

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: Erik Pit, Type II Project Manager

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

Trip dates:	June 6 - 8, 2016
EDI field staff:	Joel MacFabe, Alexandre Mischler and Danny Skookum
Weather during trip:	Conditions for the three days included air temperatures ranging from 4 to 15°C, with sunny skies to moderate rain and calm winds.

This monthly report includes a summary of site conditions and data collected during EDI's June 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 (June 2016)4. Water Quality Summary Data Tables (June 2016)5. Laboratory Certificates of Analysis (COA) & Yukon Environmental Health Services Bacteriological Results (June 2016).

SITE CONDITIONS

The June 2016 trip was reflective of late-spring conditions transitioning to summer. Water levels were moderate and have dropped since the May 2016 trip. A few small, isolated patches of snow and ice remain around the Mount Nansen site, particularly in the Dome Creek watershed where overflow ice accumulated during the winter. All watercourses were flowing and all channels, except H/WQ-DC-D1b, were free of ice and snow in the vicinity of the measurement and sampling locations.

METEOROLOGY

Meteorological data was collected at the ATM-ROAD station throughout the month of June 2016. EDI conducted a QA/QC review of the June 2016 data and all sensors appear to be functioning properly. 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 June 2016 trip. Water levels across the Mount Nansen site were lower during the June 2016 than observed during the May 2016 trip. For the month of June, continuous logger records are available for the following eight stations up to when each logger was downloaded: H-DC-B, H-DC-M WP, 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 June 2016 are summarized in Attachment 3. Site observations for the June 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 0.359 to 0.534 m³/s. The June 2016 trip discharges represent flow conditions lower than the May 9 – 11, 2016 trip.



- Hydraulic conditions were suitable for velocity-area measurements at H-BC in June; the discharge was of $0.104 \text{ m}^3/\text{s}$, which represents an increase from the discharge measured on May 9, 2016.
- The discharge measured at H-VC-UMN ($0.534 \text{ m}^3/\text{s}$) in June was greater than at the downstream station at H-VC-R+290 ($0.334 \text{ m}^3/\text{s}$). Typically discharge increases in the downstream direction of a watercourse as the contributing watershed area increases. As discussed at the end of the 2015/16 winter season, the local groundwater influences between H-VC-UMN and H-VC-R/H-VC-R+290 are not clearly defined at this time. This pattern of decreasing flows between the two locations was observed in November 2015, January 2016, February 2016 and May 2016.
- Discharge measurements were completed using salt dilution gauging along Dome Creek at H-DC-B, H-DC-M WP, H-DC-R and H-DC-D1b. Discharges ranged from 0.004 to $0.017 \text{ m}^3/\text{s}$ during the June trip.
- Volumetric methods were not suitable for collecting a discharge measurement at H-PC-DSP. Instead, a salt dilution tracer was used with an estimated discharge of $0.012 \text{ m}^3/\text{s}$.
- At H-DC-M WP, repairs were made to increase the amount of water that flows over the V-notch weir. Sandbags were placed at the right downstream side of the support structure. Additionally, the screws attaching the metal weir plate to the wooden support structure were tightened. Additional screws will be added to the bottom of the weir plate when flows recede further. Additional improvements are required before volumetric measurements can be accurately collected. Salt dilution gauging was collected conducted downstream of the weir. Some sediment was excavated from the weir pond during the June 2016 visit.
- Due to concerns with sedimentation at H-DC-M WP, the station has been 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 June 6, 2016 ($0.002 \text{ m}^3/\text{s}$) was identical to the flow rate observed at the pump in the seepage pond shack ($0.002 \text{ m}^3/\text{s}$).
- Placer mining operations were underway during the June 2016 visit. Large earthworks using heavy equipment were observed. This 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 June 2016 trip. This included opportunistic sampling of seeps around the mill site. A total of 20 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 June 8. 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 and dissolved arsenic and iron. Total iron and 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 aluminum, silver, iron and lead. Total iron also exceeded Mount Nansen EQS.
- On Dome Creek, CCME-AL guidelines were exceeded for the following parameters and sites: fluoride (WQ-DC-DX+105, WQ-DC-D1B, WQ-DC-B, WQ-DC-U), total aluminum (WQ-DC-DX+105, WQ-DC-D1B, WQ-DC-B, WQ-DC-U), total arsenic (WQ-DC-DX+105, WQ-DC-D1B, WQ-DC-B, WQ-DC-U, WQ-DC-R), dissolved arsenic (WQ-DC-D1B, WQ-DC-B, WQ-DC-U, WQ-DC-R), total cadmium (WQ-DC-DX+105, WQ-DC-D1B, WQ-DC-B), dissolved cadmium (WQ-DC-DX+105), total copper (WQ-DC-B, WQ-DC-U), total iron (WQ-DC-D1B, WQ-DC-B, WQ-DC-U, WQ-DC-R), dissolved iron (WQ-DC-R), total lead (WQ-DC-B, WQ-DC-U), total mercury (WQ-DC-B), total silver (WQ-DC-B), total zinc (WQ-DC-DX+105, WQ-DC-D1B, WQ-DC-B, WQ-DC-U) and dissolved zinc (WQ-DC-DX+105, 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-B and WQ-DC-U. All parameters from samples collected at WQ-DC-DX were below CCME-AL guidelines and Mount Nansen EQS.
- 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 arsenic, cadmium, copper, iron and lead (WQ-VC-DBC, WQ-VC-UMN). Mount Nansen EQS were exceeded for total iron at WQ-VC-DBC and WQ-VC-UMN, and for total suspended solids at WQ-VC-UMN. 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 total aluminum, arsenic, cadmium, copper, iron, lead, silver, and zinc. Total iron 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, total aluminum, arsenic, cadmium, chromium, copper, iron, lead, mercury, silver, zinc. Dissolved arsenic also exceeded CCME-AL guidelines at both sites and dissolved iron at WQ-PC-U. Mount Nansen EQS were exceeded for total iron, zinc and total suspended solids at both sites.
- 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.
- Dome East Slope Seep sites WQ-DESS-01 and WQ-DESS-03 samples all exceeded CCME-AL guideline for total and dissolved aluminum. CCME-AL guidelines were also exceeded for the following parameters and sites: pH (WQ-DESS-01), total and dissolved cadmium (WQ-DESS-01), total and dissolved copper (WQ-DESS-03), total and dissolved zinc (WQ-DESS-01). Mount Nansen EQS were exceeded for pH and total zinc at WQ-DESS-01.
- 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.
- Site WQ-NW-SEEP-02 samples exceeded CCME-AL guidelines for pH, fluoride, total and dissolved cadmium, copper and zinc. CCME-AL guidelines were also exceeded for total arsenic and iron.
- The LC50 sample collected from the WQ-SEEP had a 96-hour LC50 result of 100% trout survival at 96-hours. Laboratory added in comments that all fish appeared healthy with no signs of stress at 96 hours.
- 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-D1b-r was 13% with an average difference of 22% for total and 9% for dissolved metals. Total aluminum, arsenic, cadmium, chromium, cobalt, iron, lead, silver and titanium and uranium had RPD>20%.

The average RPD of the replicate sample WQ-NW-SEEP-02-r was 14% with an average difference of 27% for total and 5% for dissolved metals. Total aluminum, copper, iron, lead, lithium, manganese, silver, titanium and dissolved lithium had RPD>20%.

