

August 01, 2016

EDI Project No: 16Y0089

Assessment and Abandoned Mines Branch (AAM) K-419
Department of Energy, Mines and Resources, Yukon Government
Room 2C Royal Center, 4114-4th Avenue
PO 2703, Whitehorse, YT, Y1A 2C6

Attention: Emilie Hamm, A/Project Manager

RE: Mount Nansen Water Resources Investigations – Monthly Report: July 2016 - FINAL

Trip dates:	July 4 - 6, 2016
EDI field staff:	Scott Dilling, Gabe Rivest, and Danny Skookum
Weather during trip:	Conditions for the three days included air temperatures ranging from 8 to 22°C, with sunny skies to thunderstorms with moderate rain.

This monthly report includes a summary of site conditions and data collected during EDI's July 2016 trip to Mount Nansen as part of the 2016/17 Water Resources Investigations. This report includes site conditions, meteorology, hydrology, water quality, program recommendations, and additional trip information (Table 1).

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

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



Report Section	Description
List of Attachments	<ol style="list-style-type: none">1. Maps of Hydrometric Stations and Water Quality Sites2. Site and Station Photos from the trip3. Hydrology Summary Data Tables (July 2016)4. Water Quality Summary Data Tables (July 2016)5. Laboratory Certificates of Analysis (COA) & Yukon Environmental Health Services Bacteriological Results (July 2016).

SITE CONDITIONS

The July 2016 trip was reflective of mid-summer conditions. Water levels continue to recede with low to moderate flow conditions at many channels. All snow and ice at the Mount Nansen site has now melted. Active placer mining construction works were observed along Pony Creek upstream of H-PC-DSP/WQ-PC-U including the movement of large amounts of overburden soil and the construction of multiple earth dams.

METEOROLOGY

Meteorological data was collected at the ATM-ROAD station throughout July 2016. EDI conducted a QA/QC review of the July 2016 data and all sensors appear to be functioning properly. One anomalous hourly snow depth measurement was recorded on July 14, 2016 and is a single outlier within the hourly data set and does not appear to indicate an issue with the sensor. Meteorological data will be summarized and analyzed at the end of the open-water season, in the October 2016 Monthly Report.

HYDROLOGY

All hydrometric stations provided suitable conditions for discharge measurements during the July 2016 trip. Water levels were the lowest of the 2016 open water season, with the exception of H-DC-R and H-SEEP where flowrates were higher than during the June 2016 visit. For the month of July, continuous logger records are available for the following seven stations up to when each logger was downloaded: H-DC-B, H-DC-R, H-VC-U, H-BC, H-VC-DBC, H-VC-UMN and H-VC-R+290. A preliminary review of the continuous logger files indicates that all loggers are functioning properly.

Surface water conditions and hydrometric monitoring tasks completed at each station in July 2016 are summarized in Attachment 3. Site observations for the July trip are included in the subsection below. Quality control and quality assurance for the hydrometric data was conducted on both the instantaneous and continuous datasets.

Field Results

- Discharge measurements were collected with an ADV using the velocity-area method at the four Victoria Creek stations: H-VC-U, H-VC-DBC, H-VC-UMN, and H-VC-R+290. Discharge values ranged from 0.164 to 0.221 m³/s. The July 2016 trip discharges represent flow conditions lower than the June 6 – 8, 2016 trip.



- Discharge measurements were made using salt tracer tests at H-DC-B, H-DC-R, H-BC and H-DC-D1b with flowrates ranging from 0.003 to 0.040 m³/s.
- The discharge measured at H-VC-U (0.170 m³/s) in July was greater than at the downstream station at H-VC-DBC (0.164 m³/s). A description of the discharge patterns along Victoria Creek will be completed at the end of the open water season when additional data is available.
- Volumetric methods were used for collecting a discharge measurement at H-DC-DX+105, H-SEEP, H-DC-M WP and H-PC-DSP. The flowrates ranged from below the reportable confidence limit (less than 0.001 m³/s) at H-PC-DSP to 0.011 m³/s at H-DC-M WP.
- At H-DC-M WP, all water was flowing over the V-notch weir. The sandbags along the right downstream side were functioning as intended and only a small trickle of flow was seeping through. No water was leaking between the metal weir plate and the wooden support structure. Conditions were suitable for a volumetric measurement. Some sediment was excavated by hand from the weir pond during the July 2016 visit.
- Due to concerns with sedimentation at H-DC-M WP, the station was converted to a discrete discharge measurement location. The staff gauge, stilling well and continuous logger were removed during the June 2016 visit. The logger will be tested to determine if it has drifted and if it is suitable to re-use elsewhere at the Mount Nansen site.
- The H-SEEP volumetric discharge measurement on July 5, 2016 (0.004 m³/s) was the same than the flow rate observed at the pump in the seepage pond shack (0.004 m³/s).
- Placer mining operations were underway during the July 2016 visit. Large earthworks using heavy equipment were observed. Placer activity continues to produce non-representative hydrological conditions along Pony Creek.

WATER QUALITY

Water quality samples and in-situ data were collected at all planned sites during the July 2016 trip. This included opportunistic sampling of seeps around the mill site. A total of 18 sites were sampled and remaining sites had no evidence of flow (Attachment 4). The drinking water sample, including a bacteriological sample, was collected from the pumphouse well (WQ-PW) on July 6. All samples were submitted for analysis through ALS Laboratories under chain of custody documentation, except for the bacteriological sample which was submitted to Yukon Government – Health and Social Services for analysis.

Site conditions were noted and a record of the samples collected were compiled (Attachment 4). In-situ and laboratory results summary tables as well as the lab certificates of analysis are attached (Attachment 4 and Attachment 5). 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.



Many results reflect typical conditions for this time of year at Mount Nansen when there is a decrease in surface runoff and water levels following the end of the spring melt – resulting in lower concentrations of many parameters of concern compared to April and May sampling results. A summary of the results and comments on the sample QA/QC data are included in the subsections below.

Water Quality Results Summary

- The WQ-SEEP samples exceeded CCME-AL guidelines for ammonia, total aluminum, cadmium, total and dissolved, arsenic, and iron. Total manganese exceeded Mount Nansen EQS.
- Tailings Pond (WQ-TP) samples exceeded CCME-AL guidelines for fluoride, for total and dissolved arsenic, cadmium, copper and zinc, as well as for total silver, iron and lead.
- On Dome Creek, CCME-AL guidelines were exceeded for the following parameters and sites: ammonia (WQ-DC-U), fluoride (WQ-DC-DX+105, WQ-DC-D1B), total aluminum (WQ-DC-D1B, WQ-DC-B, WQ-DC-U), total arsenic (WQ-DC-DX+105, WQ-DC-DX, WQ-DC-D1B, WQ-DC-B, WQ-DC-U, WQ-DC-R), dissolved arsenic (WQ-DC-D1B, WQ-DC-DX, WQ-DC-DX+105, WQ-DC-U, WQ-DC-R), total cadmium (WQ-DC-DX+105, WQ-DC-D1B), dissolved cadmium (WQ-DC-DX+105), total iron (WQ-DC-DX+105, WQ-DC-DX, WQ-DC-D1B, WQ-DC-B, WQ-DC-U, WQ-DC-R), dissolved iron (WQ-DC-DX, WQ-DC-D1B, WQ-DC-B, WQ-DC-U, WQ-DC-R), total and dissolved zinc (WQ-DC-DX+105 and WQ-DC-D1B) Total iron exceeded Mount Nansen EQS for WQ-DC-D1B, WQ-DC-B, WQ-DC-U and WQ-DC-R. Total manganese exceeded Mount Nansen EQS for WQ-DC-DX+105, WQ-DC-D1B, WQ-DC-B and WQ-DC-U. Total suspended solids also exceeded Mount Nansen EQS for WQ-DC-D1B.
- On Victoria Creek CCME-AL guidelines were exceeded for the following parameters and sites: total aluminum (WQ-VC-R, WQ-VC-DBC, WQ-VC-UMN), total iron (WQ-VC-DBC, WQ-VC-R). All parameters from samples collected at WQ-VC-R were below CCME-AL guidelines and Mount Nansen EQS.
- Back Creek (WQ-BC) samples exceeded CCME-AL guidelines for fluoride, total aluminum, arsenic, cadmium, copper, iron, lead, silver, and zinc. Total iron, manganese, and suspended solids also exceeded Mount Nansen EQS.
- The upstream (WQ-PC-U) and downstream (WQ-PC-D) Pony Creek sites had samples that exceeded CCME-AL guidelines for total ammonia, fluoride, total aluminum, arsenic, iron, lead and silver. Dissolved arsenic also exceeded CCME-AL guidelines at both sites. Additionally, the sample collected at WQ-PC-D exceeded CCME-AL guidelines for total suspended solids, total cadmium, copper and zinc. Mount Nansen EQS were exceeded for total iron and total manganese.
- The upwelling seep above CH-P-13-01 exceeded Mount Nansen EQS for pH and total zinc. Samples exceeded CCME-AL guidelines for pH, total and dissolved aluminum, cadmium and zinc.



- Mill Site Seep site WQ-MS-S-03 samples exceeded CCME-AL guidelines for fluoride, total and dissolved arsenic, cadmium, iron and zinc. CCME-AL guidelines were also exceeded for total aluminum, copper, lead and silver. Mount Nansen EQS were exceeded for total iron and manganese.
- The bacteriological sample collected at WQ-PW on June 8, 2016 was absent of total coliforms and E. coli. All other sampling results for WQ-PW did not exceed CCME-AL guidelines and Mount Nansen EQS.

QA/QC Samples

Travel Blank Sample – did not have any parameters above detection limit. No contamination from storage or transport is suspected.

Field Blank Sample – did not have any parameters above detection limits. No contamination from field sampling methodology is suspected.

Replicate Sample(s) – the average RPD of the replicate sample WQ-DC-DX+105 was 4% with an average difference of 5% for total and 2% for dissolved metals. Total titanium had RPD>20%.

The average RPD of the replicate sample WQ-VC-DBC-r was 9% with an average difference of 13% for total and 6% for dissolved metals. Total aluminum, silver, titanium and dissolved aluminum had RPD>20%.

PROGRAM RECOMMENDATIONS

- Conduct velocity-area and salt tracer discharge measurements at all hydrometric stations during the open water season, where possible, to continue to validate the salt tracer method.

ADDITIONAL TRIP INFORMATION

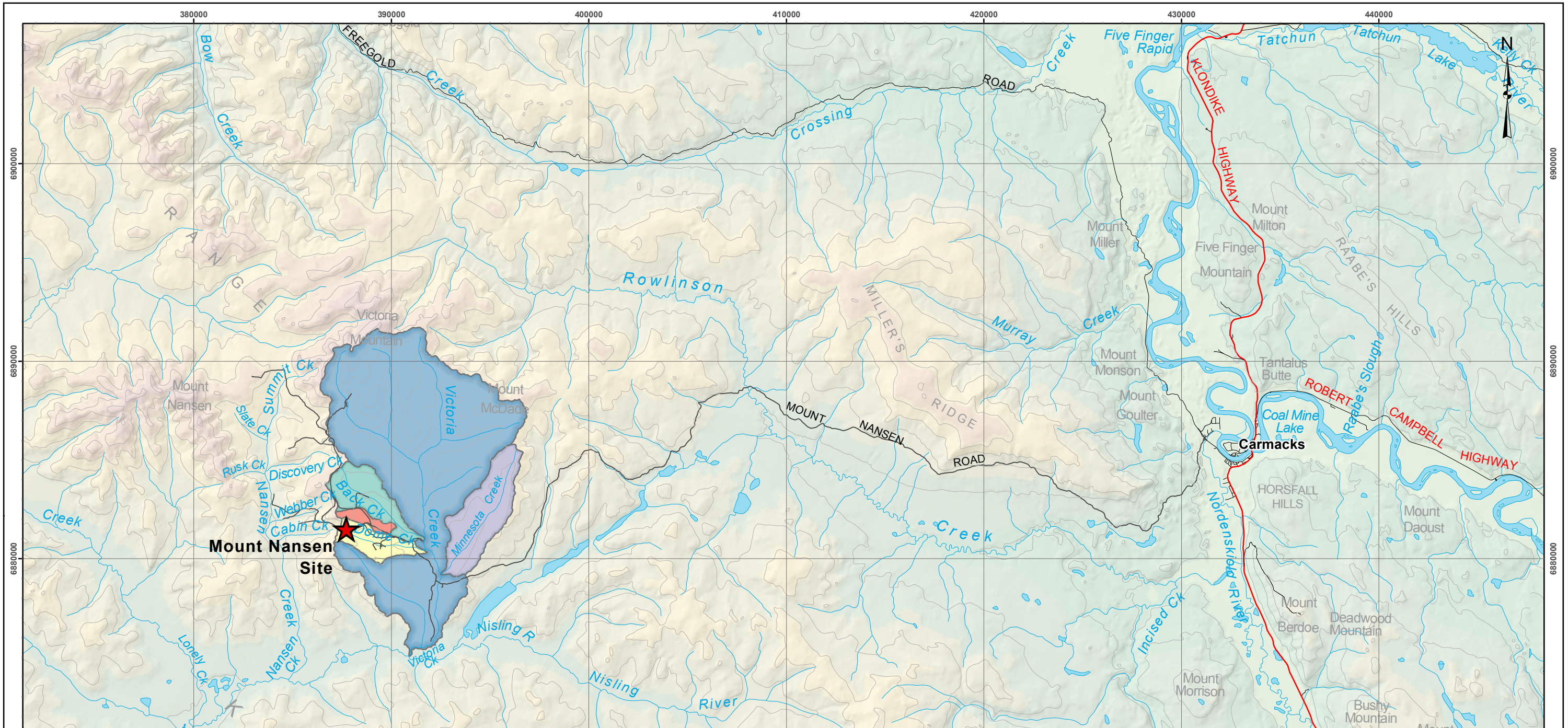
Any changes to project scope (i.e. additional sites sampled):	None. All sampling and monitoring was conducted within scope. The next trip is scheduled for August 1 – 3, 2016. The next trip will be the sixth of the 2016/2017 Water Resources Investigation.
Any alterations to sample schedule/budget:	None
Additional Comments:	Site conditions were reflective of mid-summer. Water levels were low to moderate and have dropped since the June 2016 trip. No snow or ice remains at the Mount Nansen site and all watercourses were flowing. The H-SEEP volumetric discharge measurement on July 5, 2016 (0.004 m ³ /s) was higher than the flow rate observed at the pump in the seepage pond shack (0.003 m ³ /s); typically these values are the same.



