ENVIRONMENTAL DYNAMICS INC.

2195 – 2nd Avenue
Whitehorse, YT Y1A 3T8
P: (867) 393-4882 • F: (867) 393-4883

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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: November 2015

Trip dates:	November 16-18, 2015
EDI field staff:	Scott Dilling, Joel MacFabe and Danny Skookum
Weather during trip:	Conditions for the three days included air temperatures from -30 to -13°C, with clear skies to light snow and calm to light wind conditions.

The following monthly report includes a summary of site conditions and data collected during EDI's November 2015 trip to Mount Nansen as part of the 2015/16 Water Resources Investigations. The November 2015 trip represents the first monitoring event of the winter season. 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	• Summary of weather and general site conditions
Meteorology	• Statement on station status and identification of any data gaps or QA/QC issues • Snow depth sensor QA/QC
Hydrology	• Discussion of noteworthy hydrology observations for this month • Statement of QA/QC for the data collected this month
Water Quality	• Summary of noteworthy water quality observations for this month • Statement on QA/QC sample results for this month
Program Recommendations	• Program recommendations for meteorological, hydrology and water quality programs
Additional Trip Information	• Project Safety Concerns • Wildlife sightings • Budget and schedule considerations
List of Attachments	• Maps of stations and sites • Site and station photos • Data Tables – hydrology and water quality • Water quality lab result reports

SITE CONDITIONS

The November 2015 site trip represented winter conditions at the Mount Nansen site. Air temperatures were colder than last trip, ranging from -30 to -13°C. Weather conditions ranged from clear skies to light snow, with calm to light winds. Ice cover was present to some extent across all watercourses and waterbodies. Water levels were lower than during the October 2015 trip. Stations and sites along Pony Creek and Back Creek were frozen to bed, as well as some sites and stations along Dome Creek (WQ-DC-DX and H/WQ-DC-D1b). Placer mining construction works have stopped on Pony Creek, upstream of the WQ-PC-U site. No water was flowing over or through the embankment of the placer miner's settling pond.

METEOROLOGY

Meteorological data was collected at the ATM-ROAD station throughout the month of November 2015. EDI conducted a preliminary QA/QC review of the November 2015 data and all sensors appear to be functioning as expected. There was snow on site during the November investigation, which corresponded with a snow sensor measurement of 18.2 cm on November 16, 2015. This indicates so far that the snow sensor may be slightly underestimating snow depth, although snow depth likely varies slightly in the general area of the station. Meteorological data for the winter season (October 15, 2015 to March 31, 2016) will be summarized and reported on in the March 2016 monthly report, which will include the seasonal analysis.

Table 1. Comparison of snow depth measured at the site with the snow sensor measurement.

Measurement Date/Time	Manual Snow Depth Measurement near Station (cm)	Meteorological Station Snow Sensor Measurement (cm)	Snow Sensor Quality[1]	Difference (cm)
October 13, 2015 1:00 pm	0.0	0.6	181 (Good)	0.6
November 16, 2015 2:20 pm	20.0	18.2	185 (Good)	1.8

Note:
[1]- Quality numbers provide an indication of surface density in snow monitoring applications. Values will increase during snowfall events consisting of low-density snow. Quality Numbers: 0 = Not able to read distance; 152-210 = Good Measurement Quality Numbers; 210-300= Reduced Echo Signal Strength; 300-600 = High measurement uncertainty

HYDROLOGY

Discharge measurements were collected at all stations with suitable conditions during the November 2015 trip. Water levels were lower throughout the Mount Nansen Site than during the October 2015 trip. Hydrology stations at H-PC-DSP, H-BC and H-DC-D1b were frozen to substrate. Continuous water level records are available for three stations for the period up to November 16, 2015: H-VC-DBC, H-VC-R and H-VC-R+290. Data could not be downloaded from the continuous water level loggers at H-DC-M WP, H-VC-U and H-VC-UMN because of a damaged cable on the portable downloading device. This cable will be

repaired and the data will be downloaded from the loggers during the next field visit. All collected data will remain stored within the internal memory of the loggers therefore there will be no data gaps resulting from this issue.

See attached data tables for a summary of surface water conditions and hydrometric monitoring tasks completed at each station for November 2015 (Attachment 3). Quality control and quality assurance was conducted for all hydrometric data. Noteworthy observations are included below.

Noteworthy Observations

- Discharge measurements were collected with an ADV at H-VC-U, H-VC-DBC, H-VC-UMN and H-VC-R with discharge values ranging from 0.148 to 0.176 m^3/s. These values were lower than the flows observed in October 2015 which ranged from 0.192 to 0.464 m^3/s.
    - A preliminary review of the discharge values from the Victoria Creek stations in November 2015 show that the measured discharge at H-VC-DBC (0.176 m^3/s) is greater than at the downstream station at H-VC-UMN (0.164 m^3/s). Similarly, the discharge at H-VC-UMN is greater than the discharge downstream at H-VC-R (0.158 m^3/s). Typically, discharge increases in the downstream direction as the contributing watershed area increases, therefore this decreasing flow pattern may indicate that the Victoria Creek reaches are losing surface flow to groundwater. Similar discharge patterns have been previously noted along Victoria Creek in July 2014, May 2015, June 2015 and July 2015. A more detailed review of the local hydrology along Victoria Creek will be completed at the end of the winter season when additional low flow data is available.
- A new salt tracer logging system (Sommer Flow Tracer) was used during the November 2015 trip at streams with suitable conditions. The salt tracer gauging method remained the same as previous trips; however the new system has higher measurement resolution and uses two electrical conductivity sensors rather than one. The new system was successful and will be considered for use on future trips. Discharge estimates were completed using the salt tracer system at H-DC-B, H-DC-DX+105 and H-DC-R with discharge estimates of 0.001, 0.002 and 0.006 m^3/s, respectively. Ice was present along the channel at H-DC-B and H-DC-DX+105 during the discharge measurement, which adds uncertainty to the discharge value.
- Placer mining construction works upstream of the H-PC-DSP site have stopped. No water was flowing over or through the embankment of the settling pond. The Pony Creek hydrometric site was frozen to bed. Multiple pieces of heavy equipment remain on site.
- Instantaneous volumetric discharge measurements were collected at H-DC-M WP. Fine sediment was cleared out during the October 2015 trip. All water was flowing through the weir; however the stilling well was encased in frozen sediment and ice. Concerns remain that the sedimentation is producing channel instability, rating curve shifts and continuous stage data errors for this station. Additional excavation may be required in the spring of 2016.

WATER QUALITY

Water quality samples and data were collected at the regularly scheduled sites during the November 2015 trip. A total of 20 normally scheduled sites were visited, with 12 sites sampled. As noted above in the 'Site Conditions' section, the WQ-LW-SEEP, WQ-MS-S-08 and WQ-ADIT-SEEP were all dry during this trip (consistent with previous trips) and the WQ-PC-U, WQ-PC-D, WQ-BC, WQ-DC-DX, WQ-DC-D1b had frozen to substrate for the winter since the October 2015 visit. The regular monthly drinking water sample was collected from the pumphouse well (WQ-PW) and the bi-monthly LC50 sample from the WQ-SEEP was collected. All samples were submitted for analysis through ALS Laboratories.

See the attached data tables for a summary of conditions at each site and a record of where samples were collected during each trip (Attachment 3). In situ and laboratory results summary tables are also attached. Parameters that exceeded the Canadian Council of Ministers of the Environment Freshwater Aquatic Life (CCME-AL) guidelines and/or the Mount Nansen Effluent Quality Standards (EQS) criteria are highlighted. The lab certificates of analysis are also attached. Many results reflect typical conditions for this time of year at Mount Nansen where water levels have decreased and watercourses are covered in ice. Noteworthy observations and comments on sample QA/QC are included in the subsections below.

Noteworthy Observations

- Back Creek and Pony Creek were both frozen to substrate. It is likely these sites will remain frozen through the winter as is typical for these sites.
- The four Victoria Creek samples did not exceed any guidelines or standard criteria during the November 2015 trip – this is similar to the October 2015 results.
- The CH-P-13-01 site was close to freezing to bed, and the November 2015 sample will likely be the last collected for the winter period. The sample had several parameters that exceeded both CCME-AL guidelines and/or Mount Nansen EQS, including pH, total suspended solids (TSS), aluminum, arsenic, cadmium, copper, iron, manganese, mercury, silver, and zinc. Only aluminum, cadmium and zinc exceeded the guidelines and/or standards based on both the total and dissolved metals concentrations. It is common for this site to exceed some parameters (pH, total and dissolved aluminum, cadmium, and zinc) however many parameters were likely higher in the November 2015 samples due to bed material being disturbed during sample collection through the ice hence the high TSS value. The sediment did not settle, despite the field crew waiting several minutes before collecting the samples.
- The total zinc concentration in the November 2015 WQ-SEEP sample was above the CCME-AL guideline with a concentration of 0.103 mg/L (an increase from 0.0679 mg/L in October 2015 and 0.0436 mg/L in September 2015). It is likely concentrations will continue to increase as water levels decrease and ions become more concentrated in the water column. This site also commonly exceeds the guidelines and/or standards for ammonia, arsenic, cadmium, copper, iron, and manganese. The LC50 sample result for November 2015 sample was greater than the

100% concentration, and there was 90% rainbow trout survival in the 96 hour test. These results were similar result to the September 2015 sample.

- The ammonia CCME-AL guideline was exceeded at the WQ-SEEP, WQ-DC-U and WQ-DC-R sites. This is a common monthly occurrence at WQ-SEEP, but occurs less frequently at the sites downstream on Dome Creek (WQ-DC-U and WQ-DC-R).

QA/QC Samples

Travel Blank Sample – The travel blank had all parameters below detection limits, except for total chromium and ammonia. Ammonia is often above detection levels when samples provided to the lab are dated. The total chromium concentration was just above the detection level by 0.00001 mg/L. Parameters above detection limits suggest that contamination from transportation and/or storage may have occurred; however, total chromium concentrations for all other samples appear to be within their normal range, thus there are no concerns for sample contamination.

Field Blank Sample – all parameters were below detection limits.

Replicate Sample(s) – The average RPD of the replicate sample set for WQ-VC-UMN-r and WQ-DC-B-r was 1% and 3%, respectively, indicating that sample analysis was adequately precise. The average RPD for total metals in the two replicate samples was 3% and 2%, respectively. The average RPD for dissolved metals was 1% and 2% in the two replicate sets, respectively. For the WQ-VC-UMN-r replicate set, there were no individual parameters with RPDs> 20%. For the WQ-DC-B-r replicate set, only one parameter had an RPD>20% (nitrate), suggesting that there is some imprecision in the lab instrumentation or high natural variability.

PROGRAM RECOMMENDATIONS

- Continue to collect photographs and snow depths adjacent to the meteorological station compound to confirm snow sensor data.
- Discharge measurements should continue to be collected at the H-VC-R and H-VC-R+290 stations using the mid-section ADV method to compare hydrometric conditions at the two stations during the November and December 2015 site visits where possible.
- Monitor sediment deposition in the H-DC-M WP station weir pond and recommend excavation as required. Also monitor ice build up at the H-DC-M WP
- Continue to monitor water quality at the WQ-SEEP – zinc concentrations have been increasing along with other parameters and it is likely they will continue to do so through the winter. LC50 samples will be collected again in February 2016; to date in 2015 results have been greater than the 100% concentration over the 96-hour test.
- Revisit sites/stations that have frozen to substrate in March 2016 (depending on spring weather conditions). It is common for many areas to remain frozen to substrate through April and May. This likely applies to WQ-DC-DX, H/WQ-DC-D1b, WQ-PC-U, WQ-PC-D, H-PC-DSP,

H/WQ-BC, H/WQ-DC-R, and WQ-CH-P-13-01; as well as the other seeps that have been dry most of the 2015 open water season – WQ-ADIT-SEEP, WQ-LW-SEEP-01, WQ-MS-S-08.

ADDITIONAL TRIP INFORMATION

Any changes to project scope (i.e. additional sites sampled):	The next trip is scheduled for December 14-16, 2015 and will represent the second sampling event of the winter season.
Any alterations to sample schedule/budget:	None.
Additional Comments:	It is expected several additional sites and stations will freeze to bed by next trip (WQ-CH-P-13-01, H/WQ-DC-B and H/WQ-DC-R). EDI tested new sensors and instrumentation (Sommer Flow Tracer) for salt tracer discharge measurements during the November 2015 trip. This instrument allows for real-time data review and discharge computations which enhances field based quality control. The Sommer Flow Tracer is anticipated to increase the efficiency and cost effectiveness of post-field data processing.
Wildlife Sightings:	None.
Site concerns (safety):	None.

LIST OF ATTACHMENTS

The following information is attached to this monthly report:

1. Maps of Hydrometric Stations and Water Quality Sites
2. Site and Station Photos from the trip
3. Data Tables
    a. Hydrology – Site Conditions and Tasks Completed & Summary Table of Discharge Measurements.
    b. Water Quality – Site Conditions and Samples Collected & Summary Table of In Situ Parameters and Lab Results
4. Copies of Lab Certificate of Analysis (COA) & Yukon Environmental Health Services Bacteriological Results (November 2015).

