinc (Zn)-Dissolved (mg/L)	0.592	0.593	0.597	

* 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	Bismuth (Bi)-Dissolved	DLA	L1601895-1, -2, -3
Duplicate	Boron (B)-Dissolved	DLA	L1601895-1, -2, -3
Duplicate	Chromium (Cr)-Dissolved	DLA	L1601895-1, -2, -3
Duplicate	Cobalt (Co)-Dissolved	DLA	L1601895-1, -2, -3
Duplicate	Lead (Pb)-Dissolved	DLA	L1601895-1, -2, -3
Duplicate	Nickel (Ni)-Dissolved	DLA	L1601895-1, -2, -3
Duplicate	Selenium (Se)-Dissolved	DLA	L1601895-1, -2, -3
Duplicate	Silver (Ag)-Dissolved	DLA	L1601895-1, -2, -3
Duplicate	Tin (Sn)-Dissolved	DLA	L1601895-1, -2, -3
Duplicate	Titanium (Ti)-Dissolved	DLA	L1601895-1, -2, -3
Duplicate	Vanadium (V)-Dissolved	DLA	L1601895-1, -2, -3
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1601895-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1601895-1, -2, -3
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1601895-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1601895-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1601895-1, -2, -3
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1601895-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1601895-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1601895-1, -2, -3
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1601895-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1601895-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1601895-1, -2, -3
Matrix Spike	Silicon (Si)-Total	MS-B	L1601895-1, -2, -3
Matrix Spike	Sulfur (S)-Total	MS-B	L1601895-1, -2, -3

Qualifiers for Individual Parameters Listed:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-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.			
BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
CL-IC-N-WR	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COLOUR-TRUE-VA	Water	Colour (True) by Spectrometer	BCMOE Colour Single Wavelength

Reference Information

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.

Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

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

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

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

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

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

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

HARDNESS-CALC-VA Water Hardness APHA 2340B

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

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

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

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

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

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).

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:

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

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

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

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

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

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

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

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

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

MET-TOT-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

Reference Information

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

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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.



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

Date Received: 21-APR-15
Report Date: 13-MAY-15 16:22 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1601926
Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 15-Y-0148
C of C Numbers: 1
Legal Site Desc:

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

Can Dang
Senior Account Manager

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

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID					
Grouping	Analyte				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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** ALS test methods may incorporate modifications from specified reference methods to improve performance.

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

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

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

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

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

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



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

Report Date: May 13, 2015
Work Order: 15343

Data Report

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

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

Sample ID	Collection Date and Time	96-h LC50
L1601926-1 0146-150420-003	April 20, 2015 @ N/A	>100

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

Yvonne Lam, B.Sc.
Laboratory Biologist

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

DATE: 05 May 2015

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

REPORT ON: RAINBOW TROUT BIOASSAY RESULTS

SAMPLE DESCRIPTION:

IRC Sample ID No.:	1504135
Sample Name:	L1601926-1 PO # 15343
Sample collected by:	N/A
Date collected:	20 April 2015
Date, time received:	24 April 2015; 1425 hrs.
Collection Method:	Grab
Amount, Container:	3 x 20 L plastic containers
Physical description:	Opaque, orange liquid
Date, time tested:	25 April 2015; 0915 hrs.

RAINBOW TROUT 96 HR RESULTS:

The 96 hour (static) LC₅₀ was greater than 100% (v/v sample).
0% trout mortality in 100% concentration.

The LC₅₀ is defined as the median lethal concentration or the concentration at which there is 50% fish mortality. Results are calculated following the methods described in "Guidance Document on Statistical Methods for Environmental Toxicity Tests" EPS 1/RM/46 – March 2005 (with June 2007 amendments), using the software CETIS, ver 1.8.7E (2014).

The method used for this test was as per the IRC laboratory "Standard Operating Procedure for Rainbow Trout Holding and Testing" RTver5. This procedure follows the "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout" EPS 1/RM/13, Second Edition – December 2000 (with May 2007 amendments). Test volume was 16 litres with 10 fish exposed per test vessel. Aeration was by forced air through airstones at a rate of approximately 6.5 ± 1 ml/L/min. The sample was not pH adjusted or filtered prior to testing

The initial dissolved oxygen level was 8.1 mg/L at 15.0°C, the conductivity was 1282 µS/cm and the initial pH was 6.7. After pre-aerating the sample for 30 minutes, the dissolved oxygen level was 9.0 mg/L. As the dissolved oxygen level was greater than 70% saturation and less than 100% saturation the test was initiated at this time. The test set-up technician was DB.

Please call should you have any questions.

IRC Integrated Resource Consultants Inc.