Wildlife Sightings:	Arctic grayling were observed in the channel at H-VC-R+290.
Site concerns (safety):	None



**ATTACHMENT 1: MAPS OF HYDROMETRIC
STATIONS AND WATER
QUALITY SITES**



Regional Overview Map of Mount Nansen Site

Legend

Local Drainage Area

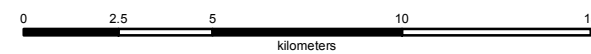
- Back Creek
- Dome Creek
- Minnesota Creek
- Pony Creek
- Victoria Creek

- Topographic Contour
- Secondary Road
- Highway

Data sources
 1:250,000 Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

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

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



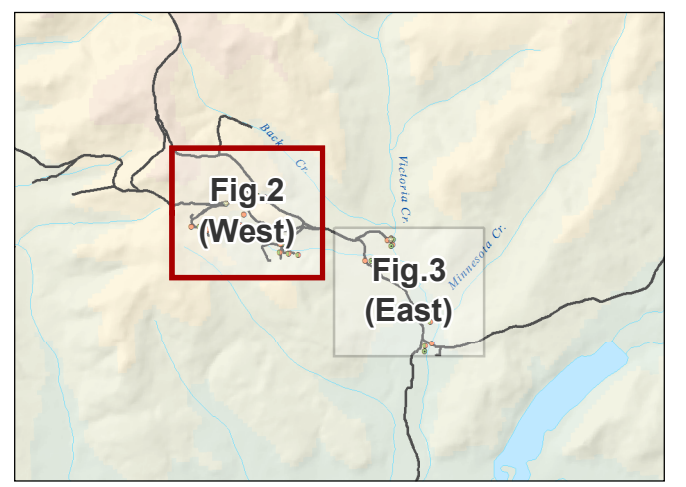
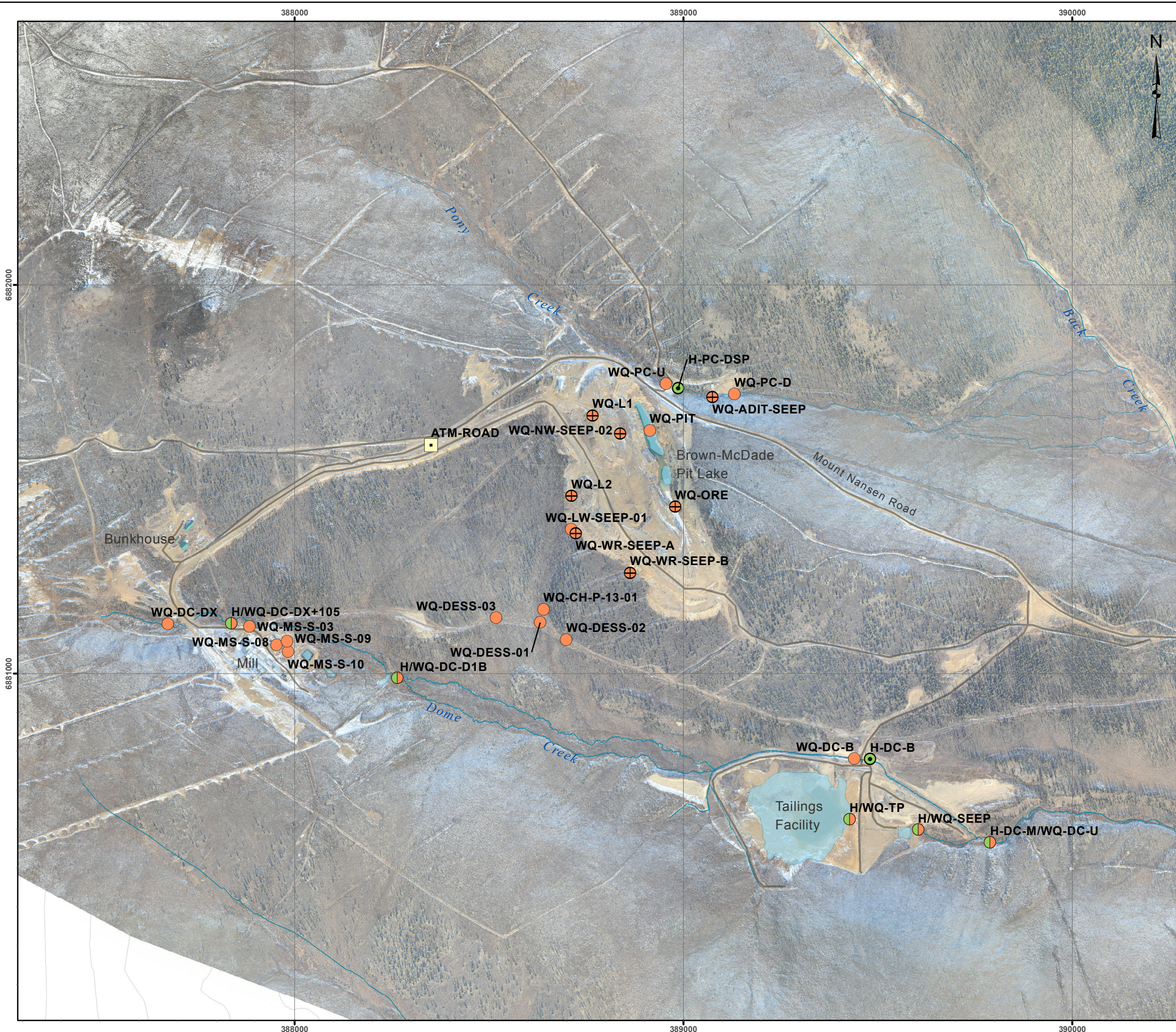
Map Scale: 1:200,000 (printed on 11 x 17)
 Map Projection: NAD 1983 UTM Zone 8N

Drawn: LG	Checked: MM / JB	Date: 14/07/2016	FIGURE 1
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Yukon





- 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

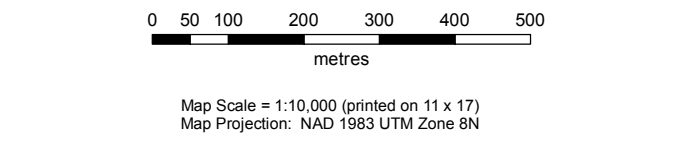
Notes:

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).

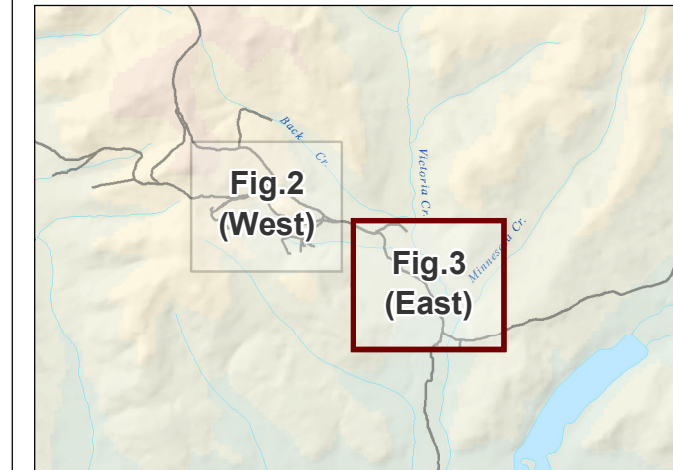
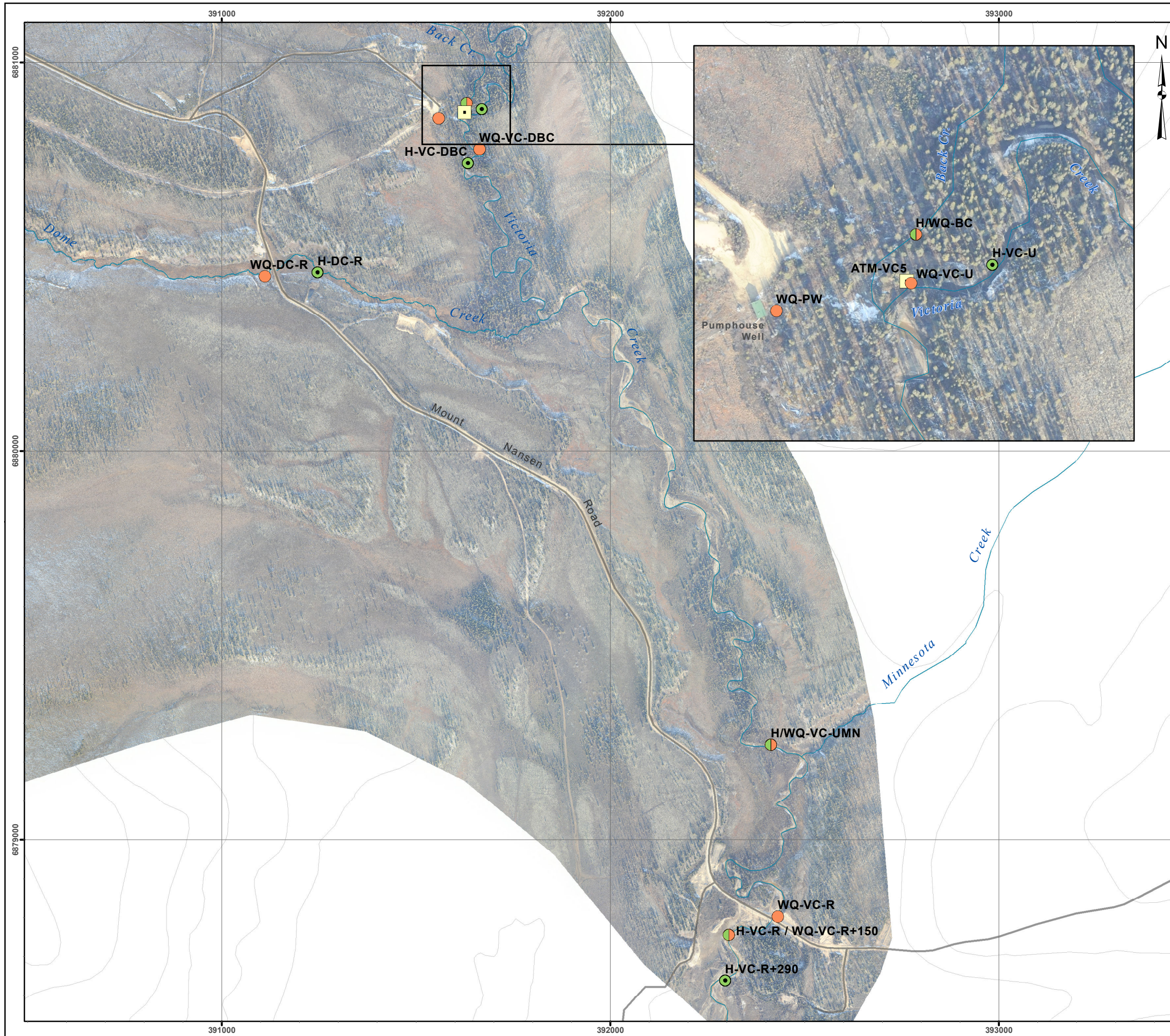
Imagery provided by Yukon Government - Energy, Mines and Resources - Abandoned Mines Branch.

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



Drawn: MP	Checked: MM/SD	Date: 04/08/2016	FIGURE 2
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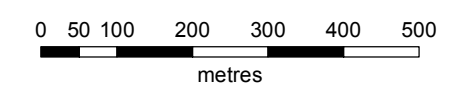


Legend

- 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).
 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.



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

Drawn: MP	Checked: MM/SD	Date: 14/07/2016	FIGURE 3
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**ATTACHMENT 2: SITE AND STATION
 PHOTOS**



Photo 1. WQ-DC-DX – looking upstream.



Photo 2. H-DC-DX+105 – looking downstream at metal trough installed for volumetric measurements.



Photo 3. WQ-DC-DX+105 – looking upstream.



Photo 4. H/WQ-DC-D1b – looking upstream.



Photo 5. WQ-CH-P-13-01 – looking upstream.



Photo 6. WQ-DC-B – looking upstream.



Photo 7. H-DC-B – looking downstream.



Photo 8. H-DC-B – looking upstream.



Photo 9. WQ-TP – overview of tailings pond.



Photo 10. H-TP – overview of tailings pond showing dry staff gauges.



Photo 11. H/WQ-SEEP – looking downstream.



Photo 12. H-DC-M WP – looking downstream.



Photo 13. H-DC-M WP – overview of V-notch weir plate.



Photo 14. WQ-DC-U – looking downstream.



Photo 15. WQ-DC-R – looking downstream showing collapsed slope.



Photo 16. H-DC-R – looking upstream.



Photo 17. WQ-PC-U – looking upstream.



Photo 19. H-PC-DSP – looking upstream.



Photo 18. WQ-ADIT-SEEP – looking upstream.



Photo 20. WQ-PC-D – looking upstream.



Photo 21. WQ-NW-SEEP-02 – overview of site.
Pipe outlet dry.



Photo 22. H/WQ-BC – looking upstream.



Photo 23. H-VC-U – looking downstream.



Photo 24. WQ-VC-U – looking upstream.



Photo 25. WQ-VC-U – confluence of Victoria Creek and Back Creek.



Photo 26. WQ-VC-DBC – looking downstream.



Photo 27. H-VC-DBC – overview of sample site.



Photo 28. H/WQ-VC-UMN – looking downstream.



Photo 29. WQ-VC-R – looking upstream.



Photo 30. H-VC-R+290 – looking downstream.



Photo 31. -WQ-MS-S-03 – looking downstream.



Photo 32. WQ-MS-S-08 – site dry.



Photo 33. WQ-PW – site dry.



**ATTACHMENT 3: JULY HYDROLOGY
DATA TABLES**

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
1455	H-BC	05/07/2016	12:15	SS	0.006	-	1.705	-	Low flow in channel. Salt tracer completed for discharge measurement. Small woody debris in channel.
1456	H-DC-B	05/07/2016	15:10	SS	0.005	-	1.926	-	Salt tracer completed for discharge measurement. Minor fine sediment deposited along channel bed.
1457	H-DC-D1b	06/07/2016	09:20	SS	0.003	-	-	-	Salt tracer completed for discharge measurement. Water goes to ground approximately 2 m downstream of waterfall and unable to see re-emergence point.
1458	H-DC-DX+105	05/07/2016	17:20	V	0.001	-	-	-	Volumetric measurement collected at outlet of metal trough. Dry soil under trough indicating that all flow is being captured.
1459	H-DC-M WP	05/07/2016	14:00	V	0.011	-	-	-	All flow passing over metal weir plate; no leakage behind plate. Volumetric discharge measurement collected.
1460	H-DC-R	04/07/2016	17:20	SS	0.040	-	0.649	-	Braided channel with water on floodplain upstream of site. Pondered water to left downstream side of site. Salt tracer completed for discharge measurement. Minor vegetation in channel.
1461	H-PC-DSP	05/07/2016	08:30	V	0.000	-	-	-	Very low flow with moderately turbid water. Volumetric measurement completed at culvert outlet. Measured discharge below detectable limits (less than 1 L/s). Placer mining activity upstream. Flow through channel is seepage through upstream settling pond
1462	H-SEEP	05/07/2016	14:20	V	0.004	-	-	-	Recent overland flow and erosion at access road above site, including sediment deposited in vicinity of pipe outlet. Volumetric measurement collected at pipe outlet. Flow rate at pump at 14:30 224.995 L/min (0.004 m ³ /s).
1463	H-TP	05/07/2016	16:00	N	-	-	-	-	Staff gauges dry with 2.5 m of dry sediment behind. Lower staff gauge exposed down to approximately 0.6 m.
1464	H-VC-DBC	05/07/2016	09:45	ADV-MID	0.164	-	1.765	-	Moderate amount of fine sediment along bed.
1465	H-VC-R+290	04/07/2016	14:05	ADV-MID	0.221	-	2.397	-	Low water stage with right downstream sandy bank exposed.
1466	H-VC-U	05/07/2016	10:35	ADV-MID	0.170	-	2.039	-	Minor sedimentation along bed stirred up while walking in channel. Fewer fines than at H-VC-DBC. Minor algae growth on submerged rocks downstream of well.
1467	H-VC-UMN	04/07/2016	15:55	ADV-MID	0.210	-	1.595	-	Low flow rate at site.