388000 389000 390000

6882000 6881000

N

Pony Creek

Buck Creek

Mount Nansen Road

Brown-McDade Pit Lake

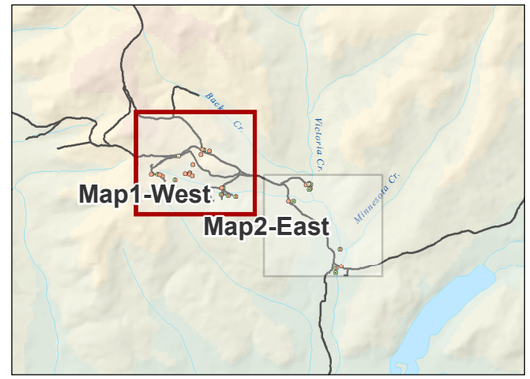
Tailings Facility

Bunkhouse

Mill

Dome Creek

H-PC-DSP
WQ-PC-U
WQ-PC-D
WQ-ADIT-SEEP
WQ-L1
WQ-PIT
ATM-ROAD
WQ-NW-SEEP-02
WQ-L2
WQ-ORE
WQ-LW-SEEP-01
WQ-WR-SEEP-A
WQ-WR-SEEP-B
WQ-DC-DX
H/WQ-DC-DX+105
WQ-MS-S-03
WQ-MS-S-08
WQ-DESS-03
WQ-CH-P-13-01
WQ-DESS-02
WQ-DESS-01
H/WQ-DC-D1B
WQ-DC-B
H-DC-B
H/WQ-TP
H/WQ-SEEP
H-DC-M/WQ-DC-U



Legend

- Atmospheric Station (label e.g. ATM-ROAD)
- Hydrometric Station and Water Quality Site (label e.g. H/WQ-VC-UMN)
- Hydrometric Station (label e.g. H-VC-R)
- Water Quality Site (label e.g. WQ-PC-U)
- Temporary Water Quality Site (label e.g. WQ-MS-S-03)
- Unpaved Road/Access

Mount Nansen Site (West): Hydrometric Stations and Water Quality Sites

Notes:

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

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

Imagery provided by Yukon Government - Energy, Mines and Resources - Abandoned Mines Branch.

Project data displayed is site specific. Data collected by EDI Environmental Dynamics Inc. (2015) was obtained using Garmin GPS technology.

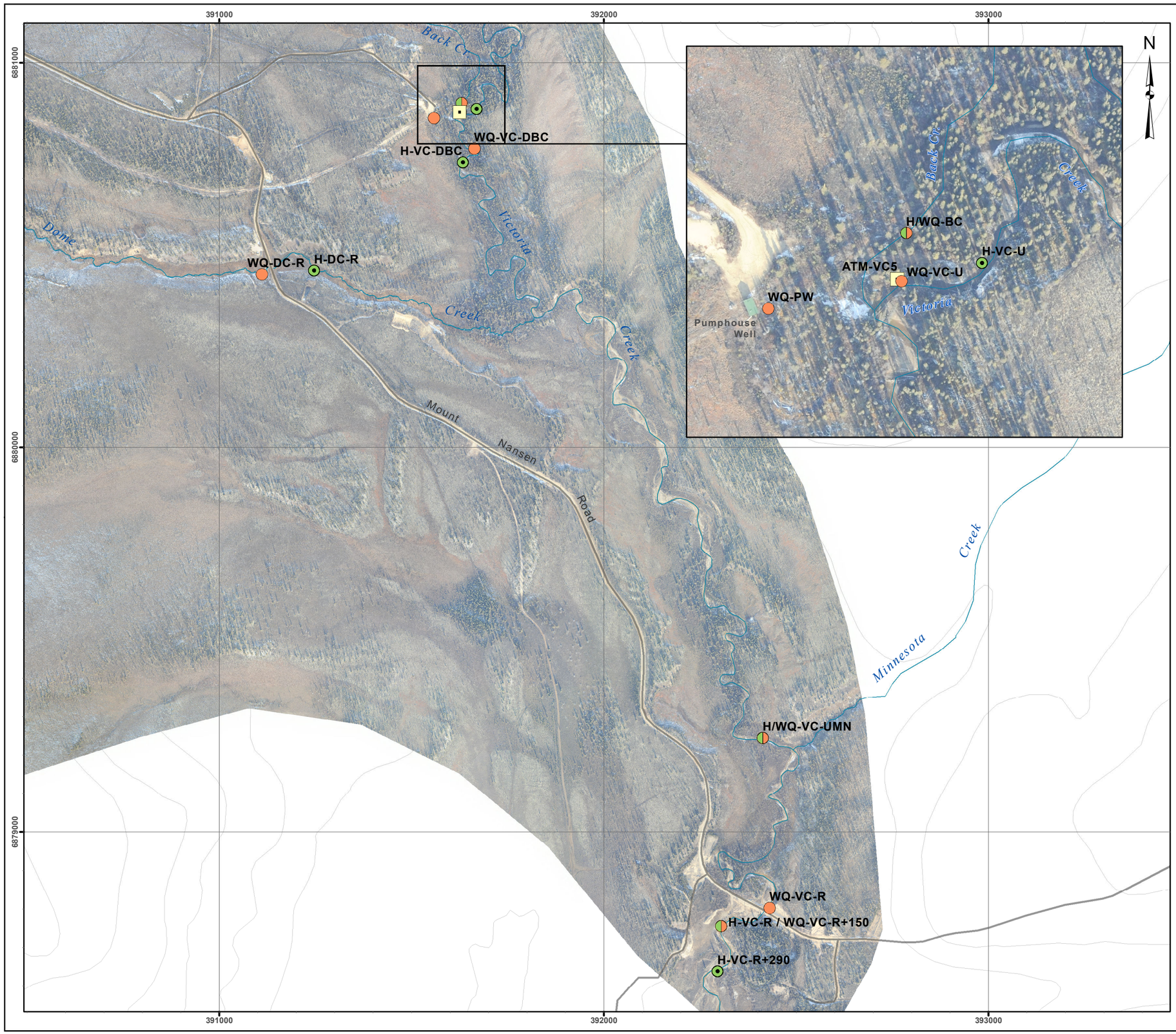
0 50 100 200 300 400 500
metres

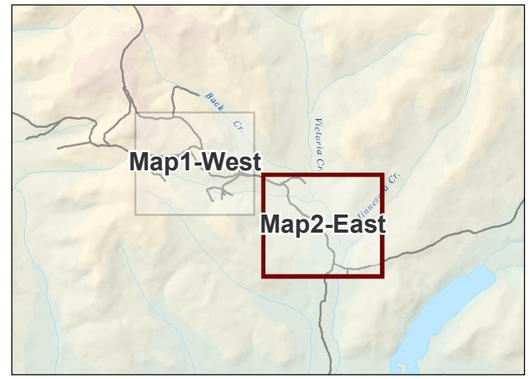
Map Scale = 1:10,000 (printed on 11 x 17)
Map Projection: NAD 1983 UTM Zone 8N

Drawn: MP	Checked: MM/SD	Date: 21/09/2015	MAP 1

Yukon EDI

Path: J:\Yukon\Projects\2015\15Y0146_AAM_Mount_Nansen\Mapping\FinalMaps\Map1_WestSites_2015.mxd





Legend

- Atmospheric Station (label e.g. ATM-ROAD)
- Hydrometric Station and Water Quality Site (label e.g. H/WQ-VC-UMN)
- Hydrometric Station (label e.g. H-VC-R)
- Water Quality Site (label e.g. WQ-PC-U)
- Temporary Water Quality Site (label e.g. WQ-MS-S-03)
- Unpaved Road/Access

Mount Nansen Site (East): Hydrometric Stations and Water Quality Sites

Notes:

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

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

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0 50 100 200 300 400 500
metres

Map Scale = 1:10,000 (printed on 11 x 17)
Map Projection: NAD 1983 UTM Zone 8N

Drawn:	Checked:	Date:	
MP	MM/SD	21/09/2015	**MAP 2**

Path: J:\Yukon\Projects\2015\15Y0146_AAM_Mount_Nansen\Mapping\FinalMaps\Map2_EastSites_2015.mxd

Photo 1. WQ-DC-DX – looking downstream. Site frozen to substrate.

Photo 2. H/WQ-DC-DX+105 – looking upstream.

Photo 3. WQ-MS-S-08 – overview, seep dry.

Photo 4. H/WQ-DC-D1b – looking downstream. Site frozen to bed.

Photo 5. WQ-DC-B – looking upstream.

Photo 6. H-DC-B – looking upstream.

Photo 7. H-DC-M WP – looking upstream. Ice removed from outlet of weir.

Photo 8. WQ-DC-U – looking downstream.

Photo 9. WQ-DC-R – looking upstream.

Photo 10. H-DC-R – looking upstream.

Photo 11. WQ-CH-P-13-01 – looking downstream.

Photo 12. WQ-LW-SEEP-01 – site dry

Photo 13. H/WQ-SEEP – overview. Pipe removed from culvert for discharge measurement.

Photo 14. H-TP – Site dry at staff gauges.

Photo 15. WQ-TP – overview sample site.

Photo 16. WQ-PC-U – overview of sample site. Site frozen to bed.

Photo 17. WQ –PC-D – looking upstream. Site frozen to bed.

Photo 18. H-PC-DSP – overview of sample site. Site frozen and culvert filled with ice.

Photo 19. WQ–ADIT-SEEP site dry.

Photo 20. H/WQ-BC – looking upstream. Ice layer above frozen bed.

Photo 21. H-VC-U – looking upstream.

Photo 22. WQ-VC-U – looking downstream.

Photo 23. H-VC-DBC – looking upstream.

Photo 24. WQ-VC-U – looking upstream.

Photo 25. H/WQ-VC-UMN – looking upstream.

Photo 26. H-VC-UMN – looking downstream.

Photo 27. WQ-VC-R – overview.

Photo 28. H-VC-R – looking downstream.

Photo 29. H-VC-R+290 – looking upstream.

Photo 30. H/WQ-PW – overview.

Photo 31. Meteorological station overview.

Photo 32. Meteorological station overview.

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
391	ATM-VC5	17/11/2015	9:20	N					Logger downloaded. Some foam from insulating tube frozen to logger below sensor ports. Measurements unaffected.
387	H-DC-DX+105	18/11/2015	13:20	SS	0.002				Ice thinkness up to 0.02 m in channel, with several open water leads. Minor algae growth present in channel. Sommer salt tracer used for discharge estimate.
389	H-DC-D1b	17/11/2015	14:50	N	0.000	X			Frozen to bed with 0.1 m of ice. Chipped to bed to expose frozen soil.
384	H-DC-B	18/11/2015	9:50	SS	0.001				Ice thickness approximately 0.35 m near bridge, with softer, thin ice in vicinity of former stilling well location. Sommer salt tracer system used for discharge estimate.
393	H-TP	17/11/2015	17:45	N					Approximately 0.2 m of snow at staff gauges with no ice or water.
382	H-SEEP	17/11/2015	16:20	V	0.003				Ice buildup inside culvert, but water flowing freely from pipe. Pipe moved outside of culvert to collect volumetric measurement. Flow rate at pump - 154.447 L/min (0.0026 m3/s) and total discharge = 95744 L.
397	H-DC-M WP	17/11/2015	15:55	V	0.003	B	2.176	S	Outflow from culvert covered in ice. Flow contained behind ice layer. Pond covered with thin ice up to 0.02 m thick. Logger not downloaded due to damaged cable on portable downloading device. Staff gauge partially encased in ice and reading is unreliable.
388	H-DC-R	16/11/2015	17:00	SS	0.006				Ice thickness ranges from 0.05 to 0.15 m. Sommer salt tracer completed for discharge estimate.
392	H-PC-DSP	16/11/2015	16:50	N	0.000	X			Site frozen to bed with no free water. Culvert filled with ice at outlet with evidence of multiple episodes of overflow.
390	H-BC	17/11/2015	11:20						No discharge measurement completed. Thin layer of ice suspended above dry bed. Stilling well and logger removed from site for winter.
395	H-VC-U	17/11/2015	10:30	ADV-MID	0.148	B	2.046	S	Channel approximately half covered with ice. Ice chipped away at ADV cross-section location. Logger not downloaded due to damaged cable on portable downloading device. Will download next trip.
396	H-PW	18/11/2015	15:30	V	0.003				Pipe frozen in ice. Chipped away ice to collect volumetric measurement.
383	H-VC-DBC	17/11/2015	10:35	ADV-MID	0.176	B	1.870	S	Ice thickness varies from 0.02 to 0.15 m. Ice and snow in vicinity of stilling well cleared away to collect staff gauge reading. Some anchor ice chipped away at discharge measurement cross-section. Some backwater effect and overflow in channel during measurement.
394	H-VC-UMN	17/11/2015	12:45	ADV-MID	0.164	B	1.658	S	Thin ice generally present in centre of channel up to 0.02 m thick. Ice along banks is 0.05 m thick. Chipped away ice at ADV cross-section location. Moderate ice jamming downstream of discharge measurement location creating backwater effect. Logger not downloaded due to damaged cable on portable downloading device. Will download next trip.
386	H-VC-R	16/11/2015	14:10	ADV-MID	0.158	B	2.131	S	ADV conducted for discharge measurement. Ice thickness ranged from 0 to 0.1 m, with multiple open water leads in channel. Minor anchor ice at ADV cross-section, with small eddies near banks. Staff gauge covered with ice cleared away prior to collecting staff gauge readings. Minor backwater effect.
385	H-VC-R+290	16/11/2015	14:10	ADV-MID	0.158	E	2.350	S	Ice thickness varies from 0 to 0.1 m. One small open water lead downstream of stilling well. Well encased in thin ice. Chipped away ice to collect staff gauge reading.