Darcie Blackall
Laboratory Biologist
b003.1
enclosure

RAW DATA:

TEST CONCENTRATION		HOURS							
		0	1.0	2.0	4.0	24	48	72	96
100%	Percent Survival	100%	100%	100%	100%	100%	100%	100%	100%
	Dissolved Oxygen (mg/L)	9.0				9.7	10.1	9.5	9.5
	Temperature (°C)	15.0				15.5	15.5	15.5	15.5
	pH	6.8				7.9	8.0	8.0	8.0
	Conductivity (µS/cm)	1285							1319
	Symptoms	1	2	2	2	2	2	2	2
	Loading Density (g/L)	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
50%	Percent Survival	100%	100%	100%	100%	100%	100%	100%	100%
	Dissolved Oxygen (mg/L)	9.6				9.5	10.0	9.1	9.2
	Temperature (°C)	15.5				15.5	15.5	15.5	15.5
	pH	6.8				7.5	7.7	7.6	7.6
	Conductivity (µS/cm)	723							746
	Symptoms	1	2	2	2	2	2	2	2
	Loading Density (g/L)	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
25%	Percent Survival	100%	100%	100%	100%	100%	100%	100%	100%
	Dissolved Oxygen (mg/L)	9.8				9.5	10.0	9.0	8.9
	Temperature (°C)	15.5				15.5	15.5	15.5	15.5
	pH	6.8				7.2	7.3	7.2	7.3
	Conductivity (µS/cm)	408							420
	Symptoms	1	2	2	2	2	2	2	2
	Loading Density (g/L)	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
12.5%	Percent Survival	100%	100%	100%	100%	100%	100%	100%	100%
	Dissolved Oxygen (mg/L)	10.0				9.5	10.0	9.1	8.9
	Temperature (°C)	15.5				15.5	15.5	15.5	15.5
	pH	6.8				7.3	7.2	7.1	7.2
	Conductivity (µS/cm)	240							249
	Symptoms	1	1,2	1,2	1,2	1,2	1,2	1,2	1,2
	Loading Density (g/L)	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
6.25%	Percent Survival	100%	100%	100%	100%	100%	100%	100%	100%
	Dissolved Oxygen (mg/L)	10.0				9.6	10.0	8.9	8.7
	Temperature (°C)	15.5				15.5	15.5	15.5	15.5
	pH	6.8				7.3	7.2	7.1	7.2
	Conductivity (µS/cm)	140							147
	Symptoms	1	1	1	1	1	1,2	1,2	1,2
	Loading Density (g/L)	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
CONTROL	Percent Survival	100%	100%	100%	100%	100%	100%	100%	100%
	Dissolved Oxygen (mg/L)	10.1				9.8	10.1	9.3	8.9
	Temperature (°C)	15.5				15.5	15.5	15.5	15.5
	pH	6.9				7.5	7.3	7.3	7.3
	Conductivity (µS/cm)	40							42
	Symptoms	1	1	1	1	1	1	1	1
	Loading Density (g/L)	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
	Technician	DB	DB	DB	DB	MH	RC	RC	RC

KEY TO SYMPTOMS:

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

TEST FISH STOCK INFORMATION:

Date received:	12 March 2015	
Source:	Aquafarms JV	
Species:	<i>Oncorhynchus mykiss</i> (Rainbow Trout)	
Fork Length:	Mean:	41.6 mm \pm 2.8 mm
	Range:	36.0 mm – 45.0 mm
Wet weight:	Mean:	0.62 g \pm 0.15 g
	Range:	0.38 g – 0.87 g
Condition Factor (100xWt/length ³ cm):	0.85	

Acclimation History	
Acclimation temperature:	14.5 to 15.0 °CELSIUS
Treatments:	None
Water:	Dechlorinated tap water
Feeding:	BioVita Starter #1 Crum
Mortality:	0.08%