PROGRAM RECOMMENDATIONS

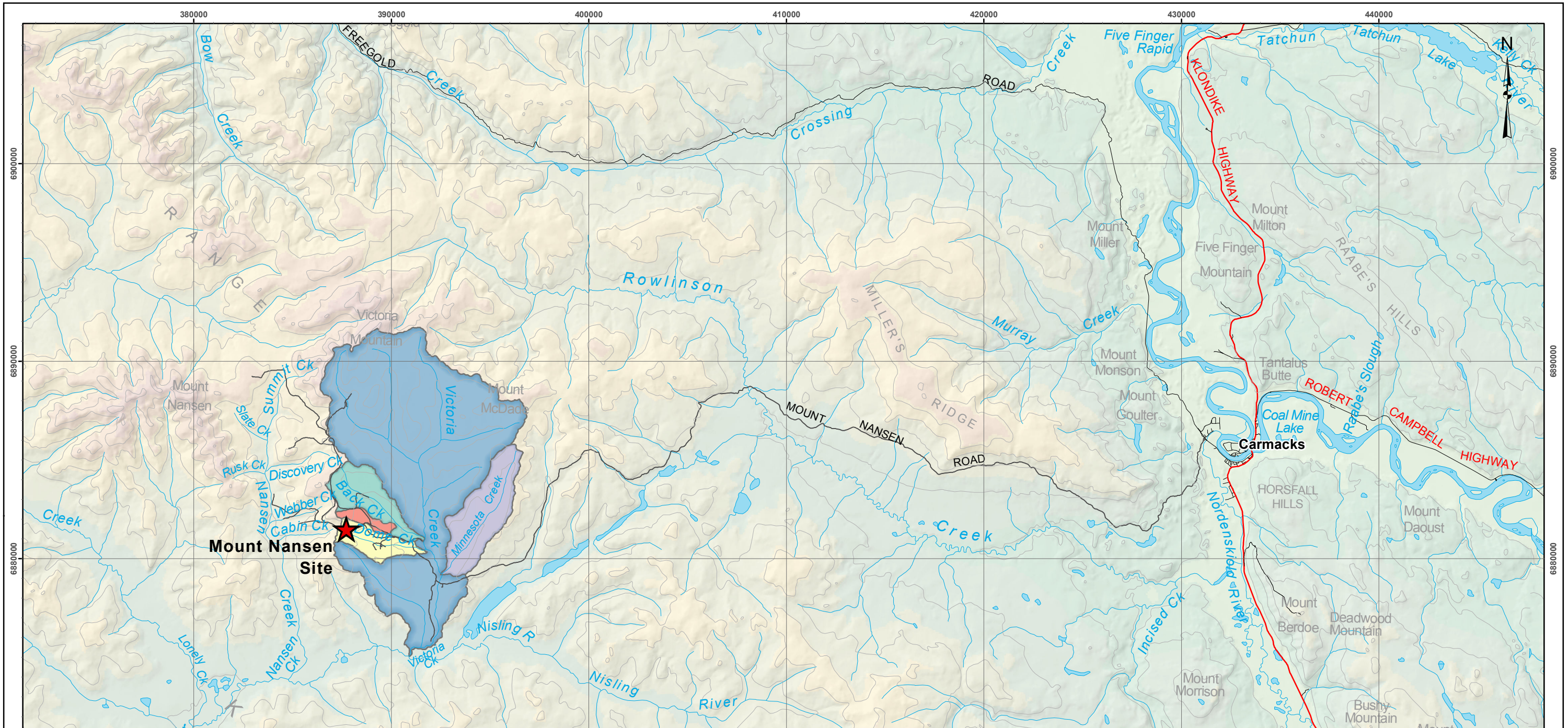
- Conduct velocity-area and salt tracer discharge measurements at all hydrometric stations during the open water season, where possible, to continue to validate the salt tracer method.

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 late spring transitioning to summer. Water levels were moderate and have dropped since the May 2016 trip. A few small, isolated patches of snow and ice remain around the Mount Nansen site and all watercourses were flowing.
Wildlife Sightings:	A porcupine was observed crossing the bridge at the Diversion Channel near the tailings pond at 19:30 on June 7, 2016.
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

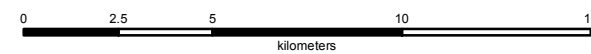
- Back Creek
- Dome Creek
- Minnesota Creek
- Pony Creek
- Victoria Creek

- 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.



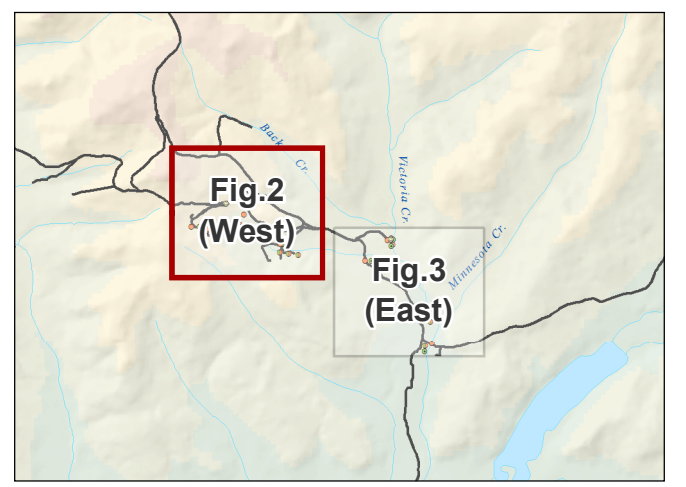
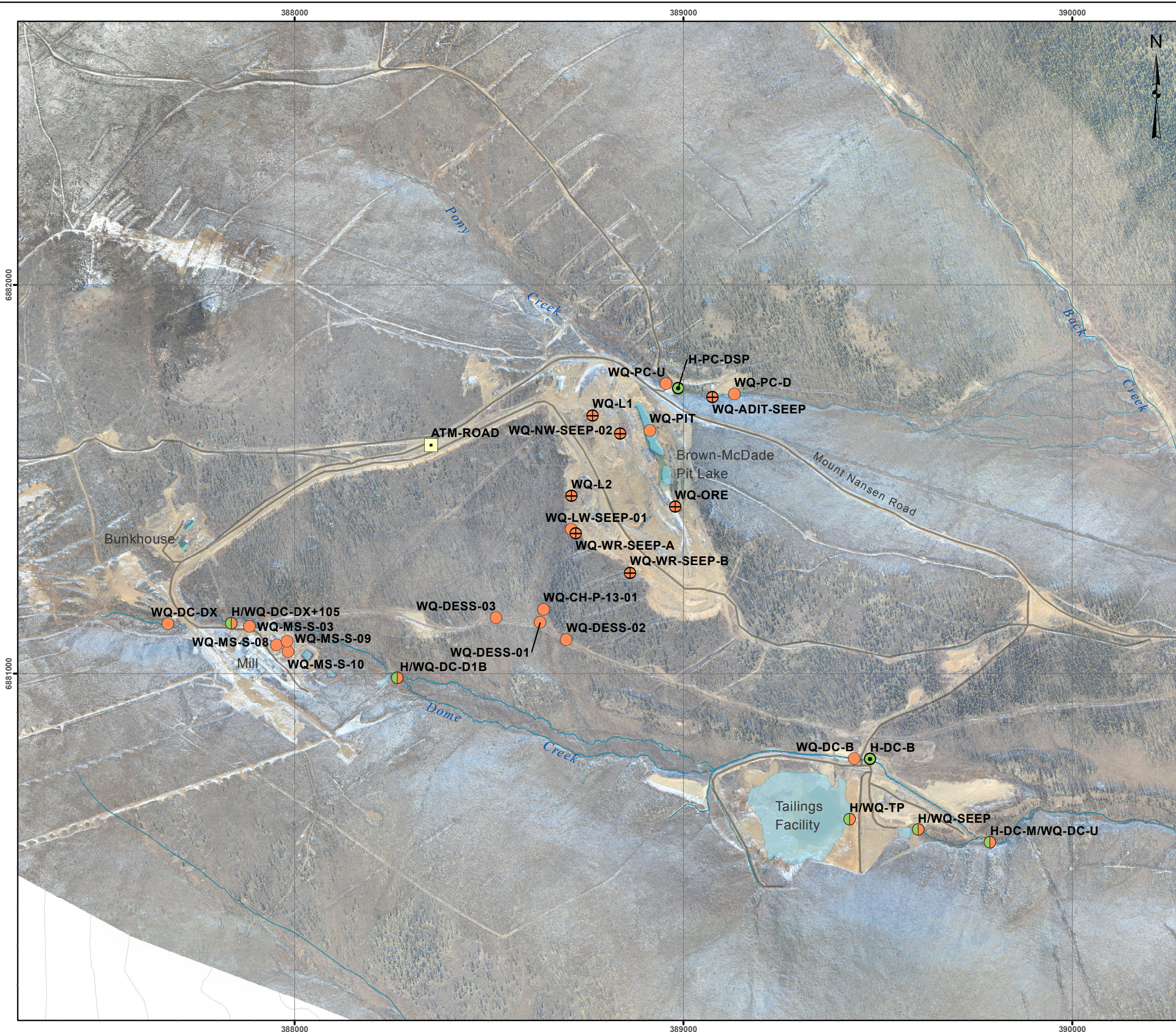
Map Scale: 1:200,000 (printed on 11 x 17)
 Map Projection: NAD 1983 UTM Zone 8N

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

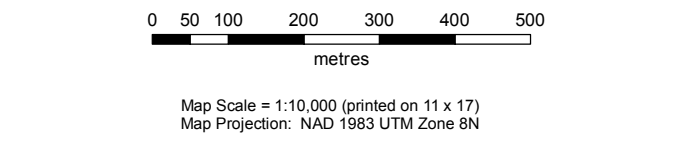
Notes:

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).