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
P	Potential Place Mining Interference with Flow
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-ADIT-SEEP	N	16-Nov-15	Site dry with no flow. Not sampled.
WQ-BC	N	17-Nov-15	Dry channel below a layer of ice. No sample collected.
WQ-CH-P-13-01	Y	18-Nov-15	Site nearly frozen to bed but water still seeping up through bed and filling hole cut in ice. Some bed material disturbed while cutting hole in ice, possible soil particulate in water sample. Crew let water settle for 8 minutes before sampling.
WQ-DC-B	Y	17-Nov-15	SPC fluctuates from 1960 to 2040 uS/cm. Layered ice, no void layers or flowing water between layers. Very slow velocity.
WQ-DC-D1b	N	17-Nov-15	Frozen to bed. No water detected. Not sampled
WQ-DC-DX	N	18-Nov-15	Dry. Site frozen to bed. Snow 0.3 m deep at site. No sample collected.
WQ-DC-DX+105	Y	18-Nov-15	Minor ice in channel with many open water leads. Minor algae growth present in channel.
WQ-DC-R	Y	16-Nov-15	Overflow ice conditions upstream of culvert. Sampled at culvert intake (10 m downstream of normal location), water flowing over and under ice. Regular sampling site frozen to bed. Ice thickness greater than 0.3m No DO due to condensation on YSI screen.
WQ-DC-U	Y	17-Nov-15	Thin ice cover and deep snow. No sign of over icing upstream of site.
WQ-LW-SEEP-01	N	18-Nov-15	Dry. No sample taken.
WQ-MS-S-08	N	18-Nov-15	Dry. Not sampled
WQ-PC-D	N	16-Nov-15	Frozen to bed. No flow. Not sampled
WQ-PC-U	N	16-Nov-15	Frozen to bed. No flow. Not sampled
WQ-PW	Y	18-Nov-15	Outlet pipe frozen in ice. Broke up ice to raise pipe and collect sample.
WQ-SEEP	Y	17-Nov-15	Some ice built up in culvert. LC50 sampled collected.
WQ-TP	Y	17-Nov-15	Chipped through ice to collect sample. Collection point approximately 2m from shore. Unable to read DO measurement due to condensation buildup on YSI screen.
WQ-VC-DBC	Y	17-Nov-15	Open water leads upstream and downstream of sampling site. Chipped through ice to collect sample. DO calibrated at site. Unable to read DO measurement due to condensation buildup on YSI screen.
WQ-VC-R	Y	16-Nov-15	Sampled 10 m upstream of culvert on left bank. Water depth 0.12m and very slow flow. Snow 0.2 m deep. Unable to read DO measurement due to condensation buildup on YSI screen.
WQ-VC-R+150	N	-	This is the winter/early spring sampling location - samples are collected from WQ-VC-R until ice thickness becomes prohibitive for sampling with overflow ice conditions.
WQ-VC-U	Y	17-Nov-15	Chipped through ice to collect sample. Open leads upstream and downstream.

Water Quality Site	Sample Collected? (Y/N)	Measurement Date	Comments
WQ-VC-UMN	Y	17-Nov-15	Ice 0 to 0.05 m thick along channel. Centre of channel covered with thin ice. Large open water leads upstream and downstream.
QA/QC Samples			
Replicate 1	Y	17-Nov-15	Replicate collected at WQ-VC-UMN (sample ID WQ-VC-UMN-r).
Replicate 2	Y	17-Nov-15	Replicate collected at WQ-DC-B (sample ID WQ-DC-B-r).
Field Blank	Y	17-Nov-15	Sample bottles filled with deionized water supplied by ALS; samples were filtered and preserved as instructed. Collected at WQ-DC-B.
Travel Blank	Y	18-Nov-15	Samples provided by lab and were transported to and from site.