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 container 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-R+290	Victoria Creek at Road + 290
H-VC-U	Upper Victoria Creek
H-VC-UMN	Victoria Creek Upstream of Minnesota Creek

Discharge Data Flag Legend

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

Survey Data Flag Legend

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



ATTACHMENT 4: **JULY WATER
QUALITY DATA
TABLES**

Water Quality Site	Sample Collected? (Y/N)	Measurement Date	Comments
WQ-SEEP	Yes	05-Jul-16	Moderate flow rate from pipe.
WQ-TP	Yes	05-Jul-16	Low water level in pond with lightly turbid water.
WQ-DC-DX	Yes	05-Jul-16	Moderate flow rate with lightly turbid water.
WQ-DC-DX+105	Yes	05-Jul-16	Moderate flow rate with lightly turbid water. Replicate sample collected.
WQ-DC-D1b	Yes	06-Jul-16	Low flow rate with clear water.
WQ-DC-B	Yes	05-Jul-16	Low water level with lightly turbid water.
WQ-DC-U	Yes	05-Jul-16	Moderate flow with lightly turbid water.
WQ-DC-R	Yes	04-Jul-16	Moderate flow with lightly turbid water.
WQ-CH-P-13-01	Yes	05-Jul-16	Low flow with clear water.
WQ-BC	Yes	05-Jul-16	Moderate flow with highly turbid water.
WQ-VC-U	Yes	05-Jul-16	Moderate flow with clear water.
WQ-VC-DBC	Yes	05-Jul-16	Moderate flow with lightly turbid water. Back Creek contributing suspended sediment into Victoria Creek at confluence. Replicate sample collected.
WQ-VC-UMN	Yes	04-Jul-16	Low flow with lightly turbid water.
WQ-VC-R	Yes	04-Jul-16	Sample collected at regular summer location upstream of culvert. Water level low with lightly turbid water.
WQ-PW	Yes	06-Jul-16	Moderate flow with clear water. Drinking water and bacteriological samples collected.
WQ-ADIT-SEEP	No	05-Jul-16	Site dry. No flow detected that was distinct from Pony creek.
WQ-PC-U	Yes	05-Jul-16	Low flow with moderately turbid water. Flows being controlled by upstream placer mining operations.
WQ-PC-D	Yes	05-Jul-16	Low flow with moderately turbid water.
WQ-MS-S-08	No	05-Jul-16	Site dry; no sample collected.
WQ-MS-S-03	Yes	05-Jul-16	Moderate flow and lightly turbid water.

Water Quality Site	Sample Collected? (Y/N)	Measurement Date	Comments
WQ-NW-SEEP-02	No	05-Jul-16	Site dry; no sample collected.
Field Blank	Yes	06-Jul-16	Sample bottles filled with deionized water supplied by ALS; samples were filtered and preserved as instructed. Collected at WQ-PW.
Travel Blank	Yes	06-Jul-16	Samples were provided by the lab and were transported to and from site.

Summary of Water Quality Results for the July 4 - 6, 2016 Trip.

Analyte	Units	CCME-WATER F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	L1794268-1 WQ-DC-DX+105 05/07/2016 17:05	L1794268-2 WQ-DC-DX+105-R 05/07/2016 17:05	QA/QC WQ-DC-DX+105 Replicate Analysis	L1794268-3 WQ-BC 05/07/2016 11:55	L1794268-4 WQ-MS-S-03 05/07/2016 17:30	L1794268-5 WQ-PC-D 05/07/2016 8:30	L1794268-6 WQ-DC-DX 05/07/2016 17:45	L1794268-7 WQ-PC-U 05/07/2016 8:15	L1794268-8 WQ-DC-B 05/07/2016 15:00	L1794268-10 WQ-DC-U 05/07/2016 13:40
Temperature (in-situ)	°C	-	-	-	0.9	-	-	13.7	2.9	10.9	3.4	9.3	15.2	12.4
Specific Conductivity (in-situ)	µS/cm	-	-	-	625	-	-	374.9	1218	805	505.1	1372	1152	1124
pH (in-situ)	pH	6.5 - 9.0	6.0 - 8.5	-	6.97	-	-	8.34	7.06	7.94	7.41	7.18	7.84	7.89
Dissolved Oxygen (in-situ)	mg/L	-	-	-	2.33	-	-	8.13	4.17	8.49	7.99	8.4	8.07	7.7
Turbidity (In-situ)	NTU	-	-	-	6.08	-	-	161	3.88	96.8	6.34	36.3	25.1	14.53
Colour, True	CU	15	-	5	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	2	1120	1130	1%	381	1200	1230	500	1320	1150	1100
Hardness (as CaCO3)	mg/L	-	-	0.5	702	706	1%	198	757	737	268	777	690	659
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	7.49	7.5	0%	8.17	7.6	7.85	7.52	7.76	8	8.07
Total Suspended Solids	mg/L	-	50	3	3.3	3.3	<2xDL	82	19.3	83.3	6	29.3	27.3	15.3
Total Dissolved Solids	mg/L	-	-	1	834	826	1%	234	890	969	326	1030	846	831
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	265	266	0%	110	274	119	82.7	130	165	170
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<DL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<DL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	265	266	0%	110	274	119	82.7	130	165	170
Ammonia, Total (as N)	mg/L	0.75	-	0.005	0.0188	0.0175	<2xDL	0.0968	0.0309	3.29	<0.0050	3.37	0.113	0.956
Chloride (Cl)	mg/L	120	-	0.5	<1.0	<1.0	<DL	0.52	<1.0	2.3	<0.50	2.4	<1.0	<1.0
Fluoride (F)	mg/L	0.12	-	0.02	0.201	0.189	6%	0.165	0.218	0.146	0.062	0.139	0.081	0.08
Nitrate (as N)	mg/L	13	-	0.005	0.019	0.026	31%	<0.010	0.105	<0.0050	0.221	<0.0050	0.07	0.309
Nitrite (as N)	mg/L	0.06	-	0.001	<0.0020	<0.0020	<DL	0.0059	<0.0020	0.0337	<0.0010	0.034	<0.0020	0.017
Sulfate (SO4)	mg/L	-	-	0.5	422	412	2%	88.3	602	451	173	642	506	481
Anion Sum	meq/L	-	-	-	14.1	13.9	<DL	4.08	14.9	15	5.25	16.1	13.8	13.4
Cation Sum	meq/L	-	-	-	14.4	14.5	<DL	4.27	15.6	15.8	5.69	16.6	14.2	14
Cation - Anion Balance	%	-	-	-	1.1	2	<DL	2.3	2.5	2.5	4	1.7	1.4	2.2
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	<0.0050	<0.0050	<DL	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	-	0.3	0.005	<0.0050	<0.0050	<DL	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanate	mg/L	-	-	0.2	<0.2	<0.20	<DL	<0.20	<0.20	0.21	<0.20	<0.20	<0.20	<0.20
Thiocyanate (SCN)	mg/L	-	-	0.5	<0.50	<0.50	<DL	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Aluminum (Al)-Total	mg/L	0.1	-	0.003	0.0198	0.0233	16%	3.84	0.142	1.65	0.0698	0.484	0.458	0.226
Antimony (Sb)-Total	mg/L	-	0.15	0.001	0.0103	0.01	3%	0.0023	0.0154	0.00848	0.00107	0.00684	0.0019	0.00119
Arsenic (As)-Total	mg/L	0.005	-	0.0001	0.0331	0.0323	2%	0.032	0.112	0.0384	0.00763	0.0177	0.011	0.0163
Barium (Ba)-Total	mg/L	-	1.0	0.00005	0.0131	0.0126	4%	0.13	0.0183	0.164	0.0398	0.136	0.051	0.0519
Beryllium (Be)-Total	mg/L	-	-	0.00002	<0.000020	<0.000020	<DL	0.00017	<0.000020	0.000093	<0.000020	0.000039	0.000025	0.000021
Bismuth (Bi)-Total	mg/L	-	-	0.0005	<0.000050	<0.000050	<DL	0.000308	<0.000050	0.000387	<0.000050	0.000142	<0.000050	<0.000050
Boron (B)-Total	mg/L	-	-	0.01	<0.010	<0.010	<DL	<0.010	<0.010	<0.010	<0.010	<0.010	0.015	0.024
Cadmium (Cd)-Total (Lab Result)	mg/L	0.00009	0.02	0.00001	0.00206	0.00198	4%	0.000609	0.00334	0.000451	0.0000217	0.000327	0.0000605	0.0000494
Cadmium (Cd)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.00001	0.0004	0.0004	-	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004
Calcium (Ca)-Total	mg/L	-	-	0.05	183	178	3%	55.3	216	193	69.2	150	157	157
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	<0.00010	<0.00010	<DL	0.00464	0.00023	0.0016	0.00015	0.00064	0.00093	0.00055
Cobalt (Co)-Total	mg/L	-	-	0.0001	0.00078	0.00076	3%	0.00241	0.00125	0.00238	0.00034	0.00281	0.0006	0.00204
Copper (Cu)-Total (Lab Result)	mg/L	0.002	0.2	0.0005	<0.00050	<0.00050	<DL	0.0123	<0.0030	0.00893	<0.0015	<0.0040	<0.0025	<0.0025
Copper (Cu)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.004	0.004	-	0.004	0.004	0.004	0.004	0.004	0.004	0.004
Iron (Fe)-Total	mg/L	0.3	1	0.01	0.411	0.449	9%	5.91	2.86	3.46	0.913	1.48	2.74	1.81
Lead (Pb)-Total (Lab Result)	mg/L	0.001	0.1	0.00005	0.000167	0.000147	<2xDL	0.0262	0.00777	0.0231	0.000428	0.000813	0.000703	0.000355
Lead (Pb)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.00005	0.007	0.007	-	0.007	0.007	0.007	0.007	0.007	0.007	0.007
Lithium (Li)-Total	mg/L	-	-	0.0005	0.0094	0.0092	2%	0.0042	0.0102	0.0068	<0.0010	0.0059	0.0036	0.0024
Magnesium (Mg)-Total	mg/L	-	-	0.1	60.4	60.5	0%	15.6	65	43.1	19.1	44.1	69	57
Manganese (Mn)-Total	mg/L	-	0.5	0.00005	1.31	1.26	4%	1.37	1.41	5.12	0.243	6.14	0.562	1.71
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.00001	<0.000050	<0.000050	<DL	0.0000137	<0.000050	0.0000108	<0.000050	0.0000075	<0.000050	<0.000050
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	0.00039	0.00032	2%	0.00462	0.000325	0.00168	0.000059	0.00139	0.000323	0.00043
Nickel (Ni)-Total (Lab Result)	mg/L	0.025	0.3	0.0005	0.00163	0.00164	<2xDL	0.00362	0.00207	0.00233	<0.00050	0.00175	0.0014	0.00153
Nickel (Ni)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.15	0.15	-	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050	<0.050	<DL	0.144	<0.050	0.137	<0.050	0.115	<0.050	<0.050
Potassium (K)-Total	mg/L	-	-	0.1	3.71	3.7	0%	2.77	6.66	3.92	4.81	6.16	2.78	3.22
Selenium (Se)-Total	mg/L	0.001	-	0.0001	<0.000050	<0.000050	<DL	0.000199	<0.000050	0.00024	0.000052	0.000274	0.000111	0.000101
Silicon (Si)-Total	mg/L	-	-	0.05	6.65	6.52	2%	15	6.87	9.08	4.4	5.88	6.07	5.7
Silver (Ag)-Total	mg/L	0.00025	0.1	0.00001	<0.000010	<0.000010	<DL	0.000396	0.000081	0.000374	<0.000010	0.000179	0.000018	0.000018
Sodium (Na)-Total	mg/L	-	-	0.05	5.38	5.05	6%	5.1	5.07	10.3	3.55	10.3	6.86	13.8
Strontium (Sr)-Total	mg/L	-	-	0.0002	0.426	0.414	3%	0.374	0.442	1.05	0.217	1.08	0.498	0.513
Sulfur (S)-Total	mg/L	-	-	0.5	148	147	1%	148	163	214	61.7	224	172	166
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	0.000093	0.00009	3%	0.000077	0.000101	0.000062	<0.000010	0.000038	<0.000010	<0.000010
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010	<DL	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.0003	0.00139	0.00201	36%	0.117	0.00802	0.0368	0.0301	0.0187	0.00845	0.00845
Uranium (U)-Total	mg/L	0.015	-	0.00001	0.00439	0.00429	2%	0.00954	0.00418	0.00608	0.000144	0.00576	0.00229	0.00173
Vanadium (V)-Total	mg/L	-	-	0.0005	<0.00050	<0.00050	<DL	0.0127	<0.00078	0.00524	<0.00050	0.00188	0.00254	0.00155
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	0.691	0.667	4%	0.0452	1.000	0.0496	<0.0030	0.0242	0.0094	0.0056
Zirconium (Zr)-Total	mg/L	-	-	0.0003	<0.00030	<0.00030	<DL	0.00077	<0.00030	0.00037	<0.00030	<0.00030	<0.00030	<0.00030

Summary of Water Quality Results for the July 4 - 6, 2016 Trip.