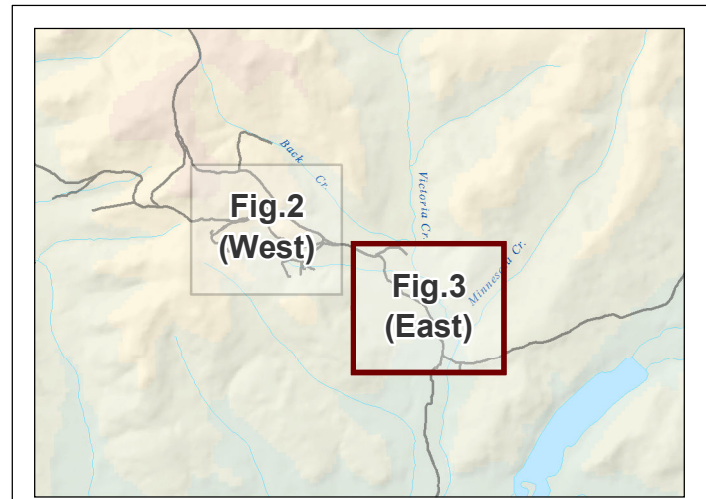
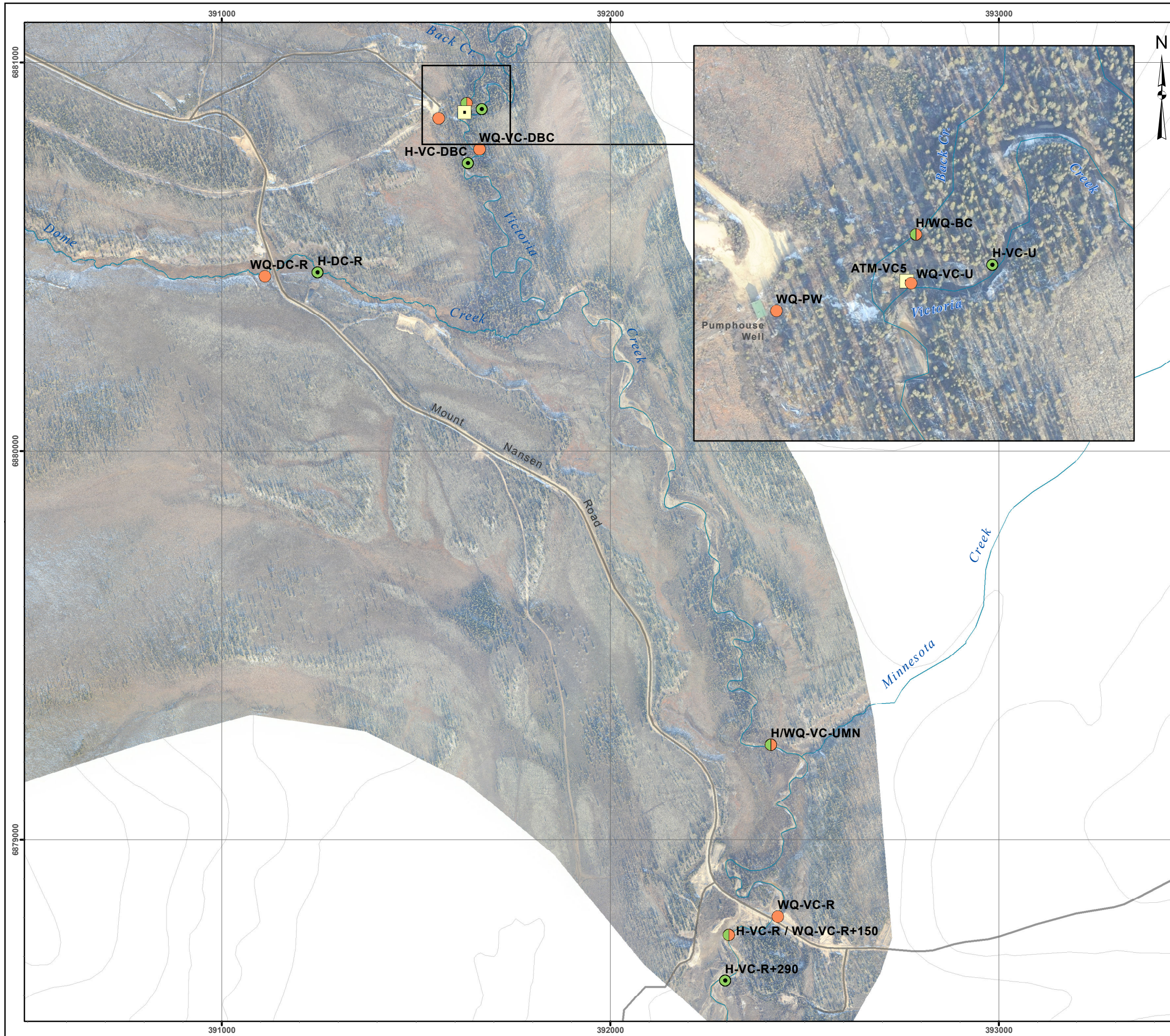
Imagery provided by Yukon Government - Energy, Mines and Resources - Abandoned Mines Branch.

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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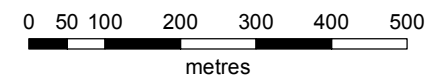


Legend

- 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

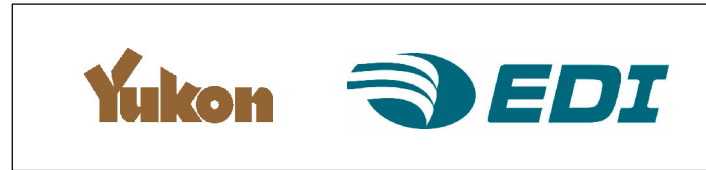
Mount Nansen Site (East): Hydrometric Stations and Water Quality Sites

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/WQ-DC-DX+105 – looking upstream at trough installed for volumetric measurements.



Photo 3. H/WQ-DC-D1b – looking downstream.



Photo 4. WQ-DESS-01 – overview of site.



Photo 5. WQ-DESS-02 – overview of site. Insufficient flow for sample.



Photo 6. WQ-DESS-03 – overview of site.



Photo 7. WQ-LW-SEEP-01 – looking downstream.
Site dry; no sample collected.



Photo 8. WQ-CH-P-13-01 – overview of site.



Photo 9. WQ-DC-B – looking downstream.



Photo 10. H-DC-B – looking downstream.



Photo 11. H-DC-B – overview showing re-installed station.



Photo 12. WQ-TP – overview of tailings pond.



Photo 13. H-TP – overview showing wetted lower staff gauge.



Photo 14. H/WQ-SEEP – looking downstream.



Photo 15. H-DC-M WP – overview of weir pond.



Photo 16. WQ-DC-U – looking downstream.



Photo 17. WQ-DC-R – looking downstream.



Photo 18. H-DC-R – looking upstream.



Photo 19. WQ-PC-U – looking upstream.



Photo 20. H-PC-DSP – looking upstream.



Photo 21. WQ-ADIT-SEEP – looking upstream.



Photo 22. WQ-PC-D – looking upstream.



Photo 23. WQ-NW-SEEP-02 – overview of site.



Photo 24. H/WQ-BC – overview of site.



Photo 25. H-VC-U – looking downstream.



Photo 26. WQ-VC-U – looking upstream.



Photo 27. WQ-VC-DBC - overview of sample site.



Photo 28. H-VC-DBC – overview of sample site.



Photo 29. H-VC-DBC – looking downstream.



Photo 30. WQ-VC-UMN – looking upstream.



Photo 31. H-VC-UMN – looking downstream.



Photo 32. WQ-VC-R – looking upstream.



Photo 33. H-VC-R+290 – looking downstream.



Photo 34. -H-VC-R+290 – looking upstream.



Photo 35. WQ-MS-S-08 – site dry.