Summary of Water Quality Results for the November 16-18, 2015 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID/Site ID Date Sampled Detection Limit	WQ-VC-U 11/17/2015 10:05:00 AM	WQ-VC-DBC 11/17/2015 9:30:00 AM	WQ-VC-UMN 11/17/2015 12:35:00 PM	WQ-VC-UMN-R 11/17/2015 12:45:00 PM	QA/QC WQ-VC-UMN-r Replicate Analysis	WQ-VC-R 11/16/2015 3:13:00 PM	WQ-DC-DX+10S 11/18/2015 12:45:00 PM	WQ-CH-F-13-01 11/18/2015 12:10:00 PM	WQ-DC-B 11/17/2015 4:45:00 PM	WQ-DC-B-R 11/17/2015 4:55:00 PM	QA/QC WQ-DC-B-r Replicate Analysis	WQ-TP 11/17/2015 5:30:00 PM	WQ-SEEP 11/17/2015 4:30:00 PM	WQ-DC-U 11/17/2015 3:45:00 PM	WQ-DC-R 11/16/2015 4:30:00 PM	WQ-PW ** 11/18/2015 3:20:00 PM	FIELD BLANK 11/17/2015 4:45:00 PM
Temperature (in-situ)	°C	-	-	-	-0.3	-0.3	-0.3	-	-	0.3	-0.2	2.3	-0.4	-	-	-0.2	1.4	-0.3	-0.4	-	-
Specific Conductivity (in-situ)	µS/cm	-	-	-	121.7	218.8	48.8	-	-	247.9	1189.0	1865.0	2000	-	-	1601.0	1655.0	1415.0	1594.0	-	-
pH (in-situ)	pH	6.5 - 9.0	6.0 - 8.5	-	7.29	7.11	7.45	-	-	7.14	6.49	4.99	7.02	-	-	7.07	7.18	7.40	7.73	-	-
Dissolved Oxygen (in-situ)	mg/L	-	-	-	12.75	n/a	13.98	-	-	n/a	2.24	7.02	8.53	-	-	n/a	5.0	11.0	n/a	-	-
Turbidity (In-situ)	NTU	-	-	-	0.30	0.73	0.28	-	-	0.58	10.38	47.30	5.71	-	-	3.61	25.2	19.4	12.3	-	-
Colour, True	CU	15	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5.0	-
Conductivity	µS/cm	-	-	2	220	222	237	237	0%	238	1180	1900	2000	2020	1%	1600	1600	1390	1380	354	<2.0
Hardness (as CaCO3)	mg/L			0.5	116	117	123	123	0%	124	745	1260	1330	1330	0%	981	938	843	751	184	<0.50
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	7.88	7.83	7.89	7.88	0%	7.93	7.69	**6.19**	7.62	7.85	3%	8.01	7.50	7.8	7.75	8.16	**5.41**
Total Suspended Solids	mg/L	-	50	3	<3.0	<3.0	<3.0	<3.0	<DL	<5.0	6	**254**	<3.0	4.7	<DL	3.3	21.3	28.7	3.3	-	<3.0
Total Dissolved Solids	mg/L	-	-	1	121	122	132	132	0%	131	858	1660	1650	1630	1%	1310	1260	1060	1020	197	<1.0
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	93.6	95.5	95	95.5	1%	92.5	283	5	298	300	1%	124	268	239	242	-	<1.0
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<DL	<1.0	<1.0	<1.0	<1.0	<1.0	<DL	<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	<DL	<1.0	<1.0	<1.0	<1.0	<1.0	<DL	<1.0	<1.0	<1.0	<1.0	-	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	93.6	95.5	95	95.5	1%	92.5	283	5	298	300	1%	124	268	239	242	167	<1.0
Ammonia, Total (as N)	mg/L	0.75	-	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<DL	<0.0050	0.0215	0.0268	0.456	0.467	2%	0.119	**4.4**	**2.61**	**2.44**	-	<0.0050
Chloride (Cl)	mg/L	120	-	0.5	<0.50	<0.50	<0.50	<0.50	<DL	<0.50	<1.0	<2.5	<2.5	<2.5	<DL	<2.5	<2.5	1	1.2	<0.50	<0.50
Fluoride (F)	mg/L	0.12	-	0.02	0.039	0.04	0.039	0.038	<2xDL	0.047	**0.148**	<0.10	<0.10	<0.10	<DL	**0.18**	<0.10	0.08	0.089	0.09	<0.020
Nitrate (as N)	mg/L	13	-	0.005	0.171	0.17	0.16	0.16	0%	0.157	0.052	0.688	0.119	0.221	60%	0.166	0.89	0.301	0.568	0.134	<0.0050
Nitrite (as N)	mg/L	0.06	-	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<DL	<0.0010	<0.0020	<0.0050	<0.0050	<0.0050	<DL	<0.0050	0.0172	0.0102	0.0198	<0.0010	<0.0010
Sulfate (SO4)	mg/L	-	-	0.3	20.3	20.2	27.8	27.7	0%	27.4	419	1200	1000	981	2%	844	690	577	572	28.3	<0.30
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	<0.0050	<0.0050	<DL	<0.0050	<0.0050	0.0077	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	-	0.3	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<DL	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<DL	<0.0050	0.0216	0.0101	0.0083	-	<0.0050
Cyanate	mg/L	-	-	0.2	<0.20	<0.20	<0.20	<0.20	<DL	<0.20	0.32	<0.20	<0.20	<0.20	<DL	<0.20	<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	<0.50	<0.50	<DL	<0.50	3.75	0.82	0.68	-	<0.50
Aluminum (Al)-Total	mg/L	0.1	-	0.003	0.0115	0.0107	0.0189	0.0177	7%	0.0153	**0.136**	**2.74**	0.0072	0.0077	<2xDL	0.026	0.0148	**0.184**	0.0155	<0.010	<0.0030
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	0.00011	0.00011	0.00022	0.00023	<2xDL	0.00027	0.0113	0.00059	0.0013	0.00135	4%	0.0414	0.00049	0.00041	0.00059	<0.00050	<0.00010
Arsenic (As)-Total	mg/L	0.005	-	0.0001	0.00031	0.00029	0.00086	0.00086	0%	0.00094	**0.138**	**0.0134**	0.00428	0.00427	0%	**0.132**	**0.055**	**0.0954**	**0.0113**	0.00042	<0.00010
Barium (Ba)-Total	mg/L	-	1.0	0.00005	0.0724	0.0738	0.0712	0.069	3%	0.0717	0.0134	0.0626	0.0578	0.057	1%	0.0166	0.0592	0.0757	0.0714	0.082	<0.000050
Beryllium (Be)-Total	mg/L	-	-	0.00002	<0.000020	<0.000020	<0.000020	<0.000020	<DL	<0.000020	<0.000020	0.000102	<0.000040	<0.000040	<DL	<0.000040	<0.000020	<0.000020	<0.000020	-	<0.000020
Bismuth (Bi)-Total	mg/L	-	-	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<DL	<0.000050	<0.000050	<0.00010	<0.00010	<0.00010	<DL	0.0001	<0.000050	<0.000050	<0.000050	-	<0.000050
Boron (B)-Total	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.010	<DL	<0.010	<0.010	<0.020	0.02	<0.020	<DL	0.09	0.056	0.037	0.038	<0.10	<0.010
Cadmium (Cd)-Total *(Lab Result)*	mg/L	0.00009	0.02	0.000005	0.0000182	0.0000166	0.000018	0.000018	<2xDL	0.0000167	**0.00566**	**0.0136**	0.000075	0.000083	10%	**0.00117**	**0.00068**	0.000285	0.000136	<0.00020	<0.0000050
Cadmium (Cd)-Total (Hardness Adjusted Guideline)	*mg/L*				*0.000179*	*0.000181*	*0.000188*	*0.000188*	-	*0.000189*	*0.000370*	*0.000370*	*0.000370*	*0.000370*	-	*0.000370*	*0.000370*	*0.000370*	*0.000370*	-	*0.000370*
Calcium (Ca)-Total	mg/L	-	-	0.05	30.6	30.7	32.4	31.8	2%	32.3	190	330	300	304	1%	296	269	227	226	42.7	<0.050
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	0.00012	0.0001	0.00012	0.00014	<2xDL	0.00017	0.00023	0.00434	<0.00020	<0.00020	<DL	<0.00020	0.00055	0.00073	0.00041	<0.0020	<0.00010
Cobalt (Co)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<DL	<0.00010	0.00099	0.00183	0.00073	0.00071	3%	0.00069	0.00862	0.00442	0.00451	-	<0.00010
Copper (Cu)-Total *(Lab Result)*	mg/L	0.002	0.2	0.0005	0.00097	0.00098	0.00108	0.00104	<2xDL	0.00126	0.00121	**0.0049**	<0.00010	<0.00010	<DL	**0.0317**	**0.00464**	0.00227	0.00119	<0.0010	<0.00050
Copper (Cu)-Total (Hardness Adjusted Guideline)	*mg/L*	-	-	-	*0.00268*	*0.00270*	*0.00282*	*0.00282*	-	*0.00284*	*0.00400*	*0.00400*	*0.00400*	*0.00400*	-	*0.00400*	*0.00400*	*0.00400*	*0.00400*	-	*0.00400*
Iron (Fe)-Total	mg/L	0.3	1.0	0.01	0.023	0.021	0.037	0.036	<2xDL	0.065	**1.54**	**4.6**	**2.95**	**2.95**	0%	0.251	**12.5**	**12**	**1.84**	<0.030	<0.010
Lead (Pb)-Total *(Lab Result)*	mg/L	0.001	0.1	0.00005	<0.000050	<0.000050	0.000063	0.000062	<2xDL	<0.000050	0.00176	0.00471	<0.00010	<0.00010	<DL	**0.01010**	0.000064	0.000317	0.000073	0.00063	<0.000050
Lead (Pb)-Total (Hardness Adjusted Guideline)	*mg/L*				*0.00384*	*0.00389*	*0.00414*	*0.00414*	-	*0.00418*	*0.00700*	*0.00700*	*0.00700*	*0.00700*	-	*0.00700*	*0.00700*	*0.00700*	*0.00700*	-	*0.00700*
Lithium (Li)-Total	mg/L	-	-	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<DL	<0.0010	0.0087	0.0036	0.0054	0.0055	2%	0.0095	0.0014	0.0014	0.0014	-	<0.0010
Magnesium (Mg)-Total	mg/L	-	-	0.1	9.44	9.39	10	9.82	2%	9.89	62	98	136	136	0%	54.1	58.1	60.7	61.7	18.8	<0.10
Manganese (Mn)-Total	mg/L		0.5	0.0001	0.0469	0.0482	0.045	0.0427	5%	0.0381	**1.43**	**1.45**	**1.74**	**1.71**	2%	0.311	**6.69**	**4.68**	**4.52**	<0.0020	<0.00010
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.0000005	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<DL	<0.0000050	0.0000259	**0.0000297**	<0.0000050	<0.0000050	<DL	<0.0000010	0.0000394	0.0000383	<0.0000050	<0.00020	<0.0000050
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	0.000403	0.000402	0.000416	0.000413	1%	0.000395	0.000371	0.0002	0.00036	0.00036	0%	0.00143	0.000921	0.000772	0.000556	-	<0.000050
Nickel (Ni)-Total *(Lab Result)*	mg/L	0.025	0.3	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<DL	<0.00050	0.00188	0.0113	0.0013	0.0014	<2xDL	0.0013	0.00412	0.00249	0.00217	-	<0.00050
Nickel (Ni)-Total (Hardness Adjusted Guideline)	*mg/L*	-	-		*0.10699*	*0.10769*	*0.11186*	*0.11186*	-	*0.11255*	*0.15000*	*0.15000*	*0.15000*	*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	<0.050	<0.050	<DL	<0.050	<0.050	<0.050	<0.050	-	<0.050
Potassium (K)-Total	mg/L	-	-	0.1	0.61	0.63	0.67	0.67	0%	0.72	3.5	1.64	3.69	3.78	2%	18.2	6.13	4.51	6.3	0.9	<0.10
Selenium (Se)-Total	mg/L	0.001	-	0.00005	<0.000050	0.000051	<0.000050	<0.000050	<DL	<0.000050	0.000056	0.0002	<0.00010	<0.00010	<DL	<0.00010	0.000314	0.000228	0.000169	<0.0010	<0.000050
Silicon (Si)-Total	mg/L	-	-	0.05	6.09	6.01	6.13	5.98	2%	6.21	6.84	12.7	7.88	7.97	1%	3.31	7.51	7.22	8.03	-	<0.050
Silver (Ag)-Total	mg/L	0.0001	0.1	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<DL	<0.000010	0.000028	**0.000116**	<0.000020	<0.000020	<DL	**0.000197**	0.000028	0.000027	<0.000010	-	<0.000010
Sodium (Na)-Total	mg/L	-	-	0.05	2.84	2.82	3.2	3.13	2%	3.17	5.24	8.08	15.8	15.2	4%	19.8	34.9	22.7	27.9	5.3	<0.050
Strontium (Sr)-Total	mg/L	-	-	0.0002	0.32	0.32	0.327	0.316	3%	0.295	0.448	0.699	1.13	1.16	3%	0.742	0.752	0.694	0.695	-	<0.00020
Sulfur (S)-Total	mg/L	-	-	0.5	7.27	7.41	9.97	9.73	2%	9.82	146	394	342	339	1%	289	238	199	203	-	<0.50
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<DL	<0.000010	0.000112	0.000054	<0.000020	<0.000020	<DL	0.000179	<0.000010	<0.000010	<0.000010	-	<0.000010
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<DL	<0.00010	<0.00010	<0.00020	<0.00020	<0.00020	<DL	<0.00020	<0.00010	<0.00015	<0.00010	-	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.0003	<0.00030	<0.00030	<0.00030	0.00043	<2xDL	0.00032	0.0066	0.0622	<0.00060	<0.00060	<DL	<0.0018	<0.00018	0.0113	<0.0015	-	<0.00030
Uranium (U)-Total	mg/L	0.015	-	0.00001	0.000685	0.000663	0.000703	0.00068	3%	0.000626	0.00452	0.000111	0.0049	0.00501	2%	0.00122	0.00221	0.00141	0.00143	0.00163	<0.0000010
Vanadium (V)-Total	mg/L	-	-	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<DL	<0.00050	0.00091	0.0078	<0.0010	<0.0010	<DL	<0.0010	0.00221	0.00221	0.00089	-	<0.00050
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	<0.0030	<0.0030	<0.0030	<0.0030	<DL	<0.0030	**0.885**	**4.6**	0.0196	0.0193	2%	**0.127**	**0.103**	**0.0421**	0.0238	<0.050	<0.0030
Aluminum (Al)-Dissolved	mg/L	0.1	-	0.001	0.0069	0.007	0.0069	0.0066	4%	0.0092	<0.0010	**0.159**	0.0034	0.0037	<2xDL	0.007	0.0091	0.0082	0.0107	-	<0.0010
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	0.00019	0.0002	<2xDL	0.00029	0.0103	<0.00020	0.00125	0.00131	5%	0.0408	0.00046	0.00027	0.0005	-	<0.00010
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	0.00025	0.00025	0.00077	0.00077	0%	0.00085	**0.0119**	0.00053	0.00386	0.00375	3%	**0.0959**	**0.0416**	**0.0499**	**0.00893**	-	<0.00010
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.0722	0.0727	0.0698	0.0699	0%	0.0707	0.0111	0.0149	0.0561	0.057	2%	0.0151	0.0579	0.0637	0.0655	-	<0.000050
Beryllium (Be)-Dissolved	mg/L	-	-	0.00002	<0.000020	<0.000020	<0.000020	<0.000020	<DL	<0.000020	<0.000020	<0.000040	<0.000040	<0.000040	<DL	<0.000040	<0.000020	<0.000020	<0.000020	-	<0.000020
Bismuth (Bi)-Dissolved	mg/L	-	-	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<DL	<0.000050	<0.000050	<0.00010	<0.00010	<0.00010	<DL	<0.00010	<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	<0.020	<0.020	<0.020	<DL	0.086	0.049	0.032	0.03	-	<0.010
Cadmium (Cd)-Dissolved *(Lab Result)*	mg/L	0.00009	-	0.0000005	0.000018	0.0000165	0.0000151	0.0000152	<2xDL	0.0000205	**0.000963**	**0.0116**	0.000079	0.000083	5%	**0.000986**	**0.000559**	0.000138	0.000117	-	<0.0000050
Cadmium (Cd)-Diss. (Hardness Adjusted Guideline)	*mg/L*	-	-		*0.000179*	*0.000181*	*0.000188*	*0.000188*	-	*0.000189*	*0.000370*	*0.000370*	*0.000370*	*0.000370*	-	*0.000370*	*0.000370*	*0.000370*	*0.000370*	-	*0.000370*
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	31.1	31.3	32.8	32.6	1%	33.3	196	342	310	308	1%	305	280	235	209	-	<0.050
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<DL	<0.00010	<0.00010	0.00052	<0.00020	<0.00020	<DL	<0.00020	0.00038	0.00025	0.00031	-	<0.00010
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<DL	<0.00010	0.00082	<0.00020	0.00071	0.0007	1%	0.00064	0.00844	0.00414	0.00406	-	<0.00010
Copper (Cu)-Dissolved *(Lab Result)*	mg/L	0.002	-	0.0002	0.0009	0.00092	0.00096	0.00098	<2xDL	0.00116	<0.00020	0.0011	<0.00040	<0.00040	<DL	**0.0262**	0.00245	0.00093	0.0009	-	<0.00020
Copper (Cu)-Diss. (Hardness Adjusted Guideline)	*mg/L*	-	-		*0.00268*	*0.00270*	*0.00282*	*0.00282*	-	*0.00284*	*0.00400*	*0.00400*	*0.00400*	*0.00400*	-	*0.00400*	*0.00400*	*0.00400*	*0.00400*	-	*0.00400*
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	0.013	0.016	0.017	0.017	<2xDL	0.036	0.093	0.066	**2.72**	**2.6**	5%	0.033	**11**	**4.17**	**1.54**	-	<0.010
Lead (Pb)-Dissolved *(Lab Result)*	mg/L	0.001	-	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<DL	<0.000050	<0.000050	<0.00010	<0.00010	<0.00010	<DL	0.00148	<0.000050	<0.000050	<0.000050	-	<0.000050
Lead (Pb)-Diss. (Hardness Adjusted Guideline)	*mg/L*	-	-		*0.00384*	*0.00389*	*0.00414*	*0.00414*	-	*0.00418*	*0.00700*	*0.00700*	*0.00700*	*0.00700*	-	*0.00700*	*0.00700*	*0.00700*	*0.00700*	-	*0.00700*
Lithium (Li)-Dissolved	mg/L	-	-	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<DL	0.001	0.0085	0.0025	0.0053	0.0054	2%	0.0091	0.0013	0.0012	0.0012	-	<0.0010
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	9.46	9.55	10.1	10.1	0%	10	61.8	98.5	135	135	0%	53.5	58.2	62	55.4	-	<0.10
Manganese (Mn)-Dissolved	mg/L	-	-	0.0001	0.0455	0.0447	0.0404	0.0411	2%	0.0368	1.27	0.266	1.71	1.7	1%	0.297	6.73	4.6	4.22	-	<0.00010
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.0000005	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<DL	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<DL	<0.0000050	<0.0000050	<0.0000050	<0.0000050	-	<0.0000050
Molybdenum (Mo)-Dissolved	mg/L	0.0073	-	0.00005	0.000382	0.00038	0.000381	0.000366	4%	0.000378	0.000343	**<0.00010**	0.00033	0.00034	3%	0.00143	0.00089	0.000726	0.000496	-	<0.000050
Nickel (Ni)-Dissolved *(Lab Result)*	mg/L	0.025	-	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<DL	<0.00050	0.00174	0.0092	0.0014	0.0013	<2xDL	0.0012	0.00407	0.00207	0.00198	-	<0.00050
Nickel (Ni)-Diss. (Hardness Adjusted Guideline)	*mg/L*	-	-	-	*0.10699*	*0.10769*	*0.11186*	*0.11186*	-	*0.11255*	*0.15000*	*0.15000*	*0.15000*	*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	<0.050	<DL	<0.050	<0.050	<0.050	<0.050	-	<0.050
Potassium (K)-Dissolved	mg/L	-	-	0.1	0.59	0.62	0.66	0.67	2%	0.8	3.58	1.39	3.87	3.77	3%	18.5	6.53	4.77	5.45	-	<0.10
Selenium (Se)-Dissolved	mg/L	0.001	-	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<DL	<0.000050	<0.000050	<0.00010	<0.00010	<0.00010	<DL	<0.00010	0.000297	0.000151	0.000137	-	<0.000050
Silicon (Si)-Dissolved	mg/L	-	-	0.05	6.06	6.06	6.05	6.04	0%	6.2	6.55	9.44	7.88	7.83	1%	3.26	7.62	6.7	7.34	-	<0.050
Silver (Ag)-Dissolved	mg/L	0.0001	-	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<DL	<0.000010	<0.000010	<0.000020	<0.000020	<0.000020	<DL	0.000046	<0.000010	<0.000010	<0.000010	-	<0.000010
Sodium (Na)-Dissolved	mg/L	-	-	0.05	2.7	2.66	3.12	3.06	2%	3.07	5.08	8.07	15.2	15.1	1%	18.8	35.1	22.5	23.6	-	<0.050
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	0.313	0.307	0.309	0.312	1%	0.293	0.433	0.696	1.12	1.15	3%	0.745	0.743	0.68	0.617	-	<0.00020
Sulfur (S)-Dissolved	mg/L	-	-	0.5	7.12	7.18	9.62	9.61	0%	9.57	140	394	331	332	0%	281	230	196	177	-	<0.50
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<DL	<0.000010	0.00009	<0.000020	<0.000020	<0.000020	<DL	0.000177	<0.000010	<0.000010	<0.000010	-	<0.000010
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<DL	<0.00010	<0.00010	<0.00020	<0.00020	<0.00020	<DL	<0.00020	<0.00010	<0.00010	<0.00010	-	<0.00010
Titanium (Ti)-Dissolved	mg/L	-	-	0.0003	<0.00030	<0.00030	<0.00030	<0.00030	<DL	<0.00030	<0.00030	<0.00060	<0.00060	<0.00060	<DL	<0.00060	<0.00015	<0.00012	0.00096	-	<0.00030
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.000654	0.000651	0.00067	0.000671	0%	0.000614	0.0043	<0.000020	0.00487	0.0049	1%	0.00121	0.00216	0.00136	0.00125	-	<0.0000010
Vanadium (V)-Dissolved	mg/L	-	-	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<DL	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<DL	<0.0010	0.00162	0.00092	0.00057	-	<0.00050
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<DL	0.0021	**0.795**	**4.52**	0.019	0.0199	4%	**0.111**	**0.0991**	0.028	0.0263	-	<0.0010

Applied Guidelines: 'Federal CCME Canadian Environmental Quality Guidelines (May 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. Refer to Methodology Document for details.

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.

QA/QC Travel/Field Blank Analysis - The travel blank had all parameters below detection limits, except for total chromium and ammonia. Ammonia is often above detection levels when samples provided by lab are dated. The total chromium concentration was just above the detection level by 0.00001 mg/L. Parameters above detection limits suggest that contamination from transportation and/or storage may have occured. However, total chromium concentrations for all other samples appear to be within their normal range, thus there are no further concerns for sample contamination. The field blank had all parameters below detection limit.

QA/QC Replicate Analysis - The average RPD of the replicate sample set for WQ-VC-UMN-r and WQ-DC-B-r was 1% and 3%, respectively, indicating that sample analysis was adequately precise. The average RPD for total metals in the two replicate samples was 3% and 2%, respectively. The average RPD for dissolved metals was 1% and 2% in the two replicate sets. For the WQ-VC-UMN-r replicate set, there were no individual parameters with RPDs > 20%. For the WQ-DC-B-r replicate set, only one parameter had an RPD > 20% (for nitrate), suggesting that there is some inprecision in the lab instrumention or high natural variability.