Analyte	Units	CCME-WATER F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	L1794268-1 WQ-DC-DX+105 05/07/2016 17:05	L1794268-2 WQ-DC-DX+105-R 05/07/2016 17:05	QA/QC WQ-DC-DX+105 Replicate Analysis	L1794268-3 WQ-BC 05/07/2016 11:55	L1794268-4 WQ-MS-S-03 05/07/2016 17:30	L1794268-5 WQ-PC-D 05/07/2016 8:30	L1794268-6 WQ-DC-DX 05/07/2016 17:45	L1794268-7 WQ-PC-U 05/07/2016 8:15	L1794268-8 WQ-DC-B 05/07/2016 15:00	L1794268-10 WQ-DC-U 05/07/2016 13:40
Aluminum (Al)-Dissolved	mg/L	0.1	-	0.001	<0.0010	<0.0010	<DL	0.0203	0.0023	0.0096	0.0053	0.0086	0.0501	0.0567
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	0.0101	0.00984	3%	0.00123	0.014	0.00642	0.00091	0.00623	0.00179	0.00111
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	0.0101	0.0098	3%	0.00437	0.0716	0.0097	0.00524	0.00728	0.00444	0.0118
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.0124	0.0122	2%	0.0702	0.0154	0.133	0.0382	0.127	0.0498	0.0509
Beryllium (Be)-Dissolved	mg/L	-	-	0.00002	<0.000020	<0.000020	<DL	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Dissolved	mg/L	-	-	0.0005	<0.000050	<0.000050	<DL	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved	mg/L	-	-	0.01	<0.010	<0.010	<DL	<0.010	<0.010	<0.010	<0.010	<0.010	0.015	0.024
Cadmium (Cd)-Dissolved (Lab Result)	mg/L	0.00009	-	0.00001	0.00075	0.00075	3%	0.000659	0.00086	0.000128	0.0000092	0.000161	0.0000197	0.0000227
Cadmium (Cd)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.00001	0.0004	0.0004	-	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	181	182	1%	55.4	195	223	74.7	236	156	166
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	<0.00010	<0.00010	<DL	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00013	0.00017
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	0.00073	0.00073	0%	0.00035	0.00109	0.00149	0.00022	0.00252	0.00045	0.00192
Copper (Cu)-Dissolved (Lab Result)	mg/L	0.002	-	0.00002	<0.00020	<0.00020	<DL	0.00177	0.00025	0.00021	0.00095	0.00126	0.00096	0.00136
Copper (Cu)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.002	0.004	0.004	-	0.004	0.004	0.004	0.004	0.004	0.004	0.004
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	0.168	0.171	2%	0.016	1.95	0.081	0.514	0.115	0.315	0.535
Lead (Pb)-Dissolved (Lab Result)	mg/L	0.001	-	0.00005	<0.000050	<0.000050	<DL	0.000117	0.000182	0.000604	<0.000050	0.00027	<0.000050	<0.000050
Lead (Pb)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.00005	0.007	0.007	-	0.007	0.007	0.007	0.007	0.007	0.007	0.007
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	0.009	0.0085	6%	0.0016	0.0095	0.005	<0.0010	0.0051	0.0031	0.0021
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	60.8	60.9	0%	14.6	65.4	43.7	19.9	45.7	73	59.5
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	1.23	1.24	1%	1.18	1.34	5.01	0.143	6.22	0.576	1.7
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.00001	<0.0000050	<0.0000050	<DL	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved	mg/L	0.0073	-	0.00005	0.000332	0.000325	2%	0.00458	0.000291	0.00147	<0.000050	0.00132	0.000299	0.000415
Nickel (Ni)-Dissolved (Lab Result)	mg/L	0.025	-	0.0005	0.00161	0.00148	<2xDL	0.00052	0.00185	0.00106	<0.00050	0.0013	0.00092	0.00117
Nickel (Ni)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.15	0.15	-	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050	<0.050	<DL	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	-	-	0.1	3.58	3.55	1%	1.64	3.79	6.18	4.73	6.4	2.7	3.57
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	<0.000050	<0.000050	<DL	0.000146	<0.000050	0.000148	<0.000050	0.00019	0.000094	0.000105
Silicon (Si)-Dissolved	mg/L	-	-	0.05	6.39	6.53	2%	6.25	6.55	4.62	4.54	5.56	5.73	
Silver (Ag)-Dissolved	mg/L	0.00025	-	0.00001	<0.000010	<0.000010	<DL	0.000018	<0.000010	0.000011	<0.000010	0.000024	<0.000010	<0.000010
Sodium (Na)-Dissolved	mg/L	-	-	0.05	5.07	5.08	0%	4.84	5.13	3.88	10.6	7.59	14.4	
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	0.421	0.405	4%	0.359	0.424	1.01	0.21	1.06	0.497	0.517
Sulfur (S)-Dissolved	mg/L	-	-	0.5	140	142	1%	156	156	211	60.8	219	177	167
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	0.000086	0.000087	1%	<0.000010	0.000087	0.000021	<0.000010	0.000025	<0.000010	<0.000010
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	<DL	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	mg/L	-	-	0.0003	<0.00030	<0.00030	<DL	<0.00030	<0.00030	<0.00030	<0.00030	0.00037	0.00045	0.00041
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.00419	0.00416	1%	0.00918	0.00416	0.00593	0.000131	0.00573	0.00229	0.00174
Vanadium (V)-Dissolved	mg/L	-	-	0.01	<0.00050	<0.00050	<DL	0.00171	<0.00050	0.00062	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	0.058	0.062	1%	0.0014	0.097	0.00059	0.0012	0.01	0.0038	0.0033
Zirconium (Zr)-Dissolved	mg/L	-	-	0.0003	<0.00030	<0.00030	<DL	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

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

COLOUR KEY:

- Exceeds CCME Guideline
- Exceeds MN Effluent Discharge Standards
- Exceeds both CCME and MN Standards
- Exceeds Hardness Dependent Calculated Guideline (CCME)

Data flag for Detection Limit Adjustment -> Please refer to the lab COA report and lab excel report for more info

QA/QC Codes: RPD - Relative Percent Difference, <DL - below detection limit, and <2XDL - less than two times the detection limit.

Notes:

QA/QC Comments:

- The Travel Blank sample did not have any parameters above detection limit. No contamination from storage or transport is suspected.
- The Field Blank did not have any parameters above detection limits. No contamination from field sampling methodology is suspected.
- QA/QC Replicate Analysis - The average RPD of the replicate sample WQ-DC-DX+105-r was 4% with an average difference of 5% for total and 2% for dissolved metals.
- Nitrate and total titanium had RPD>20%.
- The average RPD of the replicate sample WQ-VC-DBC-r was 9% with an average difference of 13% for total and 6% for dissolved metals.
- Total aluminum, silver, titanium and dissolved aluminum had RPD>20%.

Summary of Water Quality Results for the July 4 - 6, 2016 Trip.

Analyte	Units	CCME-WATER F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	L1794268-11 WQ-TP 05/07/2016 16:00	L1794268-12 WQ-SEEP 05/07/2016 14:10	L1794268-13 WQ-VC-R 04/07/2016 14:45	L1794268-14 WQ-VC-DBC 05/07/2016 10:15	L1794268-9 WQ-VC-DBC-R 05/07/2016 10:20	QA/QC WQ-VC-DBC Replicate Analysis	L1794268-15 WQ-VC-UMN 04/07/2016 15:50	L1794268-16 WQ-DC-D18 06/07/2016 9:10	L1794268-17 WQ-DC-R 04/07/2016 18:35	L1794268-18 WQ-CH-P-13-01 06/07/2016 8:40
Temperature (in-situ)	°C	-	-	-	17.6	9.6	9.7	6.2	-	-	10.8	5.4	9.1	1.3
Specific Conductivity (in-situ)	µS/cm	-	-	-	1204	1014	278.2	215.1	-	-	283.2	1503	572	1766
pH (in-situ)	pH	6.5 - 9.0	6.0 - 8.5	-	8.2	6.91	7.88	7.65	-	-	7.92	7.8	7.48	5.88
Dissolved Oxygen (in-situ)	mg/L	-	-	-	8.04	2.82	9.1	9.04	-	-	8.58	9.57	7.69	9.57
Turbidity (In-situ)	NTU	-	-	-	9.59	58.3	11.47	22	-	-	5.57	3.74	6.17	324
Colour, True	CU	15	-	5	-	-	-	-	-	-	-	-	-	-
Conductivity	µS/cm	-	-	2	1180	1480	274	217	216	0%	277	1500	567	1710
Hardness (as CaCO3)	mg/L	-	-	0.5	681	837	145	114	108	5%	146	969	307	1130
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	7.91	7.24	7.99	7.93	7.91	0%	8.03	8.03	7.72	6.91
Total Suspended Solids	mg/L	-	50	3	6.7	25.3	9.3	8.7	13.3	<2xDL	4.7	62.7	5.3	9.3
Total Dissolved Solids	mg/L	-	-	1	925	1130	159	120	119	1%	162	1150	371	1440
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	60.1	244	86.5	87	87.9	1%	90.6	260	94.4	15.3
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<1.0	<DL	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<1.0	<DL	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	60.1	244	86.5	87	87.9	1%	90.6	260	94.4	15.3
Ammonia, Total (as N)	mg/L	0.75	-	0.005	0.0055	4.23	0.0106	0.0145	0.0125	<2xDL	<0.0050	0.308	0.0462	0.0067
Chloride (Cl)	mg/L	120	-	0.5	<1.0	1.4	<0.50	<0.50	<0.50	<DL	<0.50	<1.0	<0.50	<2.5
Fluoride (F)	mg/L	0.12	-	0.02	0.198	0.072	0.065	0.066	0.066	<2xDL	0.064	0.138	0.077	<0.10
Nitrate (as N)	mg/L	13	-	0.005	0.199	0.453	0.0459	0.0617	0.064	4%	0.0407	0.119	0.184	0.033
Nitrite (as N)	mg/L	0.06	-	0.001	<0.0020	0.016	<0.0010	<0.0010	<0.0010	<DL	<0.0010	<0.0020	0.0049	<0.0050
Sulfate (SO4)	mg/L	-	-	0.5	613	620	52.4	24.1	24.5	2%	52.7	661	199	1040
Anion Sum	meq/L	-	-	-	14	17.9	2.83	2.25	2.28	<DL	2.91	19	6.04	21.9
Cation Sum	meq/L	-	-	-	14.6	19.1	3.08	2.43	2.31	<DL	3.1	19.9	6.53	23.1
Cation - Anion Balance	%	-	-	-	2.1	3.4	4.3	3.9	0.8	<DL	3.1	2.4	3.9	2.6
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	<0.0050	0.0151	<0.0050	<0.0050	<0.0050	<DL	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	-	0.3	0.005	<0.0050	0.0367	<0.0050	<0.0050	<0.0050	<DL	<0.0050	<0.0050	<0.0050	<0.0050
Cyanate	mg/L	-	-	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<DL	<0.20	<0.20	<0.20	<0.20
Thiocyanate (SCN)	mg/L	-	-	0.5	0.87	4.69	<0.50	<0.50	<0.50	<DL	<0.50	0.61	<0.50	<0.50
Aluminum (Al)-Total	mg/L	0.1	-	0.003	0.0629	0.116	0.307	0.678	0.513	28%	0.136	1.22	0.068	0.183
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	0.0403	0.00094	0.00047	0.00042	0.00037	<2xDL	0.00041	0.00713	0.00152	0.00016
Arsenic (As)-Total	mg/L	0.005	-	0.0001	0.103	0.0522	0.00388	0.00439	0.00383	14%	0.00253	0.0349	0.0131	0.00089
Barium (Ba)-Total	mg/L	-	1.0	0.00005	0.00971	0.0762	0.0662	0.0711	7%	0.065	0.0604	0.0304	0.0141	0.0141
Beryllium (Be)-Total	mg/L	-	-	0.00002	<0.000020	<0.000020	<0.000020	0.000024	<0.000020	<DL	<0.000020	0.000037	<0.000020	0.000035
Bismuth (Bi)-Total	mg/L	-	-	0.0005	0.000211	<0.000050	<0.000050	<0.000050	<0.000050	<DL	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total	mg/L	-	-	0.01	0.06	0.053	<0.010	<0.010	<0.010	<DL	<0.010	0.04	0.013	<0.010
Cadmium (Cd)-Total (Lab Result)	mg/L	0.00009	0.02	0.00001	0.000705	0.000496	0.0000575	0.00011	0.0000896	20%	0.0000379	0.000488	0.000037	0.0114
Cadmium (Cd)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.00001	0.0004	0.0004	0.0002	0.0002	0.0002	-	0.0002	0.0004	0.0004	0.0004
Calcium (Ca)-Total	mg/L	-	-	0.05	192	235	36.4	30.9	28.1	9%	38	207	79.2	275
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	0.00023	0.00069	0.00043	0.00073	0.00068	7%	0.00026	0.00215	0.00032	0.00017
Cobalt (Co)-Total	mg/L	-	-	0.0001	0.0004	0.00081	0.00027	0.00037	0.00031	<2xDL	0.00018	0.00092	0.00068	<0.00010
Copper (Cu)-Total (Lab Result)	mg/L	0.002	0.2	0.0005	0.0285	<0.0050	<0.0020	<0.0025	<0.0025	<DL	<0.0015	<0.0040	<0.0025	<0.0015
Copper (Cu)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.004	0.004	0.003	0.003	0.003	-	0.003	0.004	0.004	0.004
Iron (Fe)-Total	mg/L	0.3	1	0.01	0.516	8.54	0.451	0.824	0.712	15%	0.22	3.17	1.37	0.074
Lead (Pb)-Total (Lab Result)	mg/L	0.001	0.1	0.00005	0.0186	0.00212	0.00329	0.00335	0.00295	13%	0.00121	0.00314	0.000597	0.000081
Lead (Pb)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.00005	0.007	0.007	0.005	0.004	0.004	-	0.005	0.007	0.007	0.007
Lithium (Li)-Total	mg/L	-	-	0.0005	0.0074	0.001	<0.0010	<0.0010	0.0011	<DL	<0.0010	0.0082	<0.0010	0.0019
Magnesium (Mg)-Total	mg/L	-	-	0.1	38.6	53.3	12.1	10	9.12	9%	12.6	98.9	26.9	105
Manganese (Mn)-Total	mg/L	-	0.5	0.00005	0.0934	5.58	0.0941	0.2	0.181	10%	0.0751	1.27	0.229	0.24
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.00001	0.0000115	<0.000050	<0.000050	<0.000050	<0.000050	<DL	<0.000050	0.000066	<0.000050	<0.000050
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	0.00108	0.000865	0.000598	0.000976	0.000851	14%	0.000508	0.000283	0.000245	<0.000050
Nickel (Ni)-Total (Lab Result)	mg/L	0.025	0.3	0.0005	0.00054	0.00305	0.00064	0.00075	0.00075	<2xDL	<0.00050	0.00172	0.00112	0.00861
Nickel (Ni)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.15	0.15	0.1268	0.1056	0.1013333771	-	0.1274	0.15	0.15	0.15
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<DL	<0.050	0.055	<0.050	<0.050
Potassium (K)-Total	mg/L	-	-	0.1	12.5	6.36	0.98	1.05	0.88	18%	0.94	4.61	1.47	0.68
Selenium (Se)-Total	mg/L	0.001	-	0.0001	0.000055	0.000191	<0.000050	0.000058	<0.000050	<DL	<0.000050	0.000118	0.000098	<0.000050
Silicon (Si)-Total	mg/L	-	-	0.05	2.04	6.97	6.05	7.18	6.38	12%	5.89	7.65	5.23	6.52
Silver (Ag)-Total	mg/L	0.00025	0.1	0.00001	0.000432	0.000059	0.000027	0.000052	0.000065	22%	0.000011	0.000058	0.000014	<0.000010
Sodium (Na)-Total	mg/L	-	-	0.05	13.5	34	3.37	2.87	2.69	6%	3.51	7.13	6.3	6.3
Strontium (Sr)-Total	mg/L	-	-	0.0002	0.475	0.704	0.279	0.298	0.28	6%	0.288	0.547	0.255	0.616
Sulfur (S)-Total	mg/L	-	-	0.5	211	224	18.4	8.97	8.28	8%	18.8	228	72.8	376
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	0.000207	0.000022	0.00001	0.000016	0.000012	<2xDL	<0.000010	0.00004	<0.000010	<0.000010
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<DL	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.0003	0.00075	0.00026	0.00083	0.0169	0.0169	21%	0.00478	0.0557	0.00166	0.00187
Uranium (U)-Total	mg/L	0.015	-	0.00001	0.000837	0.00166	0.00106	0.00159	0.00143	11%	0.000845	0.00294	0.00062	0.000019
Vanadium (V)-Total	mg/L	-	-	0.0005	<0.00050	0.00223	0.00125	0.00212	0.00188	<2xDL	0.00091	0.00525	0.00083	<0.00050
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	0.0674	0.0213	0.0041	0.0073	0.0061	<2xDL	<0.0030	0.134	0.0071	4.46
Zirconium (Zr)-Total	mg/L	-	-	0.0003	<0.00030	0.00053	<0.00030	<0.00030	<0.00030	<DL	<0.00030	<0.00030	<0.00030	<0.00030

Summary of Water Quality Results for the July 4 - 6, 2016 Trip.