Photo 36. WQ-MS-S-03 – looking upstream



ATTACHMENT 3:

**JUNE HYDROLOGY
DATA TABLES**

Measurement ID	Hydrometric Identifier (HID)	Measurement Date (DD/MM/YYYY)	Measurement Time	Discharge Measurement Method	Discharge (m ³ /s)	Discharge Data Flag	Surveyed Water Elevation (m)	Survey Data Flag	Comments
1441	H-VC-R+290	06/06/2016	13:21	ADV-MID	0.334	-	2.417	-	Reduced water level compared to previous trip. All flow contained in primary channel with no overland flow upstream of station.
1442	H-DC-R	06/06/2016	15:13	SS	0.015	-	0.505	-	Salt tracer completed for discharge measurement. Moderate flowrate with all flow contained in primary channel.
1443	H-VC-DBC	07/06/2016	13:02	ADV-MID	0.520	-	1.850	-	Typical channel conditions for this time of year with slightly higher turbidity.
1444	H-VC-UMN	07/06/2016	11:25	ADV-MID	0.534	-	1.662	-	Approximately 0.15 m of sediment flushed out from well. Well is stable to the touch. Logger downloaded and appears to be functioning properly.
1445	H-VC-U	07/06/2016	14:08	ADV-MID	0.359	-	2.088	-	Moderate flow at site with normal conditions for this time of year. Logger downloaded and functioning properly. Well is stable.
1446	H-DC-B	06/06/2016	19:18	SS	0.017	-	1.973	-	Moderate flow with highly turbid water. Stilling well and benchmarks are stable.
1447	H-BC	07/06/2016	15:04	ADV-MID	0.104	-	1.817	-	Highly turbid in channel with moderate flow rate. Well is stable.
1448	H-DC-D1b	08/06/2016	9:17	SS	0.004	-	-	-	Channel has eroded from 2015 open water season with the small waterfall migrated 1.5 m upstream. Flow goes to ground at base of waterfall. Flow re-emerges 3 m downstream as surface water flow. Upstream portion of reach partially covered with ice up to 0.3 m thick.
1449	H-DC-DX+105	07/06/2016	10:20	V	0.002	-	-	-	Moderate flowrate in channel. Metal trough installed in channel confine all flow to to single point with waterfall at downstream end to allow for volumetric discharge measurements.
1450	H-DC-M WP	06/06/2016	17:26	SS	0.015	-	-	-	Logger covered with 0.3 m of muddy sediment inside well. Stilling well, staff gauge and logger removed from site. Repairs made to weir including sandbags at right downstream side to prevent water from flowing around edge of structure. Screws attaching metal weir plate to wooden support structure tightened, but some water still flows behind plate. Additional improvements could not be conducted due to high flow rate.
1451	H-PC-DSP	07/06/2016	16:57	SS	0.012	-	-	-	Salt tracer completed for discharge measurement. Turbidity very high at site. Placer mining operations active upstream of time of site visit, including earthworks with heavy equipment.
1452	H-SEEP	06/06/2016	18:20	V	0.002	-	-	-	Flow appears normal for this time of year. Volumetric measurement collected at pipe outlet. Flow rate at pump at 18:30 125.578 L/min (0.002 m ³ /s).
1453	H-TP	06/06/2016	18:40	N	-	-	-	-	Low water level in tailings pond. Fine sediment in tailings pond being stirred up due to wind and waves.

Discharge Measurement Method Legend

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

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

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



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

Water Quality Site	Sample Collected? (Y/N)	Measurement Date	Comments
WQ-PW	Y	08-Jun-16	Flow appears normal.
WQ-LW-SEEP-01	N	08-Jun-16	Sampling location dry. No sample collected.
WQ-DESS-02	N	08-Jun-16	Site has trace amounts of flow too low to sample; no sample collected.
WQ-CH-P-13-01	Y	08-Jun-16	Sample collected. Flow mod
WQ-DESS-01	Y	08-Jun-16	Sampled collected. Flow rate mod.
WQ-DESS-03	Y	08-Jun-16	Flow at seep is low. Sample was collected.
WQ-DC-D1b	Y	08-Jun-16	Channel eroded from previous season: section of vertical from site moved U/S 1.5m. Flow goes underground at base of vertical section and re-emerges 3m D/S to continue in spring time channel. Ice remains in sections of channel U/S and D/S of site (<30cm). Replicate taken at 09:00 and labelled WQ-DC-D1b-r.
WQ-PC-U	Y	07-Jun-16	Site is extremely turbid. Flows high, likely do to active placer mining ~ 200m U/S. Turbidity exceeds range of meter. Odour in the area suggests anoxia - decay in the absence of oxygen.
WQ-ADIT-SEEP	N	07-Jun-16	Site dry. No flow detected that was distinct from Pony creek
WQ-MS-S-03	Y	07-Jun-16	Green algae in stream. Small channel input upstream (from the road) and downstream of site (see photos).
WQ-MS-S-08	N	07-Jun-16	Site is dry. Not sampled.
WQ-NW-SEEP-02	Y	07-Jun-16	Bag was placed on pipe at ~noon on June 06, 2016 and was checked at sample time. Bag was full and sampled. Replicate taken at 08:50 and labelled WQ-NW-SEEP-02-r. Field blank sampled at location.
WQ-PC-D	Y	07-Jun-16	Creek has very high turbidity. Flows are high. Turbidity exceeds range of meter.
WQ-BC	Y	07-Jun-16	Creek turbidity is high. flow moderate.
WQ-VC-UMN	Y	07-Jun-16	Turbidity high compared to previous day's visit at VC-R. Channel appears unchanged after freshet. Sampled at usual summer location.
WQ-VC-DBC	Y	07-Jun-16	Turbid water. Flows appear normal for time of year.
WQ-VC-U	Y	07-Jun-16	Site above back creek has light to clear turbidity. Back creek is contributing suspended sediment into VC. Sampling site appears normal for this time of year
WQ-DC-DX	Y	07-Jun-16	Single channel. Conditions appeared normal for this time of year.
WQ-DC-DX+105	Y	07-Jun-16	Flow is moderate to high.
WQ-TP	Y	06-Jun-16	Water level low. Wind and wave action stirred up sediments.



Water Quality Site	Sample Collected? (Y/N)	Measurement Date	Comments
WQ-DC-B	Y	06-Jun-16	Very turbid water. Filtering samples was done once back at the bunkhouse using the geopump.
WQ-DC-U	Y	06-Jun-16	Turbid water. Flow was normal. WQ was collected before weir activities.
WQ-SEEP	Y	06-Jun-16	Platform installed. LC 50 collected. Flow looks normal.
WQ-DC-R	Y	06-Jun-16	Moderate flow with turbid water.
WQ-VC-R	Y	06-Jun-16	Sampled at regular site. 6m upstream of culvert. Water level low. 1/4 of flow on the right of the island.