Summary of Water Quality Results for the November 16-18, 2015 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID/Site ID Date Sampled Detection Limit	TRAVEL BLANK
Temperature (in-situ)	°C	-	-	-	-
Specific Conductivity (in-situ)	µS/cm	-	-	-	-
pH (in-situ)	pH	6.5 - 9.0	6.0 - 8.5	-	-
Dissolved Oxygen (in-situ)	mg/L	-	-	-	-
Turbidity (In-situ)	NTU	-	-	-	-
Colour, True	CU	15	-	5	-
Conductivity	µS/cm	-	-	2	<2.0
Hardness (as CaCO3)	mg/L	-	-	0.5	<0.50
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	5.37
Total Suspended Solids	mg/L	-	50	3	<3.0
Total Dissolved Solids	mg/L	-	-	1	<1.0
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	<1.0
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	1	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	<1.0
Ammonia, Total (as N)	mg/L	0.75	-	0.005	0.0133
Chloride (Cl)	mg/L	120	-	0.5	<0.50
Fluoride (F)	mg/L	0.12	-	0.02	<0.020
Nitrate (as N)	mg/L	13	-	0.005	<0.0050
Nitrite (as N)	mg/L	0.06	-	0.001	<0.0010
Sulfate (SO4)	mg/L	-	-	0.3	<0.30
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	<0.0050
Cyanide, Total	mg/L	-	0.3	0.005	<0.0050
Cyanate	mg/L	-	-	0.2	<0.20
Thiocyanate (SCN)	mg/L	-	-	0.5	<0.50
Aluminum (Al)-Total	mg/L	0.1	-	0.003	<0.0030
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	<0.00010
Arsenic (As)-Total	mg/L	0.005	-	0.0001	<0.00010
Barium (Ba)-Total	mg/L	-	1.0	0.00005	<0.000050
Beryllium (Be)-Total	mg/L	-	-	0.00002	<0.000020
Bismuth (Bi)-Total	mg/L	-	-	0.00005	<0.000050
Boron (B)-Total	mg/L	-	-	0.01	<0.010
Cadmium (Cd)-Total *(Lab Result)*	mg/L	0.00009	0.02	0.000005	<0.0000050
Cadmium (Cd)-Total (Hardness Adjusted Guideline)	*mg/L*	-	-		*0.000170*
Calcium (Ca)-Total	mg/L	-	-	0.05	<0.050
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	0.00011
Cobalt (Co)-Total	mg/L	-	-	0.0001	<0.00010
Copper (Cu)-Total *(Lab Result)*	mg/L	0.002	0.2	0.0005	<0.00050
Copper (Cu)-Total (Hardness Adjusted Guideline)	*mg/L*	-	-		*0.00400*
Iron (Fe)-Total	mg/L	0.3	1.0	0.01	<0.010
Lead (Pb)-Total *(Lab Result)*	mg/L	0.001	0.1	0.00005	<0.000050
Lead (Pb)-Total (Hardness Adjusted Guideline)	*mg/L*	-	-		*0.00700*
Lithium (Li)-Total	mg/L	-	-	0.001	<0.0010
Magnesium (Mg)-Total	mg/L	-	-	0.1	<0.10
Manganese (Mn)-Total	mg/L	-	0.5	0.0001	<0.00010
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.000005	<0.0000050
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	<0.000050
Nickel (Ni)-Total *(Lab Result)*	mg/L	0.025	0.3	0.0005	<0.00050
Nickel (Ni)-Total (Hardness Adjusted Guideline)	*mg/L*	-	-		*0.15000*
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050
Potassium (K)-Total	mg/L	-	-	0.1	<0.10
Selenium (Se)-Total	mg/L	0.001	-	0.00005	<0.000050
Silicon (Si)-Total	mg/L	-	-	0.05	<0.050
Silver (Ag)-Total	mg/L	0.0001	0.1	0.00001	<0.000010
Sodium (Na)-Total	mg/L	-	-	0.05	<0.050
Strontium (Sr)-Total	mg/L	-	-	0.0002	<0.00020
Sulfur (S)-Total	mg/L	-	-	0.5	<0.50
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	<0.000010
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.0003	<0.00030
Uranium (U)-Total	mg/L	0.015	-	0.00001	<0.000010
Vanadium (V)-Total	mg/L	-	-	0.0005	<0.00050
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	<0.0030
Aluminum (Al)-Dissolved	mg/L	0.1	-	0.001	-
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	-
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	-
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	-
Beryllium (Be)-Dissolved	mg/L	-	-	0.00002	-
Bismuth (Bi)-Dissolved	mg/L	-	-	0.00005	-
Boron (B)-Dissolved	mg/L	-	-	0.01	-
Cadmium (Cd)-Dissolved *(Lab Result)*	mg/L	0.00009	-	0.000005	-
Cadmium (Cd)-Diss. (Hardness Adjusted Guideline)	*mg/L*	-	-		-
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	-
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	-
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	-
Copper (Cu)-Dissolved *(Lab Result)*	mg/L	0.002	-	0.0002	-
Copper (Cu)-Diss. (Hardness Adjusted Guideline)	*mg/L*	-	-		-
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	-
Lead (Pb)-Dissolved *(Lab Result)*	mg/L	0.001	-	0.00005	-
Lead (Pb)-Diss. (Hardness Adjusted Guideline)	*mg/L*	-	-		-
Lithium (Li)-Dissolved	mg/L	-	-	0.001	-
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	-
Manganese (Mn)-Dissolved	mg/L	-	-	0.0001	-
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.000005	-
Molybdenum (Mo)-Dissolved	mg/L	0.0073	-	0.00005	-
Nickel (Ni)-Dissolved *(Lab Result)*	mg/L	0.025	-	0.0005	-
Nickel (Ni)-Diss. (Hardness Adjusted Guideline)	*mg/L*	-	-	-	-
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	-
Potassium (K)-Dissolved	mg/L	-	-	0.1	-
Selenium (Se)-Dissolved	mg/L	0.001	-	0.00005	-
Silicon (Si)-Dissolved	mg/L	-	-	0.05	-
Silver (Ag)-Dissolved	mg/L	0.0001	-	0.00001	-
Sodium (Na)-Dissolved	mg/L	-	-	0.05	-
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	-
Sulfur (S)-Dissolved	mg/L	-	-	0.5	-
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	-
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	-
Titanium (Ti)-Dissolved	mg/L	-	-	0.0003	-
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	-
Vanadium (V)-Dissolved	mg/L	-	-	0.0005	-
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	-

Applied Guidelines: 'Federal CCME Canadian Environmental Quality Guidelines (May 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. Refer to Methodology Document for details.

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

Date Received: 19-NOV-15
Report Date: 07-DEC-15 17:08 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1704418

Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 15-Y-0146
C of C Numbers: 1, 2, 3
Legal Site Desc:

Comments:

Can Dang
Senior Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1704418-1 Water 18-NOV-15 12:45 WQ-DC-DX+105	L1704418-2 Water 17-NOV-15 12:45 WQ-VC-UMN-R	L1704418-3 Water 17-NOV-15 12:35 WQ-VC-UMN	L1704418-4 Water 17-NOV-15 10:05 WQ-VC-U	L1704418-5 Water 16-NOV-15 16:30 WQ-DC-R
WATER						
Physical Tests	Conductivity (uS/cm)	1180	237	237	220	1380
	Hardness (as CaCO3) (mg/L)	745	123	123	116	751
	pH (pH)	7.69	7.88	7.89	7.88	7.75
	Total Suspended Solids (mg/L)	6.0	<3.0	<3.0	<3.0	3.3
	Total Dissolved Solids (mg/L)	858	132	132	121	1020
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	283	95.5	95.0	93.6	242
	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)	283	95.5	95.0	93.6	242
	Ammonia, Total (as N) (mg/L)	0.0215	<0.0050	<0.0050	<0.0050	2.44
	Chloride (Cl) (mg/L)	<1.0 DLA	<0.50	<0.50	<0.50	1.2
	Fluoride (F) (mg/L)	0.148	0.038	0.039	0.039	0.089
	Nitrate (as N) (mg/L)	0.052	0.160	0.160	0.171	0.568
	Nitrite (as N) (mg/L)	<0.0020 DLA	<0.0010	<0.0010	<0.0010	0.0198
	Sulfate (SO4) (mg/L)	419	27.7	27.8	20.3	572
	Anion Sum (meq/L)	14.4	2.50	2.49	2.31	16.8
	Cation Sum (meq/L)	15.3	2.61	2.62	2.46	16.6
	Cation - Anion Balance (%)	2.9	2.2	2.6	3.3	-0.8
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	0.0083
	Cyanate (mg/L)	0.32	<0.20	<0.20	<0.20	<0.20
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	0.68
Total Metals	Aluminum (Al)-Total (mg/L)	0.136	0.0177	0.0189	0.0115	0.0155
	Antimony (Sb)-Total (mg/L)	0.0113	0.00023	0.00022	0.00011	0.00059
	Arsenic (As)-Total (mg/L)	0.138	0.00086	0.00086	0.00031	0.0113
	Barium (Ba)-Total (mg/L)	0.0134	0.0690	0.0712	0.0724	0.0714
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	0.038
	Cadmium (Cd)-Total (mg/L)	0.00566	0.0000180	0.0000180	0.0000182	0.000136
	Calcium (Ca)-Total (mg/L)	190	31.8	32.4	30.6	226
	Chromium (Cr)-Total (mg/L)	0.00023	0.00014	0.00012	0.00012	0.00041
	Cobalt (Co)-Total (mg/L)	0.00099	<0.00010	<0.00010	<0.00010	0.00451
	Copper (Cu)-Total (mg/L)	0.00121	0.00104	0.00108	0.00099	0.00119
	Iron (Fe)-Total (mg/L)	1.54	0.036	0.037	0.023	1.84
	Lead (Pb)-Total (mg/L)	0.00176	0.000062	0.000063	<0.000050	0.000073
	Lithium (Li)-Total (mg/L)	0.0087	<0.0010	0.0010	<0.0010	0.0014

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1704418-6	L1704418-7	L1704418-8	L1704418-9	L1704418-10
Description	Water	Water	Water	Water	Water
Sampled Date	17-NOV-15	17-NOV-15	17-NOV-15	17-NOV-15	17-NOV-15
Sampled Time	16:45	17:30	09:30	15:45	16:30
Client ID	WQ-DC-B	WQ-TP	WQ-VC-DBC	WQ-DC-U	WQ-SEEP
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	2000	1600	222	1390	1600
Hardness (as CaCO3) (mg/L)	1330	981	117	843	938
pH (pH)	7.62	8.01	7.83	7.80	7.50
Total Suspended Solids (mg/L)	<3.0	3.3	<3.0	28.7	21.3
Total Dissolved Solids (mg/L)	1650	1310	122	1060	1260
Anions and Nutrients Alkalinity, Bicarbonate (as CaCO3) (mg/L)	298	124	95.5	239	268
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)	298	124	95.5	239	268
Ammonia, Total (as N) (mg/L)	0.456	0.119	<0.0050	2.61	4.40
Chloride (Cl) (mg/L)	<2.5 DLA	<2.5 DLA	<0.50	1.0	<2.5 DLA
Fluoride (F) (mg/L)	<0.10 DLA	0.18	0.040	0.081	<0.10 DLA
Nitrate (as N) (mg/L)	0.119	0.166	0.170	0.301	0.890
Nitrite (as N) (mg/L)	<0.0050 DLA	<0.0050 DLA	<0.0010	0.0102	0.0172
Sulfate (SO4) (mg/L)	1000	844	20.2	577	690
Anion Sum (meq/L)	26.8	20.1	2.34	16.9	19.8
Cation Sum (meq/L)	27.5	20.9	2.48	18.5	21.6
Cation - Anion Balance (%)	1.4	2.1	2.9	4.7	4.4
Cyanides Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	0.0077
Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	0.0101	0.0216
Cyanate (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	0.82	3.75
Total Metals Aluminum (Al)-Total (mg/L)	0.0072	0.0260	0.0107	0.184	0.0148
Antimony (Sb)-Total (mg/L)	0.00130	0.0414	0.00011	0.00041	0.00049
Arsenic (As)-Total (mg/L)	0.00428	0.132	0.00029	0.0954	0.0550
Barium (Ba)-Total (mg/L)	0.0578	0.0166	0.0738	0.0757	0.0592
Beryllium (Be)-Total (mg/L)	<0.000040 DLA	<0.000040 DLA	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Total (mg/L)	<0.00010 DLA	0.00010	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	0.020	0.090	<0.010	0.037	0.056
Cadmium (Cd)-Total (mg/L)	0.000075	0.00117	0.0000166	0.000285	0.000680
Calcium (Ca)-Total (mg/L)	300	296	30.7	227	269
Chromium (Cr)-Total (mg/L)	<0.00020 DLA	<0.00020 DLA	0.00010	0.00073	0.00055
Cobalt (Co)-Total (mg/L)	0.00073	0.00069	<0.00010	0.00442	0.00862
Copper (Cu)-Total (mg/L)	<0.0010 DLA	0.0317	0.00097	0.00227	0.00464
Iron (Fe)-Total (mg/L)	2.95	0.251	0.021	12.0	12.5
Lead (Pb)-Total (mg/L)	<0.00010 DLA	0.0101	<0.000050	0.000317	0.000064
Lithium (Li)-Total (mg/L)	0.0054	0.0095	<0.0010	0.0014	0.0014