Analyte	Units	CCME-WATER F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	L1794268-11 WQ-TP 05/07/2016 16:00	L1794268-12 WQ-SEEP 05/07/2016 14:10	L1794268-13 WQ-VC-R 04/07/2016 14:45	L1794268-14 WQ-VC-DBC 05/07/2016 10:15	L1794268-9 WQ-VC-DBC-R 05/07/2016 10:20	QA/QC WQ-VC-DBC Replicate Analysis	L1794268-15 WQ-VC-UMN 04/07/2016 15:50	L1794268-16 WQ-DC-D18 06/07/2016 9:10	L1794268-17 WQ-DC-R 04/07/2016 18:35	L1794268-18 WQ-CH-P-13-01 06/07/2016 8:40
Aluminum (Al)-Dissolved	mg/L	0.1	-	0.001	0.0168	0.0085	0.0148	0.0103	0.0129	22%	0.0125	0.0057	0.0439	0.139
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	0.0397	0.00049	0.00041	0.00024	0.0002	<2xDL	0.00039	0.00675	0.00146	<0.00010
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	0.0593	0.0291	0.0017	0.00085	0.00071	18%	0.00161	0.0184	0.00841	0.00058
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.00927	0.074	0.0635	0.0669	0.0671	0%	0.0634	0.0485	0.029	0.0125
Beryllium (Be)-Dissolved	mg/L	-	-	0.00002	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<DL	<0.000020	<0.000020	<0.000020	0.000028
Bismuth (Bi)-Dissolved	mg/L	-	-	0.0005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<DL	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved	mg/L	-	-	0.01	0.059	0.051	<0.010	<0.010	<0.010	<DL	<0.010	0.037	0.012	<0.010
Cadmium (Cd)-Dissolved (Lab Result)	mg/L	0.00009	-	0.00001	0.000743	0.000364	0.0000261	0.0000236	0.0000255	<2xDL	0.0000234	0.0000865	0.0000295	0.0114
Cadmium (Cd)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.00001	0.0004	0.0004	0.0002	0.0002	0.0002	-	0.0002	0.0004	0.0004	0.0004
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	205	244	37.8	29.9	28.4	5%	37.9	216	79.2	278
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	0.00012	0.00035	<0.00010	<0.00010	<0.00010	<DL	<0.00010	<0.00010	0.00022	<0.00010
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	0.00035	0.00035	0.00014	<0.00010	<0.00010	<DL	0.00012	0.00065	0.00065	<0.00010
Copper (Cu)-Dissolved (Lab Result)	mg/L	0.002	-	0.0002	0.0167	0.00303	0.00125	0.00109	0.00109	0%	0.00117	0.00065	0.00020	0.00091
Copper (Cu)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.002	0.004	0.004	0.003	0.003	0.002225511	-	0.003	0.004	0.004	0.004
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	<0.010	4.66	0.061	0.022	0.019	<2xDL	0.029	0.488	0.771	0.03
Lead (Pb)-Dissolved (Lab Result)	mg/L	0.001	-	0.00005	0.000359	<0.000050	0.000171	0.000058	0.000052	<2xDL	0.000083	0.000054	0.00009	0.00007
Lead (Pb)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.00005	0.007	0.005	0.004	0.004	0.003509077	-	0.005	0.007	0.007	0.007
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	0.0071	<0.0010	<0.0010	<0.0010	<0.0010	<DL	<0.0010	0.0074	<0.0010	0.0018
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	41.1	55.4	12.3	9.6	9.1	5%	12.5	104	26.7	107
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	0.0553	5.48	0.0802	0.176	0.172	2%	0.0655	1.29	0.213	0.216
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.00001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<DL	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved	mg/L	0.0073	-	0.00005	0.0011	0.000858	0.000617	0.000906	0.000833	8%	0.000505	0.000224	0.00022	<0.000050
Nickel (Ni)-Dissolved (Lab Result)	mg/L	0.025	-	0.0005	<0.00050	0.00263	<0.00050	<0.00050	<0.00050	<DL	<0.00050	0.00072	0.00103	0.00815
Nickel (Ni)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.15	0.15	0.13	0.11	0.10	-	0.13	0.15	0.15	0.15
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<DL	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	-	-	0.1	13.4	6.51	0.9	0.81	0.75	8%	0.86	1.43	0.6	0.6
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	<0.000050	0.000216	0.000059	<0.000050	<0.000050	<DL	<0.000050	0.000053	0.000079	<0.000050
Silicon (Si)-Dissolved	mg/L	-	-	0.05	2.07	6.83	5.77	5.83	5.57	5%	5.68	5.96	5.19	6.5
Silver (Ag)-Dissolved	mg/L	0.00025	-	0.00001	0.000039	<0.000010	<0.000010	<0.000010	<0.000010	<DL	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved	mg/L	-	-	0.05	14.6	34.3	4.1	2.76	2.78	1%	3.49	6.62	7.37	5.98
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	0.483	0.691	0.285	0.291	0.279	4%	0.294	0.535	0.247	0.627
Sulfur (S)-Dissolved	mg/L	-	-	0.5	215	219	18.5	8.73	8.23	6%	18.5	230	70.8	370
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	0.00021	0.00001	<0.000010	<0.000010	<0.000010	<DL	<0.000010	0.000011	<0.000010	<0.000010
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<DL	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	mg/L	-	-	0.0003	<0.00030	0.00047	<0.00030	<0.00030	<0.00030	<DL	<0.00030	<0.00030	0.00075	<0.00030
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.000832	0.00164	0.00102	0.0015	0.00142	5%	0.000835	0.0027	0.000589	0.000015
Vanadium (V)-Dissolved	mg/L	-	-	0.01	<0.00050	0.00111	<0.00050	<0.00050	<0.00050	<DL	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	0.0309	0.0176	0.0025	<0.010	<0.010	<DL	0.0011	0.095	0.0042	4.38
Zirconium (Zr)-Dissolved	mg/L	-	-	0.0003	<0.00030	0.00045	<0.00030	<0.00030	<0.00030	<DL	<0.00030	<0.00030	0.0003	<0.00030

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

COLOUR KEY:

- Exceeds CCME Guideline
- Exceeds MN Effluent Discharge Standards
- Exceeds both CCME and MN Standards
- Exceeds Hardness Dependent Calculated Guideline (CCME)

Data flag for Detection Limit Adjustment -> Please refer to the lab COA report and lab excel report for more info

QA/QC Codes: RPD - Relative Percent Difference, <DL - below detection limit, and <2XDL - less than two times the detection limit.

Summary of Water Quality Results for the July 4 - 6, 2016 Trip.

Analyte	Units	CCME-WATER F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	L1794268-19 WQ-VU-U 05/07/2016 10:45	L1794268-20 FIELD BLANK 06/07/2016 11:15	L1794268-21 TRAVEL BLANK 06/07/2016 0:00	L1794288-1 WQ-PW 06/07/2016 11:10
Temperature (in-situ)	°C	-	-	-	6.3	-	-	0.3
Specific Conductivity (in-situ)	µS/cm	-	-	-	196.8	-	-	369.2
pH (in-situ)	pH	6.5 - 9.0	6.0 - 8.5	-	7.64	-	-	6.94
Dissolved Oxygen (in-situ)	mg/L	-	-	-	8.98	-	-	2.73
Turbidity (In-situ)	NTU	-	-	-	0.61	-	-	0.42
Colour, True	CU	15	-	5	-	-	-	<5.0
Conductivity	µS/cm	-	-	2	194	<2.0	<2.0	363
Hardness (as CaCO3)	mg/L	-	-	0.5	101	<0.50	<0.50	197
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	7.93	5.38	5.41	8.05
Total Suspended Solids	mg/L	-	50	3	<3.0	<3.0	<3.0	-
Total Dissolved Solids	mg/L	-	-	1	105	<1.0	<1.0	202
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	85.1	<1.0	<1.0	-
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	-
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	-
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	85.1	<1.0	<1.0	160
Ammonia, Total (as N)	mg/L	0.75	-	0.005	<0.0050	<0.0050	0.0168	-
Chloride (Cl)	mg/L	120	-	0.5	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.12	-	0.02	0.057	<0.020	<0.020	0.105
Nitrate (as N)	mg/L	13	-	0.005	0.0445	<0.0050	<0.0050	0.124
Nitrite (as N)	mg/L	0.06	-	0.001	<0.0010	<0.0010	<0.0010	<0.0010
Sulfate (SO4)	mg/L	-	-	0.5	16.1	<0.30	<0.30	33.4
Anion Sum	meq/L	-	-	-	2.04	<0.10	<0.10	3.91
Cation Sum	meq/L	-	-	-	2.15	<0.10	<0.10	4.19
Cation - Anion Balance	%	-	-	-	2.5	0	0	3.4
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	<0.0050	<0.0050	<0.0050	-
Cyanide, Total	mg/L	-	0.3	0.005	<0.0050	<0.0050	<0.0050	-
Cyanate	mg/L	-	-	0.2	<0.20	<0.20	<0.20	-
Thiocyanate (SCN)	mg/L	-	-	0.5	<0.50	<0.50	<0.50	-
Aluminum (Al)-Total	mg/L	0.1	-	0.003	0.0175	<0.0030	<0.0030	<0.010
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	<0.00010	<0.00010	<0.00010	<0.00050
Arsenic (As)-Total	mg/L	0.005	-	0.0001	0.00039	<0.00010	<0.00010	0.00035
Barium (Ba)-Total	mg/L	-	1.0	0.00005	0.0642	<0.000050	<0.000050	0.088
Beryllium (Be)-Total	mg/L	-	-	0.00002	<0.000020	<0.000020	<0.000020	-
Bismuth (Bi)-Total	mg/L	-	-	0.0005	<0.000050	<0.000050	<0.000050	-
Boron (B)-Total	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.10
Cadmium (Cd)-Total (Lab Result)	mg/L	0.00009	0.02	0.00001	0.0000133	<0.0000050	<0.0000050	<0.00020
Cadmium (Cd)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.00001	0.0002	0.0004	0.0004	-
Calcium (Ca)-Total	mg/L	-	-	0.05	24.9	<0.050	<0.050	45.2
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	<0.00010	<0.00010	<0.00010	<0.0020
Cobalt (Co)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	-
Copper (Cu)-Total (Lab Result)	mg/L	0.002	0.2	0.0005	<0.0015	<0.00050	<0.00050	<0.0010
Copper (Cu)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.002	0.004	0.004	-
Iron (Fe)-Total	mg/L	0.3	1	0.01	0.036	<0.010	<0.010	<0.030
Lead (Pb)-Total (Lab Result)	mg/L	0.001	0.1	0.00005	<0.000050	<0.000050	<0.000050	0.00053
Lead (Pb)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.00005	0.003	0.007	0.007	-
Lithium (Li)-Total	mg/L	-	-	0.0005	<0.0010	<0.0010	<0.0010	-
Magnesium (Mg)-Total	mg/L	-	-	0.1	8.66	<0.10	<0.10	20.6
Manganese (Mn)-Total	mg/L	-	0.5	0.00005	0.0337	<0.00010	<0.00010	<0.0020
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.00001	<0.0000050	<0.0000050	<0.0000050	-
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	0.000413	<0.000050	<0.000050	-
Nickel (Ni)-Total (Lab Result)	mg/L	0.025	0.3	0.0005	<0.00050	<0.00050	<0.00050	-
Nickel (Ni)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.096302241	0.15	0.15	-
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050	<0.050	<0.050	-
Potassium (K)-Total	mg/L	-	-	0.1	0.69	<0.10	<0.10	0.89
Selenium (Se)-Total	mg/L	0.001	-	0.0001	<0.000050	<0.000050	<0.000050	<0.0010
Silicon (Si)-Total	mg/L	-	-	0.05	5.62	<0.050	<0.050	-
Silver (Ag)-Total	mg/L	0.00025	0.1	0.00001	<0.000010	<0.000010	<0.000010	-
Sodium (Na)-Total	mg/L	-	-	0.05	2.42	<0.050	<0.050	5.1
Strontium (Sr)-Total	mg/L	-	-	0.0002	0.271	<0.00020	<0.00020	-
Sulfur (S)-Total	mg/L	-	-	0.5	5.75	<0.50	<0.50	-
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	<0.000010	<0.000010	<0.000010	-
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	-
Titanium (Ti)-Total	mg/L	-	-	0.0003	0.00041	<0.00030	<0.00030	-
Uranium (U)-Total	mg/L	0.015	-	0.00001	0.000524	<0.000010	<0.000010	0.00177
Vanadium (V)-Total	mg/L	-	-	0.0005	<0.00050	<0.00050	<0.00050	-
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	<0.0030	<0.0030	<0.0030	-
Zirconium (Zr)-Total	mg/L	-	-	0.0003	<0.00030	<0.00030	<0.00030	<0.050

Summary of Water Quality Results for the July 4 - 6, 2016 Trip.