Summary of Water Quality Results for the June 06-08, 2016 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	L1780519-6	L1780519-4	L1780519-11	L1780519-8	L1780519-17	L1780519-16	QA/QC	L1780519-2	L1780519-22	L1780519-1	L1780519-21
					WQ-SEEP	WQ-TP	WQ-DC-DX	WQ-DC-DX+105	WQ-DC-D1B	WQ-DC-D1B-r	WQ-DC-D1B	WQ-DC-B	WQ-DC-U	WQ-DC-R	WQ-VC-U
					6/6/2016 6:10:00 PM	6/6/2016 6:40:00 PM	6/7/2016 9:15:00 AM	6/7/2016 9:45:00 AM	6/8/2016 9:00:00 AM	6/8/2016 9:00:00 AM	Replicate Analysis	6/6/2016 7:00:00 PM	6/6/2016 4:45:00 PM	6/6/2016 2:55:00 PM	6/7/2016 1:40:00 PM
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	0.0012	0.0074	<0.0010	0.005	0.007	0.0075	7%	0.0038	0.0028	0.0023	<0.0010
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	57.4	37.6	15	38.5	83.6	85.3	2%	67.7	68.6	56.5	6.97
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	5.6	0.161	0.0181	0.633	0.632	0.633	0%	0.451	1.05	0.66	0.0177
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.00001	<0.0000050	<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	0.000811	0.00105	<0.000050	0.000191	0.000212	0.000217	<2xDL	0.000414	0.000426	0.000383	0.000389
Nickel (Ni)-Dissolved (Lab Result)	mg/L	0.025	-	0.0005	0.00259	0.0008	<0.00050	0.00117	0.00059	0.00059	<DL	0.00077	0.00077	0.00093	<0.00050
Nickel (Ni)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.15000	0.15000	0.15000	0.15000	0.15000	0.15000	-	0.15000	0.15000	0.15000	0.08242
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050	<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	6	11	4.85	3.66	3.9	3.95	1%	2.85	3.32	2.98	0.57
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	0.000246	0.000077	<0.000050	0.000065	0.000059	0.000097	<2xDL	0.000083	0.000087	0.000096	<0.000050
Silicon (Si)-Dissolved	mg/L	-	-	0.05	7.3	1.55	4.26	5.69	5.55	5.6	1%	4.77	5.15	4.87	5.25
Silver (Ag)-Dissolved	mg/L	0.00025	-	0.00001	<0.000010	0.000026	<0.000010	0.000013	<0.000010	<0.000010	<DL	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved	mg/L	-	-	0.05	34.6	13.4	2.97	3.69	21.8	5.9	115%	6.65	9.9	11.6	2.02
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	0.723	0.453	0.169	0.277	0.485	0.48	1%	0.468	0.526	0.469	0.238
Sulfur (S)-Dissolved	mg/L	-	-	0.5	214	185	43.7	90.6	183	187	2%	156	174	147	4.99
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	<0.000010	0.000171	<0.000010	0.00005	<0.000010	<0.000010	<DL	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00010	<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	0.00061	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<DL	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.00175	0.000855	0.000098	0.00227	0.00269	0.00272	1%	0.00252	0.00242	0.00192	0.000415
Vanadium (V)-Dissolved	mg/L	-	-	0.001	0.00122	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<DL	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	0.019	0.0402	0.0024	0.423	0.0837	0.0844	1%	0.0116	0.0028	0.0047	0.0031
Zirconium (Zr)-Dissolved	mg/L	-	-	0.0003	0.00048	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<DL	<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-D1B-r was 13% with an average difference of 22% for total and 9% for dissolved metals.
Total aluminum, arsenic, cadmium, chromium, cobalt, iron, lead, silver and titanium and uranium had RPD>20%.
The average RPD of the replicate sample WQ-NW-SEEP-Q2-r was 14% with an average difference of 27% for total and 5% for dissolved metals.
Total aluminum, copper, iron, lead, lithium, manganese, silver, titanium and dissolved lithium had RPD>20%.

Summary of Water Quality Results for the June 06-08, 2016 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	L1780519-3	L1780519-12	L1780519-5	L1780519-23	L1780519-14	L1780519-7
					WQ-VC-R	WQ-VC-DBC	WQ-VC-UMN	WQ-BC	WQ-PC-U	WQ-PC-D
					6/6/2016 2:30:00 PM	6/7/2016 1:15:00 PM	6/7/2016 11:15:00 AM	6/8/2016 2:30:00 PM	6/7/2016 4:15:00 PM	6/7/2016 4:40:00 PM
Temperature (in-situ)	°C	-	-	-	4.9	5.9	4.5	9.8	5	5.3
Specific Conductivity (in-situ)	µS/cm	-	-	-	223.4	175	249.7	218.1	391.9	380
pH (in-situ)	pH	6.5 - 9.0	6.0 - 8.5	-	7.9	7.77	7.91	8.08	6.94	7.7
Dissolved Oxygen (in-situ)	mg/L	-	-	-	10.62	10.53	11.11	9.79	8.47	10.93
Turbidity (In-situ)	NTU	-	-	-	3.72	38.9	53.3	108	-	-
Colour, True	CU	15	-	5	-	-	-	-	-	-
Conductivity	µS/cm	-	-	2	220	181	248	220	385	380
Hardness (as CaCO3)	mg/L	-	-	0.5	117	93.1	128	115	178	177
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	8.09	8.02	8.08	7.96	7.2	7.33
Total Suspended Solids	mg/L	-	50	3	4.7	48.7	54.7	145	1240	840
Total Dissolved Solids	mg/L	-	-	1	128	103	145	131	242	240
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	78	67.5	75.1	59.3	53.3	53.9
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	78	67.5	75.1	59.3	53.3	53.9
Ammonia, Total (as N)	mg/L	0.75	-	0.005	0.0055	0.0201	0.0168	0.0447	2.94	2.74
Chloride (Cl)	mg/L	120	-	0.5	<0.50	<0.50	<0.50	<0.50	0.65	0.63
Fluoride (F)	mg/L	0.12	-	0.02	0.054	0.057	0.058	0.067	0.08	0.08
Nitrate (as N)	mg/L	13	-	0.005	0.0903	0.0775	0.0928	0.0528	0.396	0.388
Nitrite (as N)	mg/L	0.06	-	0.001	<0.0010	<0.0010	0.0016	0.0039	0.047	0.048
Sulfate (SO4)	mg/L	-	-	0.5	36.9	26.3	51	49.6	131	129
Anion Sum	meq/L	-	-	-	2.34	1.91	2.57	2.23	3.84	3.82
Cation Sum	meq/L	-	-	-	2.49	2	2.72	2.46	4.12	4.05
Cation - Anion Balance	%	-	-	-	3.1	2.4	2.4	2.4	2.9	2.9
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	-	0.3	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanate	mg/L	-	-	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Thiocyanate (SCN)	mg/L	-	-	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Aluminum (Al)-Total	mg/L	0.1	-	0.003	0.112	1.4	1.65	4.04	28.5	27.4
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	0.00028	0.00065	0.00082	0.00132	0.0131	0.0138
Arsenic (As)-Total	mg/L	0.005	-	0.0001	0.0014	0.00777	0.00935	0.0217	0.345	0.34
Barium (Ba)-Total	mg/L	-	1.0	0.0005	0.0583	0.0753	0.0799	0.116	0.771	0.685
Beryllium (Be)-Total	mg/L	-	-	0.00002	<0.000020	0.000056	0.000064	0.000146	0.00134	0.00132
Bismuth (Bi)-Total	mg/L	-	-	0.0005	<0.000050	0.000087	0.0001	0.000462	0.00462	0.00455
Boron (B)-Total	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	0.01
Cadmium (Cd)-Total (Lab Result)	mg/L	0.00009	0.02	0.00001	0.0000315	0.000219	0.000244	0.000673	0.00472	0.00421
Cadmium (Cd)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.00001	0.000181	0.00149	0.00195	0.00178	0.00256	0.00255
Calcium (Ca)-Total	mg/L	-	-	0.05	29.7	24	32.4	33.3	59.6	55.5
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	0.00024	0.00174	0.00224	0.00492	0.0294	0.0277
Cobalt (Co)-Total	mg/L	-	-	0.0001	0.00014	0.0008	0.00101	0.00237	0.0134	0.0123
Copper (Cu)-Total (Lab Result)	mg/L	0.002	0.2	0.0005	0.00162	0.00471	0.00486	0.0109	0.099	0.0933
Copper (Cu)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.00270	0.00222	0.00292	0.00266	0.00387	0.00385
Iron (Fe)-Total	mg/L	0.3	1	0.01	0.259	1.98	2.34	5.45	50.7	48.3
Lead (Pb)-Total (Lab Result)	mg/L	0.001	0.1	0.00005	0.000438	0.00618	0.00736	0.0168	0.302	0.29
Lead (Pb)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.00005	0.00389	0.00290	0.00436	0.00380	0.00663	0.00658
Lithium (Li)-Total	mg/L	-	-	0.0005	<0.0010	0.0013	0.0016	0.0032	0.0201	0.0199
Magnesium (Mg)-Total	mg/L	-	-	0.1	9.25	7.25	10	8.27	17.8	16.6
Manganese (Mn)-Total	mg/L	-	0.5	0.00005	0.0592	0.161	0.168	0.47	1.75	1.69
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.00001	<0.000050	0.000076	0.000013	<0.000025	0.00024	0.00025
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	0.00043	0.000574	0.000587	0.000943	0.0216	0.00181
Nickel (Ni)-Total (Lab Result)	mg/L	0.025	0.3	0.0005	0.00068	0.00157	0.00186	0.00407	0.0215	0.0197
Nickel (Ni)-Total (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.10769	0.09052	0.11530	0.10629	0.14814	0.14751
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050	<0.050	0.068	0.115	0.907	0.741
Potassium (K)-Total	mg/L	-	-	0.1	0.74	0.98	1.15	1.56	7.88	7.73
Selenium (Se)-Total	mg/L	0.001	-	0.0001	0.000064	0.000059	0.000077	0.000097	0.000604	0.0006
Silicon (Si)-Total	mg/L	-	-	0.05	5.51	7.6	7.7	12	58.5	56.9
Silver (Ag)-Total	mg/L	0.00025	0.1	0.00001	<0.000010	0.0001	0.000121	0.000262	0.00545	0.0052
Sodium (Na)-Total	mg/L	-	-	0.05	2.86	2.31	2.92	2.93	6.26	6.01
Strontium (Sr)-Total	mg/L	-	-	0.0002	0.248	0.221	0.249	0.212	0.371	0.357
Sulfur (S)-Total	mg/L	-	-	0.5	12.4	8.68	16.3	17	43.9	41.7
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	<0.000010	0.000038	0.00004	0.000087	0.000518	0.000504
Tin (Sn)-Total	mg/L	-	-	0.001	<0.00010	<0.00010	<0.00010	0.00010	0.00016	0.00021
Titanium (Ti)-Total	mg/L	-	-	0.0003	0.00352	0.0479	0.0556	0.137	0.336	0.32
Uranium (U)-Total	mg/L	0.015	-	0.00001	0.000576	0.000637	0.000751	0.00101	0.00282	0.00253
Vanadium (V)-Total	mg/L	-	-	0.0005	0.00072	0.004	0.00484	0.0113	0.0765	0.0714
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	<0.0030	0.0171	0.0207	0.0477	0.658	0.629
Zirconium (Zr)-Total	mg/L	-	-	0.0003	<0.00030	0.00033	<0.00030	0.00071	0.00125	0.00151
Aluminum (Al)-Dissolved	mg/L	0.1	-	0.001	0.0184	0.075	0.0209	0.0658	0.0201	0.0213
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	0.00021	0.00021	0.00032	0.00042	0.0033	0.00342
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	0.00092	0.00128	0.00144	0.00308	0.00915	0.00742
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.0577	0.0533	0.0523	0.0437	0.147	0.13
Beryllium (Be)-Dissolved	mg/L	-	-	0.00002	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Dissolved	mg/L	-	-	0.0005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved (Lab Result)	mg/L	0.00009	-	0.00001	0.0000248	0.0000491	0.0000408	0.0000826	0.0000681	0.0000223
Cadmium (Cd)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.00001	0.000181	0.00149	0.00195	0.00178	0.00256	0.00255
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	31	25.1	34.4	33.5	52.8	52.6
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	0.00012	0.00015	0.00011	0.00015	<0.00010	<0.00010
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	<0.00010	0.00014	0.00011	0.0002	0.00102	0.00053
Copper (Cu)-Dissolved (Lab Result)	mg/L	0.002	-	0.0002	0.00147	0.00192	0.00165	0.00262	0.00144	0.00166
Copper (Cu)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.00020	0.00270	0.00222	0.00292	0.00266	0.00387	0.00385
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	0.088	0.149	0.054	0.153	0.503	0.131
Lead (Pb)-Dissolved (Lab Result)	mg/L	0.001	-	0.00005	0.000112	0.000442	0.000123	0.000229	0.000477	0.000669
Lead (Pb)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.00005	0.00389	0.00290	0.00436	0.00380	0.00663	0.00658