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1704418-11	L1704418-12	L1704418-13	L1704418-14	L1704418-15
Description	Water	Water	Water	Water	Water
Sampled Date	18-NOV-15	16-NOV-15	17-NOV-15		17-NOV-15
Sampled Time	12:10	15:13	16:55		16:45
Client ID	WQ-CH-P-13-01	WQ-VC-R	WQ-DC-B-R	TRAVEL BLANK	FIELD BLANK
Grouping / **Analyte**					
WATER					
Physical Tests					
Conductivity (uS/cm)	1900	238	2020	<2.0	<2.0
Hardness (as CaCO3) (mg/L)	1260	124	1330	<0.50	<0.50
pH (pH)	6.19	7.93	7.85	5.37	5.41
Total Suspended Solids (mg/L)	254	<5.0	4.7	<3.0	<3.0
Total Dissolved Solids (mg/L)	1660	131	1630	<1.0	<1.0
Anions and Nutrients					
Alkalinity, Bicarbonate (as CaCO3) (mg/L)	5.0	92.5	300	<1.0	<1.0
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)	5.0	92.5	300	<1.0	<1.0
Ammonia, Total (as N) (mg/L)	0.0268	<0.0050	0.467	0.0133 RRV	<0.0050
Chloride (Cl) (mg/L)	<2.5 DLA	<0.50	<2.5 DLA	<0.50	<0.50
Fluoride (F) (mg/L)	<0.10 DLA	0.047	<0.10 DLA	<0.020	<0.020
Nitrate (as N) (mg/L)	0.688	0.157	0.221	<0.0050	<0.0050
Nitrite (as N) (mg/L)	<0.0050 DLA	<0.0010	<0.0050 DLA	<0.0010	<0.0010
Sulfate (SO4) (mg/L)	1200	27.4	981	<0.30	<0.30
Anion Sum (meq/L)	25.2	2.43	26.4	<0.10	<0.10
Cation Sum (meq/L)	25.7	2.64	27.5	<0.10	<0.10
Cation - Anion Balance (%)	1.1	4.1	1.9	0.0	0.0
Cyanides					
Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total (mg/L)	<0.0050	<0.0050	<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)	2.74	0.0153	0.0077	<0.0030	<0.0030
Antimony (Sb)-Total (mg/L)	0.00059	0.00027	0.00135	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.0134	0.00094	0.00427	<0.00010	<0.00010
Barium (Ba)-Total (mg/L)	0.0626	0.0717	0.0570	<0.000050	<0.000050
Beryllium (Be)-Total (mg/L)	0.000102	<0.000020	<0.000040 DLA	<0.000020	<0.000020
Bismuth (Bi)-Total (mg/L)	<0.00010 DLA	<0.000050	<0.00010 DLA	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.020 DLA	<0.010	<0.020 DLA	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	0.0136	0.0000167	0.000083	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	330	32.3	304	<0.050	<0.050
Chromium (Cr)-Total (mg/L)	0.00434	0.00017	<0.00020 DLA	0.00011 RRV	<0.00010
Cobalt (Co)-Total (mg/L)	0.00183	<0.00010	0.00071	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.0049	0.00126	<0.0010 DLA	<0.00050	<0.00050
Iron (Fe)-Total (mg/L)	4.60	0.065	2.95	<0.010	<0.010
Lead (Pb)-Total (mg/L)	0.00471	<0.000050	<0.00010 DLA	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	0.0036	<0.0010	0.0055	<0.0010	<0.0010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1704418-1	L1704418-2	L1704418-3	L1704418-4	L1704418-5
Description	Water	Water	Water	Water	Water
Sampled Date	18-NOV-15	17-NOV-15	17-NOV-15	17-NOV-15	16-NOV-15
Sampled Time	12:45	12:45	12:35	10:05	16:30
Client ID	WQ-DC-DX+105	WQ-VC-UMN-R	WQ-VC-UMN	WQ-VC-U	WQ-DC-R
Grouping / **Analyte**					
WATER					
Total Metals					
Magnesium (Mg)-Total (mg/L)	62.0	9.82	10.0	9.44	61.7
Manganese (Mn)-Total (mg/L)	1.43	0.0427	0.0450	0.0469	4.52
Mercury (Hg)-Total (mg/L)	0.0000059	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total (mg/L)	0.000371	0.000413	0.000416	0.000403	0.000556
Nickel (Ni)-Total (mg/L)	0.00188	<0.00050	<0.00050	<0.00050	0.00217
Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total (mg/L)	3.50	0.67	0.67	0.61	6.30
Selenium (Se)-Total (mg/L)	0.000056	<0.000050	<0.000050	<0.000050	0.000169
Silicon (Si)-Total (mg/L)	6.84	5.98	6.13	6.09	8.03
Silver (Ag)-Total (mg/L)	0.000028	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	5.24	3.13	3.20	2.84	27.9
Strontium (Sr)-Total (mg/L)	0.448	0.316	0.327	0.320	0.695
Sulfur (S)-Total (mg/L)	146	9.73	9.97	7.27	203
Thallium (Tl)-Total (mg/L)	0.000112	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	0.00660	0.00048	0.00043	<0.00030	<0.0015 DLM
Uranium (U)-Total (mg/L)	0.00452	0.000680	0.000703	0.000685	0.00143
Vanadium (V)-Total (mg/L)	0.00091	<0.00050	<0.00050	<0.00050	0.00089
Zinc (Zn)-Total (mg/L)	0.885	<0.0030	<0.0030	<0.0030	0.0238
Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	0.00031
Dissolved Metals					
Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)	<0.0010	0.0066	0.0069	0.0069	0.0107
Antimony (Sb)-Dissolved (mg/L)	0.0103	0.00020	0.00019	<0.00010	0.00050
Arsenic (As)-Dissolved (mg/L)	0.0119	0.00077	0.00077	0.00025	0.00893
Barium (Ba)-Dissolved (mg/L)	0.0111	0.0699	0.0698	0.0722	0.0655
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	<0.010	<0.010	<0.010	0.030
Cadmium (Cd)-Dissolved (mg/L)	0.000963	0.0000152	0.0000151	0.0000180	0.000117
Calcium (Ca)-Dissolved (mg/L)	196	32.6	32.8	31.1	209
Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00031
Cobalt (Co)-Dissolved (mg/L)	0.00082	<0.00010	<0.00010	<0.00010	0.00406
Copper (Cu)-Dissolved (mg/L)	<0.00020	0.00098	0.00096	0.00090	0.00090
Iron (Fe)-Dissolved (mg/L)	0.093	0.017	0.017	0.013	1.54
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	0.0085	<0.0010	<0.0010	<0.0010	0.0012

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1704418-6	L1704418-7	L1704418-8	L1704418-9	L1704418-10
Description	Water	Water	Water	Water	Water
Sampled Date	17-NOV-15	17-NOV-15	17-NOV-15	17-NOV-15	17-NOV-15
Sampled Time	16:45	17:30	09:30	15:45	16:30
Client ID	WQ-DC-B	WQ-TP	WQ-VC-DBC	WQ-DC-U	WQ-SEEP
Grouping / **Analyte**					
WATER					
Total Metals Magnesium (Mg)-Total (mg/L)	136	54.1	9.39	60.7	58.1
Manganese (Mn)-Total (mg/L)	1.74	0.311	0.0482	4.68	6.69
Mercury (Hg)-Total (mg/L)	<0.0000050	0.0000093	<0.0000050	0.0000083	0.0000094
Molybdenum (Mo)-Total (mg/L)	0.00036	0.00143	0.000402	0.000772	0.000921
Nickel (Ni)-Total (mg/L)	0.0013	0.0013	<0.00050	0.00249	0.00412
Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	0.074	<0.050
Potassium (K)-Total (mg/L)	3.69	18.2	0.63	4.51	6.13
Selenium (Se)-Total (mg/L)	<0.00010 DLA	<0.00010 DLA	0.000051	0.000228	0.000314
Silicon (Si)-Total (mg/L)	7.88	3.31	6.01	7.22	7.51
Silver (Ag)-Total (mg/L)	<0.000020 DLA	0.000197	<0.000010	0.000027	0.000028
Sodium (Na)-Total (mg/L)	15.8	19.8	2.82	22.7	34.9
Strontium (Sr)-Total (mg/L)	1.13	0.742	0.320	0.694	0.752
Sulfur (S)-Total (mg/L)	342	289	7.41	199	238
Thallium (Tl)-Total (mg/L)	<0.000020 DLA	0.000179	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00020 DLA	<0.00020 DLA	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.00060 DLA	<0.0018	<0.00030	0.0113	<0.0018 DLM
Uranium (U)-Total (mg/L)	0.00490	0.00122	0.000663	0.00141	0.00221
Vanadium (V)-Total (mg/L)	<0.0010 DLA	<0.0010 DLA	<0.00050	0.00221	0.00221
Zinc (Zn)-Total (mg/L)	0.0196	0.127	<0.0030	0.0421	0.103
Zirconium (Zr)-Total (mg/L)	<0.00060 DLA	<0.00060 DLA	<0.00030	0.00033	0.00058
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)	0.0034	0.0070	0.0070	0.0082	0.0091
Antimony (Sb)-Dissolved (mg/L)	0.00125	0.0408	<0.00010	0.00027	0.00046
Arsenic (As)-Dissolved (mg/L)	0.00386	0.0959	0.00025	0.0499	0.0416
Barium (Ba)-Dissolved (mg/L)	0.0561	0.0151	0.0727	0.0637	0.0579
Beryllium (Be)-Dissolved (mg/L)	<0.000040 DLA	<0.000040 DLA	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Dissolved (mg/L)	<0.00010 DLA	<0.00010 DLA	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved (mg/L)	<0.020 DLA	0.086	<0.010	0.032	0.049
Cadmium (Cd)-Dissolved (mg/L)	0.000079	0.000986	0.0000165	0.000138	0.000559
Calcium (Ca)-Dissolved (mg/L)	310	305	31.3	235	280
Chromium (Cr)-Dissolved (mg/L)	<0.00020 DLA	<0.00020 DLA	<0.00010	0.00025	0.00038
Cobalt (Co)-Dissolved (mg/L)	0.00071	0.00064	<0.00010	0.00414	0.00844
Copper (Cu)-Dissolved (mg/L)	<0.00040 DLA	0.0262	0.00092	0.00093	0.00245
Iron (Fe)-Dissolved (mg/L)	2.72	0.033	0.016	4.17	11.0
Lead (Pb)-Dissolved (mg/L)	<0.00010 DLA	0.00148	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	0.0053	0.0091	<0.0010	0.0012	0.0013

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1704418-11 Water 18-NOV-15 12:10 WQ-CH-P-13-01	L1704418-12 Water 16-NOV-15 15:13 WQ-VC-R	L1704418-13 Water 17-NOV-15 16:55 WQ-DC-B-R	L1704418-14 Water TRAVEL BLANK	L1704418-15 Water 17-NOV-15 16:45 FIELD BLANK
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)	98.0	9.89	136	<0.10	<0.10
	Manganese (Mn)-Total (mg/L)	1.45	0.0381	1.71	<0.00010	<0.00010
	Mercury (Hg)-Total (mg/L)	0.0000297	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.00020	0.000395	0.00036	<0.000050	<0.000050
	Nickel (Ni)-Total (mg/L)	0.0113	<0.00050	0.0014	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	0.144	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	1.64	0.72	3.78	<0.10	<0.10
	Selenium (Se)-Total (mg/L)	0.00020	<0.000050	DLA <0.00010	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	12.7	6.21	7.97	<0.050	<0.050
	Silver (Ag)-Total (mg/L)	0.000116	<0.000010	DLA <0.000020	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	8.08	3.17	15.2	<0.050	<0.050
	Strontium (Sr)-Total (mg/L)	0.699	0.295	1.16	<0.00020	<0.00020
	Sulfur (S)-Total (mg/L)	394	9.82	339	<0.50	<0.50
	Thallium (Tl)-Total (mg/L)	0.000054	<0.000010	DLA <0.000020	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	DLA <0.00020	<0.00010	DLA <0.00020	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	0.0622	0.00032	DLA <0.00060	<0.00030	<0.00030
	Uranium (U)-Total (mg/L)	0.000111	0.000626	0.00501	<0.000010	<0.000010
	Vanadium (V)-Total (mg/L)	0.0078	<0.00050	DLA <0.0010	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	4.60	<0.0030	0.0193	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	DLA <0.00060	<0.00030	DLA <0.00060	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.159	0.0092	0.0037		<0.0010
	Antimony (Sb)-Dissolved (mg/L)	DLA <0.00020	0.00029	0.00131		<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00053	0.00085	0.00375		<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0149	0.0707	0.0570		<0.000050
	Beryllium (Be)-Dissolved (mg/L)	DLA <0.000040	<0.000020	DLA <0.000040		<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	DLA <0.00010	<0.000050	DLA <0.00010		<0.000050
	Boron (B)-Dissolved (mg/L)	DLA <0.020	<0.010	DLA <0.020		<0.010
	Cadmium (Cd)-Dissolved (mg/L)	0.0116	0.0000205	0.000083		<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	342	33.3	308		<0.050
	Chromium (Cr)-Dissolved (mg/L)	0.00052	<0.00010	DLA <0.00020		<0.00010
	Cobalt (Co)-Dissolved (mg/L)	DLA <0.00020	<0.00010	0.00070		<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00110	0.00116	DLA <0.00040		<0.00020
	Iron (Fe)-Dissolved (mg/L)	0.066	0.036	2.60		<0.010
	Lead (Pb)-Dissolved (mg/L)	DLA <0.00010	<0.000050	DLA <0.00010		<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0025	0.0010	0.0054		<0.0010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1704418-1 Water 18-NOV-15 12:45 WQ-DC-DX+105	L1704418-2 Water 17-NOV-15 12:45 WQ-VC-UMN-R	L1704418-3 Water 17-NOV-15 12:35 WQ-VC-UMN	L1704418-4 Water 17-NOV-15 10:05 WQ-VC-U	L1704418-5 Water 16-NOV-15 16:30 WQ-DC-R
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	61.8	10.1	10.1	9.46	55.4
	Manganese (Mn)-Dissolved (mg/L)	1.27	0.0411	0.0404	0.0455	4.22
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000343	0.000366	0.000381	0.000382	0.000496
	Nickel (Ni)-Dissolved (mg/L)	0.00174	<0.00050	<0.00050	<0.00050	0.00198
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	3.58	0.67	0.66	0.59	5.45
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.000137
	Silicon (Si)-Dissolved (mg/L)	6.55	6.04	6.05	6.06	7.34
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	5.08	3.06	3.12	2.70	23.6
	Strontium (Sr)-Dissolved (mg/L)	0.433	0.312	0.309	0.313	0.617
	Sulfur (S)-Dissolved (mg/L)	140	9.61	9.62	7.12	177
	Thallium (Tl)-Dissolved (mg/L)	0.000090	<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	<0.00030	<0.00030	<0.00030	0.00096
	Uranium (U)-Dissolved (mg/L)	0.00430	0.000671	0.000670	0.000654	0.00125
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00057
	Zinc (Zn)-Dissolved (mg/L)	0.795	<0.0010	<0.0010	<0.0010	0.0263
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	0.00032