Analyte	Units	CCME-WATER F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	L1794268-19 WQ-VC-U 05/07/2016 10:45	L1794268-20 FIELD BLANK 06/07/2016 11:15	L1794268-21 TRAVEL BLANK 06/07/2016 0:00	L1794288-1 WQ-PW 06/07/2016 11:10
Aluminum (Al)-Dissolved	mg/L	0.1	-	0.001	0.0082	<0.0010	-	-
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	0.0001	<0.00010	-	-
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	0.00036	<0.00010	-	-
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.0665	<0.000050	-	-
Beryllium (Be)-Dissolved	mg/L	-	-	0.00002	<0.000020	<0.000020	-	-
Bismuth (Bi)-Dissolved	mg/L	-	-	0.0005	<0.000050	<0.000050	-	-
Boron (B)-Dissolved	mg/L	-	-	0.01	<0.010	<0.010	-	-
Cadmium (Cd)-Dissolved (Lab Result)	mg/L	0.00009	-	0.00001	0.0000097	<0.000050	-	-
<i>Cadmium (Cd)-Diss. (Hardness Adjusted Guideline)</i>	mg/L	-	-	0.00001	0.0002	0.0004	-	-
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	25.9	<0.050	-	-
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	<0.00010	<0.00010	-	-
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	-	-
Copper (Cu)-Dissolved (Lab Result)	mg/L	0.002	-	0.00002	0.00101	<0.00020	-	-
<i>Copper (Cu)-Diss. (Hardness Adjusted Guideline)</i>	mg/L	-	-	0.002	0.002	0.004	-	-
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	0.02	<0.010	-	-
Lead (Pb)-Dissolved (Lab Result)	mg/L	0.001	-	0.00005	<0.000050	<0.000050	-	-
<i>Lead (Pb)-Diss. (Hardness Adjusted Guideline)</i>	mg/L	-	-	0.00005	0.003	0.007	-	-
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	<0.0010	<0.0010	-	-
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	8.87	<0.10	-	-
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	0.0324	<0.00010	-	-
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.00001	<0.0000050	<0.0000050	-	-
Molybdenum (Mo)-Dissolved	mg/L	0.0073	-	0.00005	0.000416	<0.000050	-	-
Nickel (Ni)-Dissolved (Lab Result)	mg/L	0.025	-	0.0005	<0.00050	<0.00050	-	-
<i>Nickel (Ni)-Diss. (Hardness Adjusted Guideline)</i>	mg/L	-	-	0.0005	0.10	0.15	-	-
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050	<0.050	-	-
Potassium (K)-Dissolved	mg/L	-	-	0.1	0.69	<0.10	-	-
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	<0.000050	<0.000050	-	-
Silicon (Si)-Dissolved	mg/L	-	-	0.05	5.81	<0.050	-	-
Silver (Ag)-Dissolved	mg/L	0.00025	-	0.00001	<0.000010	<0.000010	-	-
Sodium (Na)-Dissolved	mg/L	-	-	0.05	2.47	<0.050	-	-
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	0.283	<0.00020	-	-
Sulfur (S)-Dissolved	mg/L	-	-	0.5	5.84	<0.50	-	-
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	<0.000010	<0.000010	-	-
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	-	-
Titanium (Ti)-Dissolved	mg/L	-	-	0.0003	<0.00030	<0.00030	-	-
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.000518	<0.000010	-	-
Vanadium (V)-Dissolved	mg/L	-	-	0.01	<0.00050	<0.00050	-	-
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	<0.0010	<0.0010	-	-
Zirconium (Zr)-Dissolved	mg/L	-	-	0.0003	<0.00030	<0.00030	-	-

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

COLOUR KEY:

Exceeds CCME Guideline

Exceeds MN Effluent Discharge Standards

Exceeds both CCME and MN Standards

Exceeds Hardness Dependent Calculated Guideline (CCME)

Data flag for Detection Limit Adjustment -> Please refer to the lab COA report and lab excel report for more info

QA/QC Codes: RPD - Relative Percent Difference, <DL - below detection limit, and <2XDL - less than two times the detection limit.

ATTACHMENT 5:

**LABORATORY
CERTIFICATES OF
ANALYSIS AND
YUKON
ENVIRONMENTAL
HEALTH SERVICES
BACTERIOLOGICAL
RESULTS**



EDI ENVIRONMENTAL DYNAMICS INC.
ATTN: Lyndsay Doetzel
2195 - 2nd Ave
Whitehorse YT Y1A 3T8

Date Received: 06-JUL-16
Report Date: 18-JUL-16 18:13 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1794268
Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 16-Y-0089
C of C Numbers: 1, 2, 3, 4
Legal Site Desc:

Can Dang
Senior Account Manager

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

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1794268-1 Water 05-JUL-16 17:05 WQ-DC-DX+105	L1794268-2 Water 05-JUL-16 17:05 WQ-DC-DX+105-R	L1794268-3 Water 05-JUL-16 11:55 WQ-BC	L1794268-4 Water 05-JUL-16 17:30 WQ-MS-S-03	L1794268-5 Water 05-JUL-16 08:30 WQ-PC-D
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	1120	1130	381	1200	1230
	Hardness (as CaCO3) (mg/L)	702	706	198	757	737
	pH (pH)	7.49	7.50	8.17	7.60	7.85
	Total Suspended Solids (mg/L)	3.3	3.3	82.0	19.3	83.3
	Total Dissolved Solids (mg/L)	834	826	234	890	969
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	265	266	110	274	119
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	265	266	110	274	119
	Ammonia, Total (as N) (mg/L)	0.0188	0.0175	0.0968	0.0309	3.29
	Chloride (Cl) (mg/L)	<1.0 ^{DLDS}	<1.0 ^{DLDS}	0.52	<1.0 ^{DLDS}	2.3
	Fluoride (F) (mg/L)	0.201	0.189	0.165	0.218	0.146
	Nitrate (as N) (mg/L)	0.019	0.026	0.167	<0.010 ^{DLDS}	0.105
	Nitrite (as N) (mg/L)	<0.0020 ^{DLDS}	<0.0020 ^{DLDS}	0.0059	<0.0020 ^{DLDS}	0.0337
	Sulfate (SO4) (mg/L)	422 ^{MB-LOR}	412 ^{MB-LOR}	88.3 ^{MB-LOR}	451 ^{MB-LOR}	602 ^{MB-LOR}
	Anion Sum (meq/L)	14.1	13.9	4.08	14.9	15.0
	Cation Sum (meq/L)	14.4	14.5	4.27	15.6	15.8
	Cation - Anion Balance (%)	1.1	2.0	2.3	2.5	2.5
	Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050	<0.050 ^{DLM}
Cyanate (mg/L)		<2.0 ^{DLIS}	<0.20	<0.20	<0.20	0.21
Thiocyanate (SCN) (mg/L)		<0.50	<0.50	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0198	0.0233	3.84	0.142	1.65
	Antimony (Sb)-Total (mg/L)	0.0103	0.0100	0.00230	0.0154	0.00848
	Arsenic (As)-Total (mg/L)	0.0331	0.0323	0.0320	0.112	0.0384
	Barium (Ba)-Total (mg/L)	0.0131	0.0126	0.130	0.0183	0.164
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	0.000170	<0.000020	0.000093
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	0.000308	<0.000050	0.000387
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	0.00206	0.00198	0.000609	0.00334	0.000451
	Calcium (Ca)-Total (mg/L)	183	178	55.3	193	216
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	0.00464	0.00023	0.00160
	Cobalt (Co)-Total (mg/L)	0.00078	0.00076	0.00241	0.00125	0.00238
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	0.0123	<0.0030 ^{DLB}	0.00893
	Iron (Fe)-Total (mg/L)	0.411	0.449	5.91	2.86	3.46
	Lead (Pb)-Total (mg/L)	0.000167	0.000147	0.0262	0.00777	0.0231

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

18-JUL-16 18:13 (MT)

Version: FINAL

Sample ID	Description	Sampled Date	Sampled Time	Client ID	L1794268-6	L1794268-7	L1794268-8	L1794268-9	L1794268-10
					Water	Water	Water	Water	Water
		05-JUL-16	17:45	WQ-DC-DX	05-JUL-16	05-JUL-16	05-JUL-16	05-JUL-16	05-JUL-16
					17:45	08:15	15:00	10:20	13:40
					WQ-DC-DX	WQ-PC-U	WQ-DC-B	WQ-VC-DBC-R	WQ-DC-U
Grouping	Analyte								
WATER									
Physical Tests	Conductivity (uS/cm)	500	1320	1150	216	1100			
	Hardness (as CaCO3) (mg/L)	268	777	690	108	659			
	pH (pH)	7.52	7.76	8.00	7.91	8.07			
	Total Suspended Solids (mg/L)	6.0	29.3	27.3	13.3	15.3			
	Total Dissolved Solids (mg/L)	326	1030	846	119	831			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	82.7	130	165	87.9	170			
	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)	82.7	130	165	87.9	170			
	Ammonia, Total (as N) (mg/L)	<0.0050	3.37	0.113	0.0125	0.956			
	Chloride (Cl) (mg/L)	<0.50	2.4	<1.0	<0.50	<1.0			
	Fluoride (F) (mg/L)	0.062	0.139	0.081	0.066	0.080			
	Nitrate (as N) (mg/L)	<0.0050	0.221	0.070	0.0640	0.309			
	Nitrite (as N) (mg/L)	<0.0010	0.0340	<0.0020	<0.0010	0.0170			
	Sulfate (SO4) (mg/L)	173	642	506	24.5	481			
	Anion Sum (meq/L)	5.25	16.1	13.8	2.28	13.4			
	Cation Sum (meq/L)	5.69	16.6	14.2	2.31	14.0			
	Cation - Anion Balance (%)	4.0	1.7	1.4	0.8	2.2			
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050			
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050			
	Cyanate (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20			
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0698	0.484	0.458	0.513	0.226			
	Antimony (Sb)-Total (mg/L)	0.00107	0.00684	0.00190	0.00037	0.00119			
	Arsenic (As)-Total (mg/L)	0.00763	0.0177	0.0110	0.00383	0.0163			
	Barium (Ba)-Total (mg/L)	0.0398	0.136	0.0551	0.0711	0.0519			
	Beryllium (Be)-Total (mg/L)	<0.000020	0.000039	0.000025	<0.000020	0.000021			
	Bismuth (Bi)-Total (mg/L)	<0.000050	0.000142	<0.000050	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	<0.010	<0.010	0.015	<0.010	0.024			
	Cadmium (Cd)-Total (mg/L)	0.0000217	0.000327	0.0000605	0.0000896	0.0000494			
	Calcium (Ca)-Total (mg/L)	69.2	225	150	28.1	157			
	Chromium (Cr)-Total (mg/L)	0.00015	0.00064	0.00093	0.00068	0.00055			
	Cobalt (Co)-Total (mg/L)	0.00034	0.00281	0.00060	0.00031	0.00204			
	Copper (Cu)-Total (mg/L)	<0.0015	<0.0040	<0.0025	<0.0025	<0.0025			
	Iron (Fe)-Total (mg/L)	0.913	1.48	2.74	0.712	1.81			
	Lead (Pb)-Total (mg/L)	0.000428	0.00813	0.000703	0.00295	0.000355			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1794268-11 Water 05-JUL-16 16:00 WQ-TP	L1794268-12 Water 05-JUL-16 14:10 WQ-SEEP	L1794268-13 Water 04-JUL-16 14:45 WQ-VC-R	L1794268-14 Water 05-JUL-16 10:15 WQ-VC-DBC	L1794268-15 Water 04-JUL-16 15:50 WQ-VC-UMN
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	1180	1480	274	217	277
	Hardness (as CaCO3) (mg/L)	681	837	145	114	146
	pH (pH)	7.91	7.24	7.99	7.93	8.03
	Total Suspended Solids (mg/L)	6.7	25.3	9.3	8.7	4.7
	Total Dissolved Solids (mg/L)	925	1130	159	120	162
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	60.1	244	86.5	87.0	90.6
	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)	60.1	244	86.5	87.0	90.6
	Ammonia, Total (as N) (mg/L)	0.0055	4.23	0.0106	0.0145	<0.0050
	Chloride (Cl) (mg/L)	<1.0 ^{DLDS}	1.4	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.198	0.072	0.065	0.066	0.064
	Nitrate (as N) (mg/L)	0.199	0.453	0.0459	0.0617	0.0407
	Nitrite (as N) (mg/L)	<0.0020 ^{DLDS}	0.0160	<0.0010	<0.0010	<0.0010
	Sulfate (SO4) (mg/L)	613 ^{MB-LOR}	620 ^{MB-LOR}	52.4 ^{MB-LOR}	24.1 ^{MB-LOR}	52.7 ^{MB-LOR}
	Anion Sum (meq/L)	14.0	17.9	2.83	2.25	2.91
	Cation Sum (meq/L)	14.6	19.1	3.08	2.43	3.10
	Cation - Anion Balance (%)	2.1	3.4	4.3	3.9	3.1
	Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	0.0151	<0.0050	<0.0050
Cyanide, Total (mg/L)		<0.0050	0.0367	<0.0050	<0.0050	<0.0050
Cyanate (mg/L)		<0.20	<0.20	<0.20	<0.20	<0.20
Thiocyanate (SCN) (mg/L)		0.87	4.69	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0629	0.116	0.307	0.678	0.136
	Antimony (Sb)-Total (mg/L)	0.0403	0.00094	0.00047	0.00042	0.00041
	Arsenic (As)-Total (mg/L)	0.103	0.0522	0.00388	0.00439	0.00253
	Barium (Ba)-Total (mg/L)	0.00971	0.0762	0.0662	0.0764	0.0650
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	0.000024	<0.000020
	Bismuth (Bi)-Total (mg/L)	0.000211	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	0.060	0.053	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	0.000705	0.000496	0.0000575	0.000110	0.0000379
	Calcium (Ca)-Total (mg/L)	192	235	36.4	30.9	38.0
	Chromium (Cr)-Total (mg/L)	0.00023	0.00069	0.00043	0.00073	0.00026
	Cobalt (Co)-Total (mg/L)	0.00040	0.00801	0.00027	0.00037	0.00018
	Copper (Cu)-Total (mg/L)	0.0285	<0.0050 ^{DLB}	<0.0020 ^{DLB}	<0.0025 ^{DLB}	<0.0015 ^{DLB}
	Iron (Fe)-Total (mg/L)	0.516	8.54	0.451	0.824	0.220
	Lead (Pb)-Total (mg/L)	0.0186	0.00212	0.00329	0.00335	0.00121