Summary of Water Quality Results for the June 06-08, 2016 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	L1780519-3	L1780519-12	L1780519-5	L1780519-23	L1780519-14	L1780519-7
					WQ-VC-R	WQ-VC-DBC	WQ-VC-UMN	WQ-BC	WQ-PC-U	WQ-PC-D
					6/6/2016 2:30:00 PM	6/7/2016 1:15:00 PM	6/7/2016 11:15:00 AM	6/8/2016 2:30:00 PM	6/7/2016 4:15:00 PM	6/7/2016 4:40:00 PM
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	<0.0010	<0.0010	<0.0010	<0.0010	0.0016	0.0017
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	9.59	7.38	10.3	7.66	11.3	11.1
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	0.0492	0.0887	0.0609	0.218	0.922	0.835
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.00001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Molybdenum (Mo)-Dissolved	mg/L	0.0073	-	0.00005	0.000405	0.00043	0.00046	0.000696	0.000672	0.000738
Nickel (Ni)-Dissolved (Lab Result)	mg/L	0.025	-	0.0005	<0.00050	0.00052	<0.00050	0.00068	0.00117	0.00077
Nickel (Ni)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.10769	0.09052	0.11530	0.10629	0.14814	0.14751
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	-	-	0.1	0.75	0.67	0.77	0.83	2.49	2.47
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	<0.000050	<0.000050	0.000061	0.000065	0.000111	0.000091
Silicon (Si)-Dissolved	mg/L	-	-	0.05	5.49	5.48	5.21	5.7	4.65	4.57
Silver (Ag)-Dissolved	mg/L	0.00025	-	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	0.000025	0.000021
Sodium (Na)-Dissolved	mg/L	-	-	0.05	2.81	2.3	2.96	2.6	5	5.01
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	0.248	0.224	0.246	0.197	0.25	0.255
Sulfur (S)-Dissolved	mg/L	-	-	0.5	12.4	8.69	17.1	17.5	44.2	43.8
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	mg/L	-	-	0.0003	<0.00030	0.00153	<0.00030	0.00095	0.00065	0.00095
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.000561	0.000531	0.000605	0.000711	0.000164	0.000325
Vanadium (V)-Dissolved	mg/L	-	-	0.001	<0.00050	<0.00050	<0.00050	0.0007	<0.00050	0.00058
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	0.0053	0.002	0.0012	0.0053	0.0156	0.008
Zirconium (Zr)-Dissolved	mg/L	-	-	0.0003	<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 <ZDXL - less than two times the detection limit.

Summary of Water Quality Results for the June 06-08, 2016 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	L1780519-18	L1780519-19	L1780519-15	L1780519-10	L1780519-13	L1780519-20	QA/QC	L1780519-9	L1780519-24	L1780529-1
					WQ-CH-P-13-01	WQ-DESS-01	WQ-DESS-03	WQ-MS-5-03	WQ-NW-SEEP-02	WQ-NW-SEEP-02-r	WQ-NW-SEEP-02	FIELD BLANK	TRAVEL BLANK	WQ-PW
					6/8/2016 10:30:00 AM	6/8/2016 10:20:00 AM	6/8/2016 10:05:00 AM	6/7/2016 9:35:00 AM	6/7/2016 8:40:00 AM	6/7/2016 8:50:00 AM	Replicate Analysis	6/7/2016 9:00:00 AM	6/8/2016 12:30:00 PM	
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	0.0017	<0.0010	<0.0010	0.0104	0.0031	0.0024	25%	<0.0010	-	-
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	70.5	41.1	1.61	67.1	49.5	48.8	1%	<0.10	-	-
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	0.292	0.072	0.00198	1.35	0.0335	0.032	5%	<0.00010	-	-
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.00001	<0.0000050	<0.000050	0.0000087	<0.0000050	<0.0000050	<0.0000050	<DL	<0.0000050	-	-
Molybdenum (Mo)-Dissolved	mg/L	0.0073	-	0.00005	<0.000050	<0.000050	<0.000050	0.000267	0.000092	0.000081	<2xDL	<0.000050	-	-
Nickel (Ni)-Dissolved (Lab Result)	mg/L	0.025	-	0.0005	0.00706	0.00422	0.00137	0.00211	<0.00050	<0.00050	<DL	<0.00050	-	-
Nickel (Ni)-Diss. (Hardness Adjusted Guideline)	mg/L			0.0005	0.15000	0.15000	0.02500	0.15000	0.15000	0.15000	-	0.15000	-	-
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<DL	<0.050	-	-
Potassium (K)-Dissolved	mg/L	-	-	0.1	0.97	0.7	3.51	2.67	2.61	2.61	2%	<0.10	-	-
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	0.000062	<0.000050	0.000058	0.000062	0.000464	0.000437	<2xDL	<0.000050	-	-
Silicon (Si)-Dissolved	mg/L	-	-	0.05	5.44	5.66	5.93	6.63	3.89	3.86	1%	<0.050	-	-
Silver (Ag)-Dissolved	mg/L	0.00025	-	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	0.000015	0.000016	<2xDL	<0.000010	-	-
Sodium (Na)-Dissolved	mg/L	-	-	0.05	3.61	2.6	1.35	5.06	2.03	1.88	8%	<0.050	-	-
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	0.367	0.233	0.0367	0.435	0.597	0.597	0%	<0.00020	-	-
Sulfur (S)-Dissolved	mg/L	-	-	0.5	207	121	3.43	156	279	285	2%	<0.50	-	-
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	<0.000010	<0.000010	<0.000010	0.000093	0.000036	<0.000010	<DL	<0.000010	-	-
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<DL	<0.00010	-	-
Titanium (Ti)-Dissolved	mg/L	-	-	0.0003	<0.00030	0.00041	0.00077	<0.00030	<0.00030	<0.00030	<DL	<0.00030	-	-
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	<0.000010	<0.000010	0.000018	0.00403	0.000656	0.000641	2%	<0.000010	-	-
Vanadium (V)-Dissolved	mg/L	-	-	0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<DL	<0.00050	-	-
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	3.74	1.71	0.0053	1.16	0.079	0.078	1%	<0.0010	-	-
Zirconium (Zr)-Dissolved	mg/L	-	-	0.0003	<0.00030	<0.00030	0.0005	<0.00030	<0.00030	<0.00030	<DL	<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: 08-JUN-16
Report Date: 22-JUN-16 19:12 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1780506
Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 16Y0089
C of C Numbers: 1
Legal Site Desc:

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

Can Dang
Senior Account Manager

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID					
Grouping	Analyte				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
---------------	--------	------------------	--------------------

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

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

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

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

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

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

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



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

Report Date: June 22, 2016
Work Order: 16641

Data Report

Species: Rainbow trout (*Oncorhynchus mykiss*)
Protocol: EPS 1/RM/13 (Second Ed. 2000 with 2007 & 2016 amendments)

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

Sample ID	Collection Date and Time	96-h LC50 (%v/v)
L1780506-1 WQ-SEEP	June 6, 2016 @ N/A	>100

N/A = Not Available.

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

Yvonne Lam, B.Sc.
Laboratory Biologist

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

Rainbow Trout Summary Sheet

Client: ALS (ED1)

Start Date/Time: Jun 10 / 16 @ 1300L

Work Order No.: 16641

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: L1780506-1-WQ-SEEP
Sample Date: Jun 6 / 16
Date Received: Jun 9 / 16
Sample Volume: 2 X 20L
Other: /

Test Validity Criteria:

≥ 90% control survival

WQ Ranges:

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

Dilution Water:

Type: Dechlorinated Municipal Tap Water
Hardness (mg/L CaCO₃): 10
Alkalinity (mg/L CaCO₃): 8

Test Organism Information:

Batch No.: 052416
Source: Aqua Farms
No. Fish/Volume (L): 10/10L
Loading Density (g/L): 0.31
Mean Length ± SD (mm): 29 ± 1
Mean Weight ± SD (g): 0.31 ± 0.03

Range: 27 - 31
Range: 0.27 - 0.37

Zinc Reference Toxicant Results:

Reference Toxicant ID: RTZn42
Stock Solution ID: 15Zn05
Date Initiated: Jun 9/15
96-h LC50 (95% CL): 53.6 (43.2-66.4) µg/L Zn

Reference Toxicant Mean and Historical Range: 64.0 (27.3 - 149.8) µg/L Zn
Reference Toxicant CV (%): 53.0%

Test Results: The 96h LC50 is estimated to be >100% (v/v).

Reviewed by: 

Date reviewed: June 17, 2016

96-Hour Rainbow Trout Toxicity Test Data Sheet

Client/Project#: ALS (ED1)
 Sample I.D. L1780506-1-WQ-SEEP
 W.O. # 16641
 RBT Batch #: 052416
 Date Collected/Time: Jun 6/16 @ (Not available)
 Date Setup/Time: Jun 10/16 @ 1300h
 Sample Setup By: EC

Number Fish/Volume: 10/10 L
 7-d % Mortality: 0.2
 Total Pre-aeration Time (mins): 30 min
 Aeration rate adjusted to 6.5 ± 1 mL/min/L? (Y/N): Y

Thermometer: CER# 2 D.O. meter: 2
 Cond./Salinity: 2 pH meter: 1

Undiluted Sample WQ			
Parameters	Initial WQ	Adjustment	30 min WQ
Temp °C	15.0	/	15.0
pH	6.9	/	7.0
D.O. (mg/L)	9.5	/	9.8
Cond. (µS/cm)	1515	/	1515
Salinity (ppt)	0.8	/	0.8

Concentration (% v/v)	# Survivors							Temperature (°C)					Dissolved Oxygen (mg/L)					pH					Conductivity (µS/cm)	
	1	2	4	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
(+)				10	10	10	10	15.0	15.0	15.0	15.0	15.0	10.0	9.7	9.9	9.8	9.6	7.4	6.9	6.9	6.9	6.9	29	34
6.25				10	10	10	10	15.0	15.0	15.0	15.0	15.0	10.0	9.9	9.6	9.7	9.6	7.3	6.8	7.0	7.4	7.3	154	160
12.5				10	10	10	10	15.0	15.0	15.0	15.0	15.0	10.0	9.8	9.7	9.7	9.7	7.2	6.9	7.1	7.5	7.5	267	261
25				10	10	10	10	15.0	15.0	15.0	15.0	15.0	10.0	9.9	9.6	9.7	9.8	7.0	7.0	7.2	7.6	7.7	475	447
50				10	10	10	10	15.0	15.0	15.0	15.0	15.0	10.0	9.8	9.6	9.7	9.7	7.0	7.4	7.4	8.0	8.0	838	846
100				10	10	10	10	15.0	15.0	15.0	15.0	15.0	7.8	9.8	9.7	9.6	9.7	7.0	7.5	7.5	8.2	8.2	1515	1494
Initials				AS	AS	EL	EL	EC	AS	AS	EL	EL	EC	AS	AS	EL	EL	EC	AS	AS	EL	EL	EC	EL

Sample Description/Comments: Orange, turbid, some particulates, gasoline smell

Fish Description at 96 h All fish appear healthy Number of Stressed Fish at 96 h 0

Other Observations: _____

Reviewed by: [Signature]

Date Reviewed: June 17, 2016

Subcontract Request Form
Subcontract To:
NAUTILUS ENVIRONMENTAL

 8664 COMMERCE COURT
 BURNABY, BC V5A 4N7

NOTES: Please reference on final report and invoice: PO# L1780506
 ALS requires QC data to be provided with your final results.

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

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED	Priority Flag
		DUE DATE	
L1780506-1 WQ-SEEP		6/6/2016	
<i>WO # 16641</i>	Trout Bioassay LC50 (96 Hour) - Nautilus (TROUT-LC50-96HR-NL 1)	6/20/2016	

Subcontract Info Contact: Walter Lin (604) 253-4188
 Analysis and reporting info contact: Can Dang
 8081 LOUGHEED HWY
 SUITE 100
 BURNABY, BC V5A 1W9
 Phone: (604) 253-4188 Email: can.dang@alsglobal.com

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

Shipped By: *[Signature]* Date Shipped: June 09, 2016
 Received By: *[Signature] Nautilus* Date Received: Jun 09/16 @ 15:20
 Verified By: *NY- Nan Yamamoto* Date Verified: _____
 Temperature: 13.7°C
 Sample Integrity Issues: 2x 20L



Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



L1780506-COFC

COC Number: 14 -

Page 1 of 1

www.alsglobal.com

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

Invoice To	Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Invoice Distribution	
	Copy of Invoice with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Select Invoice Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX
Company:	EDI	Email 1 or Fax:	sjenner@edynamics.com
Contact:	S Jenner	Email 2:	ldoetzel@edynamics.com
Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q55559	Approver ID:	Cost Center:
Job #:	MOUNT NANSEN 16Y0089	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact:	Sean Sluggett
		Sampler:	JM DS AM

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type
	WQ - SEEP	08-Jun-16	18:10	Water