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1704418-6	L1704418-7	L1704418-8	L1704418-9	L1704418-10
Description	Water	Water	Water	Water	Water
Sampled Date	17-NOV-15	17-NOV-15	17-NOV-15	17-NOV-15	17-NOV-15
Sampled Time	16:45	17:30	09:30	15:45	16:30
Client ID	WQ-DC-B	WQ-TP	WQ-VC-DBC	WQ-DC-U	WQ-SEEP
Grouping / **Analyte**					
WATER					
Dissolved Metals Magnesium (Mg)-Dissolved (mg/L)	135	53.5	9.55	62.0	58.2
Manganese (Mn)-Dissolved (mg/L)	1.71	0.297	0.0447	4.60	6.73
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.00033	0.00143	0.000380	0.000726	0.000890
Nickel (Ni)-Dissolved (mg/L)	0.0014	0.0012	<0.00050	0.00207	0.00407
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved (mg/L)	3.87	18.5	0.62	4.77	6.53
Selenium (Se)-Dissolved (mg/L)	<0.00010 DLA	<0.00010 DLA	<0.000050	0.000151	0.000297
Silicon (Si)-Dissolved (mg/L)	7.88	3.26	6.06	6.70	7.62
Silver (Ag)-Dissolved (mg/L)	<0.000020 DLA	0.000046	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	15.2	18.8	2.66	22.5	35.1
Strontium (Sr)-Dissolved (mg/L)	1.12	0.745	0.307	0.680	0.743
Sulfur (S)-Dissolved (mg/L)	331	281	7.18	196	230
Thallium (Tl)-Dissolved (mg/L)	<0.000020 DLA	0.000177	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00020 DLA	<0.00020 DLA	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.00060 DLA	<0.00060 DLA	<0.00030	<0.0012 DLM	<0.0015 DLM
Uranium (U)-Dissolved (mg/L)	0.00487	0.00121	0.000651	0.00136	0.00216
Vanadium (V)-Dissolved (mg/L)	<0.0010 DLA	<0.0010 DLA	<0.00050	0.00092	0.00162
Zinc (Zn)-Dissolved (mg/L)	0.0191	0.111	<0.0010	0.0280	0.0991
Zirconium (Zr)-Dissolved (mg/L)	<0.00060 DLA	<0.00060 DLA	<0.00030	0.00030	0.00057

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1704418-11	L1704418-12	L1704418-13	L1704418-14	L1704418-15
Description	Water	Water	Water	Water	Water
Sampled Date	18-NOV-15	16-NOV-15	17-NOV-15		17-NOV-15
Sampled Time	12:10	15:13	16:55		16:45
Client ID	WQ-CH-P-13-01	WQ-VC-R	WQ-DC-B-R	TRAVEL BLANK	FIELD BLANK
Grouping **Analyte**					
WATER					
Dissolved Metals Magnesium (Mg)-Dissolved (mg/L)	98.5	10.0	135		<0.10
Manganese (Mn)-Dissolved (mg/L)	0.266	0.0368	1.70		<0.00010
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	<0.00010 DLA	0.000378	0.00034		<0.000050
Nickel (Ni)-Dissolved (mg/L)	0.0092	<0.00050	0.0013		<0.00050
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050		<0.050
Potassium (K)-Dissolved (mg/L)	1.39	0.80	3.77		<0.10
Selenium (Se)-Dissolved (mg/L)	<0.00010 DLA	<0.000050	<0.00010 DLA		<0.000050
Silicon (Si)-Dissolved (mg/L)	9.44	6.20	7.83		<0.050
Silver (Ag)-Dissolved (mg/L)	<0.000020 DLA	<0.000010	<0.000020 DLA		<0.000010
Sodium (Na)-Dissolved (mg/L)	8.07	3.07	15.1		<0.050
Strontium (Sr)-Dissolved (mg/L)	0.696	0.293	1.15		<0.00020
Sulfur (S)-Dissolved (mg/L)	394	9.57	332		<0.50
Thallium (Tl)-Dissolved (mg/L)	<0.000020 DLA	<0.000010	<0.000020 DLA		<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00020 DLA	<0.00010	<0.00020 DLA		<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.00060 DLA	<0.00030	<0.00060 DLA		<0.00030
Uranium (U)-Dissolved (mg/L)	<0.000020 DLA	0.000614	0.00490		<0.000010
Vanadium (V)-Dissolved (mg/L)	<0.0010 DLA	<0.00050	<0.0010 DLA		<0.00050
Zinc (Zn)-Dissolved (mg/L)	4.52	0.0021	0.0199		<0.0010
Zirconium (Zr)-Dissolved (mg/L)	<0.00060 DLA	<0.00030	<0.00060 DLA		<0.00030

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

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

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

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

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

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

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

Reference Information

method using an ammonia selective electrode

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

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

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

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

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

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

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

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

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

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

HARDNESS-CALC-VA Water Hardness APHA 2340B

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

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

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

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

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

IONBALANCE-VA Water Ion Balance Calculation APHA 1030E

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

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

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

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

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

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

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

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

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

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

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

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

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

NH3-F-VA Water Ammonia in Water by Fluorescence APHA 4500 NH3-NITROGEN (AMMONIA)

Reference Information

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

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

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

NO2-L-IC-N-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-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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1 2 3

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.

ALS Environmental

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Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1704418-COFC

COC Number: 14 -

Page ____ of ____

Report To		Report Format / Distribution		Rush Turnaround Time (TAT) is not available for all tests
Company:	EDI	Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	R	☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Meghan Marjanovic	Quality Control (QC) Report with Report ☐ Yes ☐ No	P	☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2195 - 2nd Avenue Whitehorse, YT Y1A 3T8	☐ Criteria on Report - provide details below if box checked	E	☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
		Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	E2	☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	867-393-4882	Email 1 or Fax: mmarjanovic@edynamics.com	Specify Date Required for E2,E or P:	
		Email 2: Emilie.Hamm@gov.yk.ca		
		Email 3: erik.pit@gov.yk.ca		

Invoice To	Same as Report To ☑ Yes ☑ No	Invoice Distribution	
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	
Company:	EDI	Email 1 or Fax: sjenner@edynamics.com	
Contact:	S Jenner	Email 2: mmarjanovic@edynamics.com	
Project Information		**Oil and Gas Required Fields (client use)**	
ALS Quote #:	Q49310	Approver ID:	Cost Center:
Job #:	MOUNT NANSEN 15-Y-0146	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Sean Slugget	Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-PCT-VA,EC-PCT-VA,PH-PCT-VA	ANIONS-ALL-IC-WR,TSS-MAN-WR	CN-WAD-CFA-VA,CN-T-CFA-VA	CN-CNO-WT	CN-SCN-VA	NH3-F-VA	MET-T-BCMDG-VA	MET-D-BCMDG-VA	IONBALANC-VA, TDS-CALC-VA	LC50				Number of Containers
					P	P	P	P	P	P	P	F/P						
	WQ-DC-B	17-Nov-15	16:55	Water	R	R	R	R	R	R	R	R	R					9
	WQ-TP	17-Nov-15	17:30	Water	R	R	R	R	R	R	R	R	R					9
	WQ-VC-DBC	17-Nov-15	0930	Water	R	R	R	R	R	R	R	R	R					9
	WQ-DC-U	17-Nov-15	1545	Water	R	R	R	R	R	R	R	R	R					9
	WQ-SEEP	17-Nov-15	1630	Water	R	R	R	R	R	R	R	R	R					9
	~~WQ-LC50~~	~~17~~-Nov-15	~~1630~~	Water	R	R	R	R	R	R	R	R	R					9
		-Nov-15		Water	R	R	R	R	R	R	R	R	R					9
L1704418	WQ-LC50	17-NOV-2015	1630											R				2

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☑ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☑

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
2.1	3.3	3.5, 3.6	3.4		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: SCOTT DILLING	Date: 18-NOV-2015	Time:	Received by:	Date: 18 NOV 15	Time: 10:00	Received by: EDWARD	Date: NOV 24/15	Time: 1340

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0328a v09 Front/04 January 2014

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Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1704418-COFC

COC Number: 14 -

Page ____ of ____

Report To		Report Format / Distribution		(Rush Turnaround Time (TAT) is not available for all tests)
Company:	EDI	Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Meghan Marjanovic	Quality Control (QC) Report with Report	☐ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2195 - 2nd Avenue Whitehorse, YT Y1A 3T8	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
		Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	867-393-4882	Email 1 or Fax	mmarjanovic@edynamics.com	Specify Date Required for E2,E or P:
		Email 2	Emilie.Hamm@gov.yk.ca	
		Email 3	erik.pit@gov.yk.ca	

Invoice To	Same as Report To ☑ Yes ☑ No	Invoice Distribution		
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	
Company:	EDI	Email 1 or Fax	sjenner@edynamics.com	
Contact:	S Jenner	Email 2	mmarjanovic@edynamics.com	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q49310	Approver ID:	Cost Center:
Job #:	MOUNT NANSEN 15-Y-0146	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only)		ALS Contact: Sean Slugget	Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-PCT-VA,EC-PCT-VA,PH-PCT-VA	ANIONS-ALL-IC-WR,TSS-MAN-WR	CN-WAD-CFA-VA,CN-T-CFA-VA	CN-CNO-WT	CN-SCN-VA	NH3-F-VA	MET-T-BCMDG-VA	MET-D-BCMDG-VA	IONBALANC-VA, TDS-CALC-VA					Number of Containers
							P	P	P	P	P	F/P						
	WQ-CH-P-13-01	18 - Nov -15	12:10	Water	R	R	R	R	R	R	R	R	R					9
	WQ-VC-R	16 - Nov -15	15:13	Water	R	R	R	R	R	R	R	R	R					9
	WQ-DC-B-R	17 - Nov -15	16:55	Water	R	R	R	R	R	R	R	R	R					9
	TRAVEL BLANK	- Nov -15		Water	R	R	R	R	R	R	R	R	R					9
	FIELD BLANK	17 - Nov -15	16:45	Water	R	R	R	R	R	R	R	R	R					9
		- Nov -15		Water	R	R	R	R	R	R	R	R	R					9
		- Nov -15		Water	R	R	R	R	R	R	R	R	R					9

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice packs Yes ☑ No ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☑

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
3.1	3.3	3.5, 3.6	3.4		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: SCOTT DILLING	Date: 18-NOV-2015	Time:	Received by:	Date: 19 NOV 15	Time: 10:00	Received by: Edward	Date: NOV 20/15	Time: 1340

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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NAEN-0328e V09 Front/04 January 2014

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

Date Received: 19-NOV-15
Report Date: 03-DEC-15 16:27 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1704428

Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 15-Y-0146
C of C Numbers: 1
Legal Site Desc:

Comments: Please note ALS identified sample L1704428-1 was sublet to Nautilus Environmental for Rainbow Trout LC50 analysis.

Can Dang
Senior Account Manager

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

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

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

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Nautilus Environmental

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

Report Date: December 2, 2015
Work Order: 15960

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 (% v/v)
L1704428-1 (WQ-LC50)	November 17, 2015 @ N/A	>100

N/A = Not Available.

The test met performance criteria and there were no deviations from the test method. The results presented here relate only to the sample tested.