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1794268-16	L1794268-17	L1794268-18	L1794268-19	L1794268-20
		Description	Water	Water	Water	Water	Water
		Sampled Date	06-JUL-16	04-JUL-16	06-JUL-16	05-JUL-16	06-JUL-16
		Sampled Time	09:10	18:35	08:40	10:45	11:15
		Client ID	WQ-DC-D1B	WQ-DC-R	WQ-CH-P-13-01	WQ-VC-U	FIELD BLANK
Grouping	Analyte						
WATER							
Physical Tests	Conductivity (uS/cm)		1500	567	1710	194	<2.0
	Hardness (as CaCO3) (mg/L)		969	307	1130	101	<0.50
	pH (pH)		8.03	7.72	6.91	7.93	5.38
	Total Suspended Solids (mg/L)		62.7	5.3	9.3	<3.0	<3.0
	Total Dissolved Solids (mg/L)		1150	371	1440	105	<1.0
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		260	94.4	15.3	85.1	<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)		260	94.4	15.3	85.1	<1.0
	Ammonia, Total (as N) (mg/L)		0.308	0.0462	0.0067	<0.0050	<0.0050
	Chloride (Cl) (mg/L)		<1.0 ^{DLDS}	<0.50	<2.5 ^{DLDS}	<0.50	<0.50
	Fluoride (F) (mg/L)		0.138	0.077	<0.10 ^{DLDS}	0.057	<0.020
	Nitrate (as N) (mg/L)		0.119	0.184	0.033	0.0445	<0.0050
	Nitrite (as N) (mg/L)		<0.0020 ^{DLDS}	0.0049	<0.0050	<0.0010	<0.0010
	Sulfate (SO4) (mg/L)		661 ^{MB-LOR}	199 ^{MB-LOR}	1040 ^{MB-LOR}	16.1 ^{MB-LOR}	<0.30
	Anion Sum (meq/L)		19.0	6.04	21.9	2.04	<0.10
	Cation Sum (meq/L)		19.9	6.53	23.1	2.15	<0.10
	Cation - Anion Balance (%)		2.4	3.9	2.6	2.5	0.0
	Cyanides	Cyanide, Weak Acid Diss (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total (mg/L)			<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanate (mg/L)			<0.20	<0.20	<0.20	<0.20	<0.20
Thiocyanate (SCN) (mg/L)			0.61	<0.50	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)		1.22	0.0680	0.183	0.0175	<0.0030
	Antimony (Sb)-Total (mg/L)		0.00713	0.00152	0.00016	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)		0.0349	0.0131	0.00089	0.00039	<0.00010
	Barium (Ba)-Total (mg/L)		0.0604	0.0304	0.0141	0.0642	<0.000050
	Beryllium (Be)-Total (mg/L)		0.000037	<0.000020	0.000035	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)		0.040	0.013	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)		0.000488	0.0000370	0.0114	0.0000133	<0.000050
	Calcium (Ca)-Total (mg/L)		207	79.2	275	24.9	<0.050
	Chromium (Cr)-Total (mg/L)		0.00215	0.00032	0.00017	<0.00010	<0.00010
	Cobalt (Co)-Total (mg/L)		0.00092	0.00068	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)		<0.0040 ^{DLB}	<0.0025 ^{DLB}	<0.0015 ^{DLB}	<0.0015 ^{DLB}	<0.00050
	Iron (Fe)-Total (mg/L)		3.17	1.37	0.074	0.036	<0.010
	Lead (Pb)-Total (mg/L)		0.00314	0.000597	0.000081	<0.000050	<0.000050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1794268-21 Water 06-JUL-16 TRAVEL BLANK			
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (uS/cm)	<2.0			
	Hardness (as CaCO3) (mg/L)	<0.50			
	pH (pH)	5.41			
	Total Suspended Solids (mg/L)	<3.0			
	Total Dissolved Solids (mg/L)	<1.0			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	<1.0			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	<1.0			
	Ammonia, Total (as N) (mg/L)	0.0168 ^{RRV}			
	Chloride (Cl) (mg/L)	<0.50			
	Fluoride (F) (mg/L)	<0.020			
	Nitrate (as N) (mg/L)	<0.0050			
	Nitrite (as N) (mg/L)	<0.0010			
	Sulfate (SO4) (mg/L)	<0.30			
	Anion Sum (meq/L)	<0.10			
	Cation Sum (meq/L)	<0.10			
	Cation - Anion Balance (%)	0.0			
	Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050		
Cyanide, Total (mg/L)		<0.0050			
Cyanate (mg/L)		<0.20			
Thiocyanate (SCN) (mg/L)		<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030			
	Antimony (Sb)-Total (mg/L)	<0.00010			
	Arsenic (As)-Total (mg/L)	<0.00010			
	Barium (Ba)-Total (mg/L)	<0.000050			
	Beryllium (Be)-Total (mg/L)	<0.000020			
	Bismuth (Bi)-Total (mg/L)	<0.000050			
	Boron (B)-Total (mg/L)	<0.010			
	Cadmium (Cd)-Total (mg/L)	<0.0000050			
	Calcium (Ca)-Total (mg/L)	<0.050			
	Chromium (Cr)-Total (mg/L)	<0.00010			
	Cobalt (Co)-Total (mg/L)	<0.00010			
	Copper (Cu)-Total (mg/L)	<0.00050			
	Iron (Fe)-Total (mg/L)	<0.010			
	Lead (Pb)-Total (mg/L)	<0.000050			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1794268-1 Water 05-JUL-16 17:05 WQ-DC-DX+105	L1794268-2 Water 05-JUL-16 17:05 WQ-DC-DX+105-R	L1794268-3 Water 05-JUL-16 11:55 WQ-BC	L1794268-4 Water 05-JUL-16 17:30 WQ-MS-S-03	L1794268-5 Water 05-JUL-16 08:30 WQ-PC-D
Grouping	Analyte					
WATER						
Total Metals	Lithium (Li)-Total (mg/L)	0.0094	0.0092	0.0042	0.0102	0.0068
	Magnesium (Mg)-Total (mg/L)	60.4	60.5	15.6	65.0	43.1
	Manganese (Mn)-Total (mg/L)	1.31	1.26	1.37	1.41	5.12
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	0.0000137	<0.0000050	0.0000108
	Molybdenum (Mo)-Total (mg/L)	0.000339	0.000332	0.00462	0.000325	0.00168
	Nickel (Ni)-Total (mg/L)	0.00163	0.00164	0.00362	0.00207	0.00233
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	0.144	<0.050	0.137
	Potassium (K)-Total (mg/L)	3.71	3.70	2.77	3.92	6.66
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	0.000199	<0.000050	0.000240
	Silicon (Si)-Total (mg/L)	6.65	6.52	15.0	6.87	9.08
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	0.000396	0.000081	0.000374
	Sodium (Na)-Total (mg/L)	5.38	5.05	5.10	5.07	10.3
	Strontium (Sr)-Total (mg/L)	0.426	0.414	0.374	0.442	1.05
	Sulfur (S)-Total (mg/L)	148	147	31.3	163	214
	Thallium (Tl)-Total (mg/L)	0.000093	0.000090	0.000077	0.000101	0.000062
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	0.00139	0.00201	0.117	0.00802	0.0368
	Uranium (U)-Total (mg/L)	0.00439	0.00429	0.00954	0.00418	0.00608
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	0.0127	0.00078	0.00524
	Zinc (Zn)-Total (mg/L)	0.691	0.667	0.0452	1.00	0.0496
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	0.00077	<0.00030	0.00037
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	<0.0010	0.0203	0.0023	0.0096
	Antimony (Sb)-Dissolved (mg/L)	0.0101	0.00984	0.00123	0.0140	0.00642
	Arsenic (As)-Dissolved (mg/L)	0.0101	0.00980	0.00437	0.0716	0.00970
	Barium (Ba)-Dissolved (mg/L)	0.0124	0.0122	0.0702	0.0154	0.133
	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	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	0.000775	0.000750	0.0000659	0.000886	0.000128
	Calcium (Ca)-Dissolved (mg/L)	181	182	55.4	195	223
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00073	0.00073	0.00035	0.00109	0.00149
	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	0.00177	0.00025	0.00210
	Iron (Fe)-Dissolved (mg/L)	0.168	0.171	0.016	1.95	0.081
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	0.000117	0.000182	0.000604

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1794268-6 Water 05-JUL-16 17:45 WQ-DC-DX	L1794268-7 Water 05-JUL-16 08:15 WQ-PC-U	L1794268-8 Water 05-JUL-16 15:00 WQ-DC-B	L1794268-9 Water 05-JUL-16 10:20 WQ-VC-DBC-R	L1794268-10 Water 05-JUL-16 13:40 WQ-DC-U
Grouping	Analyte					
WATER						
Total Metals	Lithium (Li)-Total (mg/L)	<0.0010	0.0059	0.0036	0.0011	0.0024
	Magnesium (Mg)-Total (mg/L)	19.1	44.1	69.0	9.12	57.0
	Manganese (Mn)-Total (mg/L)	0.243	6.14	0.562	0.181	1.71
	Mercury (Hg)-Total (mg/L)	<0.0000050	0.0000075	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.000059	0.00139	0.000323	0.000851	0.000430
	Nickel (Ni)-Total (mg/L)	<0.00050	0.00175	0.00140	0.00075	0.00153
	Phosphorus (P)-Total (mg/L)	<0.050	0.115	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	4.81	6.16	2.78	0.88	3.22
	Selenium (Se)-Total (mg/L)	0.000052	0.000274	0.000111	<0.000050	0.000101
	Silicon (Si)-Total (mg/L)	4.40	5.88	6.07	6.38	5.70
	Silver (Ag)-Total (mg/L)	<0.000010	0.000179	0.000018	0.000065	0.000018
	Sodium (Na)-Total (mg/L)	3.55	10.3	6.86	2.69	13.8
	Strontium (Sr)-Total (mg/L)	0.217	1.08	0.498	0.280	0.513
	Sulfur (S)-Total (mg/L)	61.7	224	172	8.28	166
	Thallium (Tl)-Total (mg/L)	<0.000010	0.000038	<0.000010	0.000012	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	0.00301	0.0137	0.0187	0.0169	0.00845
	Uranium (U)-Total (mg/L)	0.000144	0.00576	0.00229	0.00143	0.00173
	Vanadium (V)-Total (mg/L)	<0.00050	0.00188	0.00254	0.00188	0.00155
	Zinc (Zn)-Total (mg/L)	<0.0030	0.0242	0.0094	0.0061	0.0056
	Zirconium (Zr)-Total (mg/L)	<0.00030	0.00030	<0.00030	<0.00030	<0.00030
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)	0.0053	0.0086	0.0501	0.0129	0.0567
	Antimony (Sb)-Dissolved (mg/L)	0.00091	0.00623	0.00179	0.00020	0.00111
	Arsenic (As)-Dissolved (mg/L)	0.00524	0.00728	0.00444	0.00071	0.0118
	Barium (Ba)-Dissolved (mg/L)	0.0382	0.127	0.0498	0.0671	0.0509
	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	0.015	<0.010	0.024
	Cadmium (Cd)-Dissolved (mg/L)	0.0000092	0.000161	0.0000197	0.0000255	0.0000227
	Calcium (Ca)-Dissolved (mg/L)	74.7	236	156	28.4	166
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	0.00013	<0.00010	0.00017
	Cobalt (Co)-Dissolved (mg/L)	0.00022	0.00252	0.00045	<0.00010	0.00192
	Copper (Cu)-Dissolved (mg/L)	0.00095	0.00126	0.00096	0.00109	0.00136
	Iron (Fe)-Dissolved (mg/L)	0.514	0.115	0.315	0.019	0.535
	Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000270	<0.000050	0.000052	<0.000050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1794268-11	L1794268-12	L1794268-13	L1794268-14	L1794268-15
		Description	Water	Water	Water	Water	Water
		Sampled Date	05-JUL-16	05-JUL-16	04-JUL-16	05-JUL-16	04-JUL-16
		Sampled Time	16:00	14:10	14:45	10:15	15:50
		Client ID	WQ-TP	WQ-SEEP	WQ-VC-R	WQ-VC-DBC	WQ-VC-UMN
Grouping	Analyte						
WATER							
Total Metals	Lithium (Li)-Total (mg/L)		0.0074	0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)		38.6	53.3	12.1	10.0	12.6
	Manganese (Mn)-Total (mg/L)		0.0934	5.58	0.0941	0.200	0.0751
	Mercury (Hg)-Total (mg/L)		0.0000115	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)		0.00108	0.000865	0.000598	0.000976	0.000508
	Nickel (Ni)-Total (mg/L)		0.00054	0.00305	0.00064	0.00075	<0.00050
	Phosphorus (P)-Total (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)		12.5	6.36	0.98	1.05	0.94
	Selenium (Se)-Total (mg/L)		0.000055	0.000191	<0.000050	0.000058	<0.000050
	Silicon (Si)-Total (mg/L)		2.04	6.97	6.05	7.18	5.89
	Silver (Ag)-Total (mg/L)		0.000432	0.000059	0.000027	0.000052	0.000011
	Sodium (Na)-Total (mg/L)		13.5	34.0	3.37	2.87	3.51
	Strontium (Sr)-Total (mg/L)		0.475	0.704	0.279	0.298	0.288
	Sulfur (S)-Total (mg/L)		211	224	18.4	8.97	18.8
	Thallium (Tl)-Total (mg/L)		0.000207	0.000022	0.000010	0.000016	<0.000010
	Tin (Sn)-Total (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)		0.00075	0.00426	0.00823	0.0208	0.00478
	Uranium (U)-Total (mg/L)		0.000837	0.00166	0.00106	0.00159	0.000845
	Vanadium (V)-Total (mg/L)		<0.00050	0.00223	0.00125	0.00212	0.00091
	Zinc (Zn)-Total (mg/L)		0.0674	0.0213	0.0041	0.0073	<0.0030
	Zirconium (Zr)-Total (mg/L)		<0.00030	0.00053	<0.00030	<0.00030	<0.00030
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)		0.0168	0.0085	0.0148	0.0103	0.0125
	Antimony (Sb)-Dissolved (mg/L)		0.0397	0.00049	0.00041	0.00024	0.00039
	Arsenic (As)-Dissolved (mg/L)		0.0593	0.0291	0.00170	0.00085	0.00161
	Barium (Ba)-Dissolved (mg/L)		0.00927	0.0740	0.0635	0.0669	0.0634
	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)		0.059	0.051	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)		0.000743	0.000364	0.0000261	0.0000236	0.0000234
	Calcium (Ca)-Dissolved (mg/L)		205	244	37.8	29.9	37.9
	Chromium (Cr)-Dissolved (mg/L)		0.00012	0.00035	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)		0.00035	0.00755	0.00014	<0.00010	0.00012
	Copper (Cu)-Dissolved (mg/L)		0.0167	0.00303	0.00125	0.00109	0.00117
	Iron (Fe)-Dissolved (mg/L)		<0.010	4.66	0.061	0.022	0.029
	Lead (Pb)-Dissolved (mg/L)		0.000359	<0.000050	0.000171	0.000058	0.000083