RAINBOW TROUT REFERENCE TOXICANT DATA

Stock Arrival Date (y/m/d)	Test Date (y/m/d)	Toxicant	LC50 (mg/L)	95% Confidence Interval
13.11.21	13.12.05	Phenol	9.02	7.42 to 10.65
13.12.12	13.12.30	“	14.10	12.06 to 16.42
13.12.23	14.01.14	“	10.66	9.60 to 11.82
14.01.20	14.02.04	“	11.07	9.34 to 12.45
14.02.05	14.02.19	“	8.94	7.96 to 10.04
14.02.25	14.03.11	“	14.10	11.86 to 16.57
14.03.11	14.03.25	“	11.07	9.84 to 12.45
14.04.01	14.04.10	“	10.16	8.41 to 12.08
14.04.04	14.04.18	“	10.15	8.87 to 11.61
14.04.28	14.05.06	“	8.94	7.96 to 10.04
14.05.13	14.05.25	“	10.20	9.45 to 11.02
14.05.29	14.06.12	“	9.96	8.19 to 11.89
14.06.12	14.07.09	“	9.02	7.42 to 10.65
14.06.24	14.07.18	“	9.58	9.14 to 10.05
14.07.16	14.08.06	“	12.00	10.56 to 13.64
14.07.30	14.08.14	“	10.20	9.45 to 11.02
14.08.14	14.09.09	“	11.57	9.40 to 13.98
14.09.01	14.09.05	“	10.59	9.54 to 11.74
14.09.24	14.10.08	“	11.52	10.16 to 13.07
14.10.10	14.10.24	“	10.22	9.45 to 11.05
14.10.22	14.11.12	“	10.66	8.74 to 12.55
14.11.30	14.12.19	“	9.80	8.00 to 12.00
14.12.21	15.01.19	“	9.80	8.00 to 12.00
15.01.25	15.02.10	“	12.50	11.02 to 14.17
15.02.01	15.02.17	“	11.52	10.16 to 13.07
15.02.15	15.03.03	“	10.63	9.59 to 11.77
15.03.12	15.03.26	“	10.63	9.59 to 11.77
LAB GEOMETRIC MEAN \pm 2 standard deviations:				10.82 mg/L \pm 3.76
Warning Limits:				7.05 mg/L to 14.58 mg/L

CONTROL/DILUTION WATER QUALITY:

Hardness: 20 mg/L
Total Residual Chlorine: 10 μ g/L



L1601926

VANCOUVER

Subcontract Request Form

Subcontract To:

NAUTILUS ENVIRONMENTAL

8664 COMMERCE COURT
BURNABY, BC V5A 4N7

Request for Rimbaw Trout LC50
w/ 1,2,4 hours monitoring. and LT50
NY

NOTES: Please reference on final report and invoice: PO# L1601926
ALS requires QC data to be provided with your final results.

wo# 15343

Please see enclosed 1 sample(s) in 3 Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED	Priority Flag
		DUE DATE	
L1601926-1 0146-150420-003	Special Request- Nautilus Environmental (SPECIAL REQUEST-NL 14)	4/20/2015	
		4/29/2015	

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

Analysis and reporting info contact: Can Dang
8081 LOUGHEED HWY
SUITE 100
BURNABY, BC V5A 1W9

Phone: (604) 253-4188

Email: can.dang@alsglobal.com

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

Shipped By: Paul Date Shipped: APRIL 24/2015

Received By: NAUTILUS - NY - NAIR YAMANO Date Received: Apr 24/15 @ 11:05

Verified By: _____ Date Verified: _____

Temperature: 6.2 (2x20L)

Sample Integrity Issues: _____
8.4 (1x20L)
blue jug.

Subcontracted to IRC



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 Meghan Marjanovic Téléphone 867-393-4882
Mailing address 2195 Second Ave Fax 867-393-4883
Adresse postale Whitehorse YT Y1A 3T8 Télécopieur 867-393-4883
Postal code Y1A 3T8
Code postal Y1A 3T8
First Nation, Municipal or Business Name EDI (Environmental Dynamics Inc)
Nom de la Première nation, de la municipalité ou de l'entreprise EDI (Environmental Dynamics Inc)
Agent _____ Fax _____
Agent _____ Télécopieur _____

Sampling Location • Lieu de la prise d'échantillon

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

Sample Collection / Prélèvement de l'échantillon

Sample Collected By BP, DS, JM Date 15 04 21 Time 10:30 am
Échantillon prélevé par BP, DS, JM Date 15 04 21 Heure 10:30 am
YY/MM/DD • AA/MM/JJ
Sampling Site (e.g., kitchen tap) Pump house well
Point d'échantillonnage (ex. : robinet de cuisine) Pump house well
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 _____ ppm
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 15/04/22 Time 8:30 am By JW
Réception de l'échantillon Date 15/04/22 Heure 8:30 am Par JW
YY/MM/DD • AA/MM/JJ
Condition of Sample Satisfactory Unsatisfactory Details 6.6 °C
État de l'échantillon Satisfaisant Non satisfaisant Précisez 6.6 °C
Incubation 15-04-22 Time 9:45 am By SS Incubator 4
Incubation Date 15-04-22 Heure 9:45 am Par SS Incubateur 4
YY/MM/DD • AA/MM/JJ
Analysis Completed 15-04-23 Time 11:00 am By SS
Analyse terminée Date 15-04-23 Heure 11:00 am Par SS
YY/MM/DD • AA/MM/JJ

**Results (See Reverse Side for Interpretation) per 100 ml
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

email MMarjanovic@edynamics.ca

Report Authorized By WLT Position WLT Date 15-04-23
Rapport autorisé par WLT Poste WLT Date 15-04-23
YY/MM/DD • AA/MM/JJ

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

Sample Number : **62720**
Numéro de l'échantillon : **62720**