Josh Baker, M.Sc., P.Chem
Environmental Chemist

Reviewed By:
Edmund Canaria, R.P.Bio
Senior Reviewer

Rainbow Trout Summary Sheet

Client: ALS

Start Date/Time: Nov 20/15 @ 1615h

Work Order No.: 15960

Test Species: *Oncorhynchus mykiss*

Test Validity Criteria:
≥ 90% control survival
WQ Ranges:
T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Sample Information:

Sample ID: L1704428-1 (WO-LC50)
Sample Date: NOV17/15
Date Received: NOV 20/15
Sample Volume: 2x20L
Other: /

Dilution Water:

Type: Dechlorinated Municipal Tap Water
Hardness (mg/L $CaCO_3$): 10
Alkalinity (mg/L $CaCO_3$): 10

Test Organism Information:

Batch No.: 102715
Source: Aqua Farms
No. Fish/Volume (L): 10/10L
Loading Density (g/L): 0.33
Mean Length ± SD (mm): 28 ± 2 Range: 25 - 31
Mean Weight ± SD (g): 0.33 ± 0.06 Range: 0.25 - 0.41

Zinc Reference Toxicant Results:

Reference Toxicant ID: RTZn28
Stock Solution ID: 15Zn05
Date Initiated: Nov 16/15
96-h LC50 (95% CL): 43.5 (35.6 - 53.2) mg/L Zn

Reference Toxicant Mean and Historical Range: 75.7 (39.2 - 146.3) mg/L Zn
Reference Toxicant CV (%): 39.0 %

Test Results: The 96-hr LC50 is > 100 % (v/v)

Reviewed by: [signature]

Date reviewed: Nov. 30, 2015

96-Hour Rainbow Trout Toxicity Test Data Sheet

Client/Project#: ALS
Sample I.D. L1704428-1 (WQ-LC50)
W.O. # 15960
RBT Batch #: 102715
Date Collected/Time: NOV 17/15 @ N/A
Date Setup/Time: Nov 20/15 @ 1615h
Sample Setup By: EL

D.O. meter: 2
pH meter: 1
Cond. Meter: 2

Number Fish/Volume: 10/10L
7-d % Mortality: 0.1
Total Pre-aeration Time (mins): ~~EL~~ 30mins
Aeration rate adjusted to 6.5 ± 1 mL/min/L? (Y/N): Y

Undiluted Sample WQ			
Parameters	Initial WQ	Adjustment	30 min WQ
Temp °C	15.0		15.0
pH	6.9		7.1
D.O. (mg/L)	9.0		9.3
Cond. (µS/cm)	1584		1584

Concentration	# Survivors							Temperature (°C)					Dissolved Oxygen (mg/L)					pH					Conductivity (µS/cm)	
(% v/v)	1	2	4	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
Ctl				10	10	10	10	15.0	14.0	14.0	14.0	14.5	10.0	10.0	9.9	9.8	10.0	10.1	6.9	7.0	6.9	7.0	31	38
6.25				10	10	10	10	15.0	14.0	14.0	14.0	14.5	10.0	9.9	9.8	9.7	9.9	10.0	7.1	7.2	7.2	7.2	157	159
12.5				10	10	10	10	15.0	14.0	14.0	14.0	14.5	10.0	9.8	9.9	9.8	9.9	10.0	7.4	7.6	7.4	7.3	317	322
25				10	10	10	10	15.0	14.0	14.0	14.0	14.5	10.0	9.9	9.7	9.8	9.8	10.0	7.8	7.9	7.7	7.7	477	482
50				10	10	10	10	15.0	14.0	14.0	14.0	14.5	10.0	9.8	9.8	9.8	9.9	10.0	8.0	8.1	8.1	8.1	815	828
100				9	9	9	9	15.0	14.0	14.0	14.0	14.5	9.6	9.9	9.9	9.9	9.9	9.3	8.1	8.3	8.3	8.4	1584	1548
																		EL						
Initials				A	A	EL	EL	EL	A	A	EL	EL	EL	A	A	EL	EL	EL	A	A	EL	EL	EL	EL

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

① pH @ 0: 6.5 Ctl; 6.6 6.25; 6.9 12.5; 6.9 25; 7.0 50; 7.1 100

Sample Description/Comments: orange.

Fish Description at 96 h: OK Number of Stressed Fish at 96 h: Ø

Other Observations:

Reviewed by: EL Date Reviewed: NOV. 30, 2015

ALS Environmental

L1704428

VANCOUVER

Re

Subcontract Request Form

Subcontract To:

NAUTILUS ENVIRONMENTAL
8664 COMMERCE COURT
BURNABY,BC V5A 4N7

LC50 Rainbow Trout
WO# 15960

NOTES: Please reference on final report and invoice: PO# *L1704428*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 2 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L1704428-1 WQ-LC50		11/17/2015	
	Special Request- Nautilus Environmental (SPECIAL REQUEST-NL 14)	11/26/2015	

Subcontract Info Contact: Walter Lin (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: Heiko Zy Date Shipped: Nov 20, 2015

Received By: Nautilus Date Received: Nov 20/15 @

Verified By: NY- Nan Yamamoto Date Verified:

Temperature: 8.0 °C

Sample Integrity Issues: 2x20L

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1704428-COFC

COC Number: 14 -

Page ____ of ____

Report To		Report Format / Di	
Company:	EDI	Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Contact:	Meghan Marjanovic	Quality Control (QC) Report with Report	☐ Yes ☐ No
Address:	2195 - 2nd Avenue Whitehorse, YT Y1A 3T8	☐ Criteria on Report - provide details below if box checked	
Phone:	867-393-4682	Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
		Email 1 or Fax	mmarjanovic@edynamics.com
		Email 2	Emilie.Hamm@gov.yk.ca
		Email 3	erik.pit@gov.yk.ca

Invoice To	Same as Report To	☑ Yes ☑ No	Invoice Distribution	
	Copy of Invoice with Report	☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Company:	EDI		Email 1 or Fax	sjenner@edynamics.com
Contact:	S Jenner		Email 2	mmarjanovic@edynamics.com

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q49310	Approver ID:	Cost Center:
Job #:	MOUNT NANSEN 15-Y-0146	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only)		ALS Contact: Sean Slugget	Sampler:

R ☑ Regular (Standard TAT if received by 3 pm - business days)
P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Rush Turnaround Time (TAT) is not available for all tests

Specify Date Required for E2,E or P:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-PCT-VA,EC-PCT-VA,PH-PCT-VA	ANIONS-ALL-IC-WR,TSS-MAN-WR	CN-WAD-CFA-VA,CN-T-CFA-VA	CN-CNO-WT	CN-SCN-VA	NH3-F-VA	MET-T-BCMDG-VA	MET-D-BCMDG-VA	IONBALANC-VA, TDS-CALC-VA	LC50				Number of Containers
					P	P	P	P	P	P	P	F/P						
	WQ-DC-B	17 - Nov -15	16:55	Water	R	R	R	R	R	R	R	R	R					9
	WQ-TP	17 - Nov -15	17:30	Water	R	R	R	R	R	R	R	R	R					9
	WQ-VC-DBC	17 - Nov -15	0930	Water	R	R	R	R	R	R	R	R	R					9
	WQ-DC-U	17 - Nov -15	1545	Water	R	R	R	R	R	R	R	R	R					9
	WQ-SEEP	17 - Nov -15	1630	Water	R	R	R	R	R	R	R	R	R					9
	~~WQ-LC50~~	~~17~~ - Nov -15	~~1630~~	Water	R	R	R	R	R	R	R	R	R					9
		- Nov -15		Water	R	R	R	R	R	R	R	R	R					9
	WQ-LC50	17-NOV-2015	1630											R				2

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ Yes ☑ No

Are samples for human drinking water use?
☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐ No ☐
Ice packs	Yes ☑ No ☐	Custody seal intact	Yes ☐ No ☐
Cooling Initiated	☑		

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
2.3	3.5	3.4			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
SCOTT DILLING	18-NOV-2015			17/11/15	10:00	Edward	Nov 23/15	13:40

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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YELLOW - CLIENT COPY

NA-EM-0328e v08 Front04 January 2014

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

Date Received: 19-NOV-15
Report Date: 01-DEC-15 12:22 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1704431

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

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1704431-1				
	Description	Water				
	Sampled Date	18-NOV-15				
	Sampled Time	15:20				
	Client ID	WQ-PW				
Grouping	**Analyte**					
WATER						
Physical Tests	Colour, True (CU)	<5.0				
	Conductivity (uS/cm)	354				
	Hardness (as CaCO3) (mg/L)	184				
	pH (pH)	8.16				
	Total Dissolved Solids (mg/L)	197				
	Turbidity (NTU)	<0.10				
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	167				
	Chloride (Cl) (mg/L)	<0.50				
	Fluoride (F) (mg/L)	0.090				
	Nitrate (as N) (mg/L)	0.134				
	Nitrite (as N) (mg/L)	<0.0010				
	Sulfate (SO4) (mg/L)	28.3				
	Anion Sum (meq/L)	3.95				
	Cation Sum (meq/L)	3.93				
	Cation - Anion Balance (%)	-0.2				
Total Metals	Aluminum (Al)-Total (mg/L)	<0.010				
	Antimony (Sb)-Total (mg/L)	<0.00050				
	Arsenic (As)-Total (mg/L)	0.00042				
	Barium (Ba)-Total (mg/L)	0.082				
	Boron (B)-Total (mg/L)	<0.10				
	Cadmium (Cd)-Total (mg/L)	<0.00020				
	Calcium (Ca)-Total (mg/L)	42.7				
	Chromium (Cr)-Total (mg/L)	<0.0020				
	Copper (Cu)-Total (mg/L)	<0.0010				
	Iron (Fe)-Total (mg/L)	<0.030				
	Lead (Pb)-Total (mg/L)	0.00063				
	Magnesium (Mg)-Total (mg/L)	18.8				
	Manganese (Mn)-Total (mg/L)	<0.0020				
	Mercury (Hg)-Total (mg/L)	<0.00020				
	Potassium (K)-Total (mg/L)	0.90				
	Selenium (Se)-Total (mg/L)	<0.0010				
	Sodium (Na)-Total (mg/L)	5.3				
	Uranium (U)-Total (mg/L)	0.00163				
	Zinc (Zn)-Total (mg/L)	<0.050				

Reference Information

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.

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

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-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-TOT-CVAFS-VA	Water	Total Hg in Water by CVAFS LOR=50ppt	EPA 1631E (mod)

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

IONBALANCE-VA	Water	Ion Balance Calculation	APHA 1030E

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

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

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-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).

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-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

Reference Information

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

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".

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

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

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 Turbidity

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

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

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

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

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1704431-COFC

COC Number: 14 -

Page ____ of ____

Report To		Report Format / Di		Turnaround Time (TAT) is not available for all tests
Company:	EDI	Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Meghan Marjanovic	Quality Control (QC) Report with Report	☐ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2195 - 2nd Avenue Whitehorse, YT Y1A 3T8	☐ Criteria on Report - provide details below if box checked Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	867-393-4882	Email 1 or Fax	mmarjanovic@edynamics.com	Specify Date Required for E2,E or P:
		Email 2	Emilie.Hamm@gov.yk.ca	
		Email 3	erik.pit@gov.yk.ca	

Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution	
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Company:	EDI	Email 1 or Fax	sjenner@edynamics.com
Contact:	S Jenner	Email 2	mmarjanovic@edynamics.com

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q49312	Approver ID:	Cost Center:
Job #:	MOUNT NANSEN 15-Y-0146	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	[redacted]	ALS Contact: Sean Sluggett	Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	FULL-TOT-DW-WR	Number of Containers
[redacted]	WQ - PW	18 - Nov- 15	1520	Water	R	3
[redacted]						
[redacted]						
[redacted]						
[redacted]						
[redacted]						
[redacted]						
[redacted]						
[redacted]						
[redacted]						
[redacted]						
[redacted]						

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☐ No Are samples for human drinking water use? ☐ Yes ☐ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen		SIF Observations	Yes ☐	No ☐
Ice packs	Yes ☐ No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☐			

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
3.3	3.3	3.6	3.5		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
SCOTT DILLING	18-NOV-15		[redacted]	18-Nov-15	10:05	[redacted]	Nov 20/15	1210

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

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

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

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

Contact Information · *Coordonnées de la personne ressource*

Contact Person / *Personne ressource*: Megan Marjanovic
Phone / *Téléphone*: 867 393 4882
Mailing address / *Adresse postale*:
Fax / *Télécopieur*: 393 4883
Postal code / *Code postal*: Y1A 3T8
First Nation, Municipal or Business Name / *Nom de la Première nation, de la municipalité ou de l'entreprise*: Environmental Dynamics Inc
Agent / *Agent*: COF
Fax / *Télécopieur*:

Sampling Location · *Lieu de la prise d'échantillon*

Municipal Address / *Adresse municipale*: MT NANSEN
Subdivision / *Lotissement*: Pump house Well
Legal Description Lot / *Désignation officielle Lot*:
Quad / *Quadrilatère*:
Plan no. / *Plan n°*:
Other Information (e.g., Location, Business / Building Name) / *Autres renseignements (ex. : emplacement, nom de l'entreprise, nom de l'édifice)*: Pump House Well

Sample Collection / *Prélèvement de l'échantillon*

Sample Collected By / *Échantillon prélevé par*: JM/SD
Date / *Date*: 15/11/18 (YY/MM/DD · *AA/MM/JJ*)
Time / *Heure*: 15:30 am/pm
Sampling Site (e.g., kitchen tap) / *Point d'échantillonnage (ex. : robinet de cuisine)*: well outlet
Is this a Resample from a Previous Test? / *Est-ce un deuxième échantillon d'un test antérieur?*: ☐ Yes / *Oui* ☑ No / *Non*
Previous Sample Number / *Numéro de l'échantillon précédent*:

Sample Supply / *Source d'approvisionnement en eau*

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

Sample Source / *Provenance de l'échantillon*

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

Water Treatment / *Traitement de l'eau*

Is the Water Chlorinated? / *L'eau contient-elle du chlore?*: ☐ Yes / *Oui* ☑ No / *Non*
Free Available Chlorine / *Chlore libre disponible*: ppm / *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 / ***Réception de l'échantillon***: Date / *Date*: 15-11-19 (YY/MM/DD · *AA/MM/JJ*) Time / *Heure*: 1010 am/pm By / *Par*: SS
Condition of Sample / ***État de l'échantillon***: ☑ Satisfactory / *Satisfaisant* ☐ Unsatisfactory / *Non satisfaisant* Details / *Précisez*: 6.0°C
Incubation / ***Incubation***: Date / *Date*: 15-11-19 (YY/MM/DD · *AA/MM/JJ*) Time / *Heure*: 1100 am/pm By / *Par*: SS Incubator / *Incubateur*: 2
Analysis Completed / ***Analyse terminée***: Date / *Date*: 15-11-20 (YY/MM/DD · *AA/MM/JJ*) Time / *Heure*: 100 am/pm By / *Par*: SS

Results (See Reverse Side for Interpretation) per 100 ml
Résultats (Voir au verso l'interprétation des résultats)

Total Coliforms/*Coliformes totaux*	**E. coli**/*E. coli*
☐ Present / *Présence* ☒ Absent / *Absence*	☐ Present / *Présence* ☒ Absent / *Absence*

Comments / *Commentaires*

Report Authorized By / *Rapport autorisé par*: [signature] Position / *Poste*: WLT Date / *Date*: 15-11-20 (YY/MM/DD · *AA/MM/JJ*)

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

YG(4649)NC3 Rev.03/2013

Sample Number / ***Numéro de l'échantillon*** : 62210