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1794268-16 Water 06-JUL-16 09:10 WQ-DC-D1B	L1794268-17 Water 04-JUL-16 18:35 WQ-DC-R	L1794268-18 Water 06-JUL-16 08:40 WQ-CH-P-13-01	L1794268-19 Water 05-JUL-16 10:45 WQ-VC-U	L1794268-20 Water 06-JUL-16 11:15 FIELD BLANK
Grouping	Analyte					
WATER						
Total Metals	Lithium (Li)-Total (mg/L)	0.0082	<0.0010	0.0019	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	98.9	26.9	105	8.66	<0.10
	Manganese (Mn)-Total (mg/L)	1.27	0.229	0.240	0.0337	<0.00010
	Mercury (Hg)-Total (mg/L)	0.0000066	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.000283	0.000245	<0.000050	0.000413	<0.000050
	Nickel (Ni)-Total (mg/L)	0.00172	0.00112	0.00861	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	0.055	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	4.61	1.47	0.68	0.69	<0.10
	Selenium (Se)-Total (mg/L)	0.000118	0.000098	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	7.65	5.23	6.52	5.62	<0.050
	Silver (Ag)-Total (mg/L)	0.000058	0.000014	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	7.13	6.80	6.30	2.42	<0.050
	Strontium (Sr)-Total (mg/L)	0.547	0.255	0.616	0.271	<0.00020
	Sulfur (S)-Total (mg/L)	228	72.8	376	5.75	<0.50
	Thallium (Tl)-Total (mg/L)	0.000040	<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)	0.0557	0.00166	0.00187	0.00041	<0.00030
	Uranium (U)-Total (mg/L)	0.00294	0.000620	0.000019	0.000524	<0.000010
	Vanadium (V)-Total (mg/L)	0.00525	0.00083	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	0.134	0.0071	4.46	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
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)	0.0057	0.0439	0.139	0.0082	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	0.00675	0.00146	<0.00010	0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.0184	0.00841	0.00058	0.00036	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0485	0.0290	0.0125	0.0665	<0.000050
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	0.000028	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	0.037	0.012	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	0.0000865	0.0000295	0.0114	0.0000097	<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	216	79.2	278	25.9	<0.050
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00022	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00043	0.00065	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00065	0.00202	0.00091	0.00101	<0.00020
	Iron (Fe)-Dissolved (mg/L)	0.488	0.771	0.030	0.020	<0.010
	Lead (Pb)-Dissolved (mg/L)	0.000054	0.000090	0.000070	<0.000050	<0.000050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1794268-21			
		Water			
		06-JUL-16			
		TRAVEL BLANK			
Grouping	Analyte				
WATER					
Total Metals	Lithium (Li)-Total (mg/L)	<0.0010			
	Magnesium (Mg)-Total (mg/L)	<0.10			
	Manganese (Mn)-Total (mg/L)	<0.00010			
	Mercury (Hg)-Total (mg/L)	<0.0000050			
	Molybdenum (Mo)-Total (mg/L)	<0.000050			
	Nickel (Ni)-Total (mg/L)	<0.00050			
	Phosphorus (P)-Total (mg/L)	<0.050			
	Potassium (K)-Total (mg/L)	<0.10			
	Selenium (Se)-Total (mg/L)	<0.000050			
	Silicon (Si)-Total (mg/L)	<0.050			
	Silver (Ag)-Total (mg/L)	<0.000010			
	Sodium (Na)-Total (mg/L)	<0.050			
	Strontium (Sr)-Total (mg/L)	<0.00020			
	Sulfur (S)-Total (mg/L)	<0.50			
	Thallium (Tl)-Total (mg/L)	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.00030			
	Uranium (U)-Total (mg/L)	<0.000010			
	Vanadium (V)-Total (mg/L)	<0.00050			
	Zinc (Zn)-Total (mg/L)	<0.0030			
	Zirconium (Zr)-Total (mg/L)	<0.00030			
Dissolved Metals	Dissolved Mercury Filtration Location				
	Dissolved Metals Filtration Location				
	Aluminum (Al)-Dissolved (mg/L)				
	Antimony (Sb)-Dissolved (mg/L)				
	Arsenic (As)-Dissolved (mg/L)				
	Barium (Ba)-Dissolved (mg/L)				
	Beryllium (Be)-Dissolved (mg/L)				
	Bismuth (Bi)-Dissolved (mg/L)				
	Boron (B)-Dissolved (mg/L)				
	Cadmium (Cd)-Dissolved (mg/L)				
	Calcium (Ca)-Dissolved (mg/L)				
	Chromium (Cr)-Dissolved (mg/L)				
	Cobalt (Co)-Dissolved (mg/L)				
	Copper (Cu)-Dissolved (mg/L)				
	Iron (Fe)-Dissolved (mg/L)				
	Lead (Pb)-Dissolved (mg/L)				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1794268-1 Water 05-JUL-16 17:05 WQ-DC-DX+105	L1794268-2 Water 05-JUL-16 17:05 WQ-DC-DX+105-R	L1794268-3 Water 05-JUL-16 11:55 WQ-BC	L1794268-4 Water 05-JUL-16 17:30 WQ-MS-S-03	L1794268-5 Water 05-JUL-16 08:30 WQ-PC-D
Grouping	Analyte					
WATER						
Dissolved Metals	Lithium (Li)-Dissolved (mg/L)	0.0090	0.0085	0.0016	0.0095	0.0050
	Magnesium (Mg)-Dissolved (mg/L)	60.8	60.9	14.6	65.4	43.7
	Manganese (Mn)-Dissolved (mg/L)	1.23	1.24	1.18	1.34	5.01
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000332	0.000325	0.00458	0.000291	0.00147
	Nickel (Ni)-Dissolved (mg/L)	0.00161	0.00148	0.00052	0.00185	0.00106
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	3.58	3.55	1.64	3.79	6.18
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	0.000146	<0.000050	0.000148
	Silicon (Si)-Dissolved (mg/L)	6.39	6.53	6.25	6.55	4.62
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	0.000018	<0.000010	0.000011
	Sodium (Na)-Dissolved (mg/L)	5.07	5.08	4.84	5.13	10.4
	Strontium (Sr)-Dissolved (mg/L)	0.421	0.405	0.359	0.424	1.01
	Sulfur (S)-Dissolved (mg/L)	140	142	31.0	156	211
	Thallium (Tl)-Dissolved (mg/L)	0.000086	0.000087	<0.000010	0.000087	0.000021
	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	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.00419	0.00416	0.00918	0.00416	0.00593
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	0.00171	<0.00050	0.00062
	Zinc (Zn)-Dissolved (mg/L)	0.658	0.662	0.0014	0.970	0.0059
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1794268-6 Water 05-JUL-16 17:45 WQ-DC-DX	L1794268-7 Water 05-JUL-16 08:15 WQ-PC-U	L1794268-8 Water 05-JUL-16 15:00 WQ-DC-B	L1794268-9 Water 05-JUL-16 10:20 WQ-VC-DBC-R	L1794268-10 Water 05-JUL-16 13:40 WQ-DC-U
Grouping	Analyte					
WATER						
Dissolved Metals	Lithium (Li)-Dissolved (mg/L)	<0.0010	0.0051	0.0031	<0.0010	0.0021
	Magnesium (Mg)-Dissolved (mg/L)	19.9	45.7	73.0	9.10	59.5
	Manganese (Mn)-Dissolved (mg/L)	0.143	6.22	0.576	0.172	1.70
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	0.00132	0.000299	0.000833	0.000415
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00130	0.00092	<0.00050	0.00117
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	4.73	6.40	2.70	0.75	3.57
	Selenium (Se)-Dissolved (mg/L)	<0.000050	0.000190	0.000094	<0.000050	0.000105
	Silicon (Si)-Dissolved (mg/L)	4.54	4.53	5.56	5.57	5.73
	Silver (Ag)-Dissolved (mg/L)	<0.000010	0.000024	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	3.88	10.6	7.59	2.78	14.4
	Strontium (Sr)-Dissolved (mg/L)	0.210	1.06	0.497	0.279	0.517
	Sulfur (S)-Dissolved (mg/L)	60.8	219	177	8.23	167
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	0.000025	<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	0.00037	0.00045	<0.00030	0.00041
	Uranium (U)-Dissolved (mg/L)	0.000131	0.00573	0.00229	0.00142	0.00174
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0012	0.0100	0.0028	<0.0010	0.0023
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1794268-11	L1794268-12	L1794268-13	L1794268-14	L1794268-15
		Description	Water	Water	Water	Water	Water
		Sampled Date	05-JUL-16	05-JUL-16	04-JUL-16	05-JUL-16	04-JUL-16
		Sampled Time	16:00	14:10	14:45	10:15	15:50
		Client ID	WQ-TP	WQ-SEEP	WQ-VC-R	WQ-VC-DBC	WQ-VC-UMN
Grouping	Analyte						
WATER							
Dissolved Metals	Lithium (Li)-Dissolved (mg/L)		0.0071	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)		41.1	55.4	12.3	9.56	12.5
	Manganese (Mn)-Dissolved (mg/L)		0.0553	5.48	0.0802	0.176	0.0655
	Mercury (Hg)-Dissolved (mg/L)		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)		0.00110	0.000858	0.000617	0.000906	0.000505
	Nickel (Ni)-Dissolved (mg/L)		<0.00050	0.00263	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)		13.4	6.51	0.90	0.81	0.86
	Selenium (Se)-Dissolved (mg/L)		<0.000050	0.000216	0.000059	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)		2.07	6.83	5.77	5.83	5.68
	Silver (Ag)-Dissolved (mg/L)		0.000039	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)		14.6	34.3	3.41	2.76	3.49
	Strontium (Sr)-Dissolved (mg/L)		0.483	0.691	0.285	0.291	0.294
	Sulfur (S)-Dissolved (mg/L)		215	219	18.5	8.73	18.5
	Thallium (Tl)-Dissolved (mg/L)		0.000210	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	0.00047	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)		0.000832	0.00164	0.00102	0.00150	0.000835
	Vanadium (V)-Dissolved (mg/L)		<0.00050	0.00111	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)		0.0309	0.0176	0.0025	<0.0010	0.0011
	Zirconium (Zr)-Dissolved (mg/L)		<0.00030	0.00045	<0.00030	<0.00030	<0.00030

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1794268-16	L1794268-17	L1794268-18	L1794268-19	L1794268-20
		Description	Water	Water	Water	Water	Water
		Sampled Date	06-JUL-16	04-JUL-16	06-JUL-16	05-JUL-16	06-JUL-16
		Sampled Time	09:10	18:35	08:40	10:45	11:15
		Client ID	WQ-DC-D1B	WQ-DC-R	WQ-CH-P-13-01	WQ-VC-U	FIELD BLANK
Grouping	Analyte						
WATER							
Dissolved Metals	Lithium (Li)-Dissolved (mg/L)		0.0074	<0.0010	0.0018	<0.0010	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)		104	26.7	107	8.87	<0.10
	Manganese (Mn)-Dissolved (mg/L)		1.29	0.213	0.216	0.0324	<0.00010
	Mercury (Hg)-Dissolved (mg/L)		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)		0.000224	0.000220	<0.000050	0.000416	<0.000050
	Nickel (Ni)-Dissolved (mg/L)		0.00072	0.00103	0.00815	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)		4.48	1.43	0.60	0.69	<0.10
	Selenium (Se)-Dissolved (mg/L)		0.000053	0.000079	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)		5.96	5.19	6.50	5.81	<0.050
	Silver (Ag)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)		7.37	6.62	5.98	2.47	<0.050
	Strontium (Sr)-Dissolved (mg/L)		0.535	0.247	0.627	0.283	<0.00020
	Sulfur (S)-Dissolved (mg/L)		230	70.8	370	5.84	<0.50
	Thallium (Tl)-Dissolved (mg/L)		0.000011	<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	0.00075	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)		0.00270	0.000589	0.000015	0.000518	<0.000010
	Vanadium (V)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)		0.0950	0.0042	4.38	<0.0010	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)		<0.00030	0.00030	<0.00030	<0.00030	<0.00030

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1794268-21			
	Description	Water			
	Sampled Date	06-JUL-16			
	Sampled Time				
	Client ID	TRAVEL BLANK			
Grouping	Analyte				
WATER					
Dissolved Metals	Lithium (Li)-Dissolved (mg/L)				
	Magnesium (Mg)-Dissolved (mg/L)				
	Manganese (Mn)-Dissolved (mg/L)				
	Mercury (Hg)-Dissolved (mg/L)				
	Molybdenum (Mo)-Dissolved (mg/L)				
	Nickel (Ni)-Dissolved (mg/L)				
	Phosphorus (P)-Dissolved (mg/L)				
	Potassium (K)-Dissolved (mg/L)				
	Selenium (Se)-Dissolved (mg/L)				
	Silicon (Si)-Dissolved (mg/L)				
	Silver (Ag)-Dissolved (mg/L)				
	Sodium (Na)-Dissolved (mg/L)				
	Strontium (Sr)-Dissolved (mg/L)				
	Sulfur (S)-Dissolved (mg/L)				
	Thallium (Tl)-Dissolved (mg/L)				
	Tin (Sn)-Dissolved (mg/L)				
	Titanium (Ti)-Dissolved (mg/L)				
	Uranium (U)-Dissolved (mg/L)				
	Vanadium (V)-Dissolved (mg/L)				
	Zinc (Zn)-Dissolved (mg/L)				
	Zirconium (Zr)-Dissolved (mg/L)				

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Cyanide, Weak Acid Diss	DLM	L1794268-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -6, -7, -8, -9
Duplicate	Cyanide, Weak Acid Diss	DLM	L1794268-5
Duplicate	Sulfate (SO4)	MB-LOR	L1794268-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -21, -3, -4, -5, -6, -7, -8, -9
Method Blank	Beryllium (Be)-Total	MB-LOR	L1794268-10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -20, -21, -8, -9
Method Blank	Copper (Cu)-Total	MB-LOR	L1794268-10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -20, -21, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1794268-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -21, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1794268-20
Matrix Spike	Barium (Ba)-Total	MS-B	L1794268-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Total	MS-B	L1794268-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1794268-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1794268-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1794268-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1794268-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1794268-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1794268-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1794268-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1794268-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1794268-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLIS	Detection Limit Adjusted: Insufficient Sample
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
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)

Reference Information

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

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

Reference Information

6010B).

NH3-F-VA	Water	Ammonia in Water by Fluorescence	APHA 4500 NH3-NITROGEN (AMMONIA)
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
WR	ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA

Reference Information

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

Chain of Custody Numbers:

1 2 3 4

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

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

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

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



EDI ENVIRONMENTAL DYNAMICS INC.
ATTN: Lyndsay Doetzel
2195 - 2nd Ave
Whitehorse YT Y1A 3T8

Date Received: 06-JUL-16
Report Date: 18-JUL-16 13:03 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1794288
Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 16-Y-0089
C of C Numbers: 1
Legal Site Desc:

Can Dang
Senior Account Manager

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID	Description	Sampled Date	Sampled Time	Client ID
		L1794288-1	Water	06-JUL-16	11:10	WQ-PW
WATER						
Physical Tests	Colour, True (CU)					<5.0
	Conductivity (uS/cm)					363
	Hardness (as CaCO3) (mg/L)					197
	pH (pH)					8.05
	Total Dissolved Solids (mg/L)					202
	Turbidity (NTU)					<0.10
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)					160
	Chloride (Cl) (mg/L)					<0.50
	Fluoride (F) (mg/L)					0.105
	Nitrate (as N) (mg/L)					0.124
	Nitrite (as N) (mg/L)					<0.0010
	Sulfate (SO4) (mg/L)					33.4
	Anion Sum (meq/L)					3.91
	Cation Sum (meq/L)					4.19
	Cation - Anion Balance (%)					3.4
Total Metals	Aluminum (Al)-Total (mg/L)					<0.010
	Antimony (Sb)-Total (mg/L)					<0.00050
	Arsenic (As)-Total (mg/L)					0.00035
	Barium (Ba)-Total (mg/L)					0.088
	Boron (B)-Total (mg/L)					<0.10
	Cadmium (Cd)-Total (mg/L)					<0.00020
	Calcium (Ca)-Total (mg/L)					45.2
	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)					0.00053
	Magnesium (Mg)-Total (mg/L)					20.6
	Manganese (Mn)-Total (mg/L)					<0.0020
	Mercury (Hg)-Total (mg/L)					<0.00020
	Potassium (K)-Total (mg/L)					0.89
	Selenium (Se)-Total (mg/L)					<0.0010
	Sodium (Na)-Total (mg/L)					5.1
	Uranium (U)-Total (mg/L)					0.00177
	Zinc (Zn)-Total (mg/L)					<0.050

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Sulfate (SO4)	MB-LOR	L1794288-1
Method Blank	Copper (Cu)-Total	MB-LOR	L1794288-1
Matrix Spike	Sulfate (SO4)	MS-B	L1794288-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-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.			
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)

Reference Information

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.

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
WR	ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

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

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

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