Short Holding Time
Rush Processing

Drinking Water (DW) Samples¹ (client use)		Special Instructions / Specify Criteria to add on report (client use)				SAMPLE CONDITION AS RECEIVED (lab use only)					
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No						Frozen	<input type="checkbox"/>	SIF Observations	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/>	
Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No						Ice packs	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Custody seal intact	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/>	
						Cooling Initiated	<input checked="" type="checkbox"/>				
						INITIAL COOLER TEMPERATURES °C	9.5	9.7	FINAL COOLER TEMPERATURES °C	8.10	15.15
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)				FINAL SHIPMENT RECEPTION (lab use only)					
Released by: Paul Macfarlane	Date: 08 Jun 2016	Time: 16:28	Received by: [Signature]	Date: 08 Jun 16	Time: 4:30	Received by: Shelley	Date: June 9	Time: 2:10			



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

Date Received: 08-JUN-16
Report Date: 23-JUN-16 17:02 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1780519
Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 16-Y-0089
C of C Numbers: 1, 2, 3, 4
Legal Site Desc:

Comments: ADDITIONAL 23-JUN-16 15:27
ADDITIONAL 23-JUN-16 15:00

Can Dang
Senior Account Manager

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	Description	Sampled Date	Sampled Time	Client ID	L1780519-1	L1780519-2	L1780519-3	L1780519-4	L1780519-5
					Water	Water	Water	Water	Water
		06-JUN-16	14:55	WQ-DC-R	06-JUN-16	06-JUN-16	06-JUN-16	06-JUN-16	07-JUN-16
					19:00	19:00	14:30	18:40	11:15
					WQ-DC-R	WQ-DC-B	WQ-VCR	WQ-TP	WQ-VC-VMN
Grouping	Analyte								
WATER									
Physical Tests	Conductivity (uS/cm)	1050	1090	220	1120	248			
	Hardness (as CaCO3) (mg/L)	622	665	117	636	128			
	pH (pH)	8.23	8.20	8.09	7.98	8.08			
	Total Suspended Solids (mg/L)	4.7	217	4.7	20.7	54.7			
	Total Dissolved Solids (mg/L)	772	799	128	857	145			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	160	162	78.0	64.7	75.1			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	160	162	78.0	64.7	75.1			
	Ammonia, Total (as N) (mg/L)	0.320	0.0921	0.0055	0.0179	0.0168			
	Chloride (Cl) (mg/L)	<1.0 ^{DLDS}	<1.0 ^{DLDS}	<0.50	<1.0 ^{DLDS}	<0.50			
	Fluoride (F) (mg/L)	0.114	0.122	0.054	0.259	0.058			
	Nitrate (as N) (mg/L)	0.449	0.118	0.0903	0.144	0.0928			
	Nitrite (as N) (mg/L)	0.0091	0.0021	<0.0010	0.0036	0.0016			
	Sulfate (SO4) (mg/L)	445	469	36.9	562	51.0			
	Anion Sum (meq/L)	12.5	13.0	2.34	13.0	2.57			
	Cation Sum (meq/L)	13.1	13.7	2.49	13.6	2.72			
	Cation - Anion Balance (%)	2.2	2.5	3.1	2.1	2.8			
	Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		
Cyanide, Total (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050			
Cyanate (mg/L)		<2.0 ^{DLIS}	<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)	0.0765	3.72	0.112	0.167	1.65			
	Antimony (Sb)-Total (mg/L)	0.00249	0.00557	0.00028	0.0486	0.00082			
	Arsenic (As)-Total (mg/L)	0.0243	0.0676	0.00140	0.147	0.00935			
	Barium (Ba)-Total (mg/L)	0.0475	0.104	0.0583	0.0115	0.0799			
	Beryllium (Be)-Total (mg/L)	<0.000020	0.000168	<0.000020	<0.000020	0.000064			
	Bismuth (Bi)-Total (mg/L)	<0.000050	0.000069	<0.000050	0.000794	0.000100			
	Boron (B)-Total (mg/L)	0.018	0.017	<0.010	0.057	<0.010			
	Cadmium (Cd)-Total (mg/L)	0.0000930	0.000747	0.0000315	0.00153	0.000244			
	Calcium (Ca)-Total (mg/L)	151	151	29.7	186	32.4			
	Chromium (Cr)-Total (mg/L)	0.00031	0.00742	0.00024	0.00033	0.00224			
	Cobalt (Co)-Total (mg/L)	0.00117	0.00224	0.00014	0.00064	0.00101			
	Copper (Cu)-Total (mg/L)	0.00143	0.0134	0.00162	0.0366	0.00486			
	Iron (Fe)-Total (mg/L)	1.85	9.18	0.259	1.19	2.34			
	Lead (Pb)-Total (mg/L)	0.00364	0.0195	0.000438	0.0599	0.00736			
	Lithium (Li)-Total (mg/L)	0.0023	0.0061	<0.0010	0.0071	0.0016			

* 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	L1780519-6	L1780519-7	L1780519-8	L1780519-9	L1780519-10
					Water	Water	Water	Water	Water
		06-JUN-16	18:10	WQ-SEEP	06-JUN-16	07-JUN-16	07-JUN-16	07-JUN-16	07-JUN-16
					18:10	16:40	09:45	09:00	09:35
					WQ-SEEP	WQ-PC-D	WQ-DC-DX+105	WQ-FIELD BLANK	WQ-MS-S-03
Grouping	Analyte								
WATER									
Physical Tests	Conductivity (uS/cm)	1510	380	782	<2.0	1240			
	Hardness (as CaCO3) (mg/L)	872	177	461	<0.50	792			
	pH (pH)	8.10	7.33	8.16	5.31	8.22			
	Total Suspended Solids (mg/L)	32.0	840	<3.0	<3.0	6.7			
	Total Dissolved Solids (mg/L)	1210	240	536	<1.0	934			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	262	53.9	172	<1.0	286			
	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)	262	53.9	172	<1.0	286			
	Ammonia, Total (as N) (mg/L)	4.16	2.74	0.0101	<0.0050	0.0263			
	Chloride (Cl) (mg/L)	<2.5 ^{DLDS}	0.63	<0.50	<0.50	<1.0 ^{DLDS}			
	Fluoride (F) (mg/L)	0.092	0.080	0.131	<0.020	0.212 ^{DLDS}			
	Nitrate (as N) (mg/L)	0.460	0.388	<0.0050	<0.0050	<0.010 ^{DLDS}			
	Nitrite (as N) (mg/L)	0.0122	0.0480	<0.0010	<0.0010	<0.0020 ^{DLDS}			
	Sulfate (SO4) (mg/L)	686	129	265	<0.30	476			
	Anion Sum (meq/L)	19.6	3.82	8.96	<0.10	15.6			
	Cation Sum (meq/L)	19.9	4.05	9.51	<0.10	16.3			
	Cation - Anion Balance (%)	0.9	2.9	3.0	0.0	2.2			
Cyanides	Cyanide, Weak Acid Diss (mg/L)	0.0084	<0.0050	<0.0050	<0.0050	<0.0050			
	Cyanide, Total (mg/L)	0.0230	<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)	4.81	<0.50	<0.50	<0.50	<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0207	27.4	0.0166	<0.0030	1.86			
	Antimony (Sb)-Total (mg/L)	0.00050	0.0138	0.00674	<0.00010	0.0348			
	Arsenic (As)-Total (mg/L)	0.0750	0.340	0.0149	<0.00010	0.449			
	Barium (Ba)-Total (mg/L)	0.0689	0.685	0.0201	<0.000050	0.0672			
	Beryllium (Be)-Total (mg/L)	<0.000020	0.00132	<0.000020	<0.000020	0.000100			
	Bismuth (Bi)-Total (mg/L)	<0.000050	0.00455	<0.000050	<0.000050	0.000603			
	Boron (B)-Total (mg/L)	0.057	0.010	<0.010	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	0.000269	0.00421	0.00135	<0.000050	0.0108			
	Calcium (Ca)-Total (mg/L)	253	55.5	106	<0.050	194			
	Chromium (Cr)-Total (mg/L)	0.00064	0.0277	0.00127	<0.00010	0.00273			
	Cobalt (Co)-Total (mg/L)	0.00742	0.0123	0.00039	<0.00010	0.00325			
	Copper (Cu)-Total (mg/L)	0.00261	0.0933	0.00136	<0.00050	0.0528			
	Iron (Fe)-Total (mg/L)	12.0	48.3	0.222	<0.010	11.7			
	Lead (Pb)-Total (mg/L)	0.000125	0.290	0.000102	<0.000050	0.114			
	Lithium (Li)-Total (mg/L)	0.0012	0.0199	0.0045	<0.0010	0.0111			

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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1780519-11	L1780519-12	L1780519-13	L1780519-14	L1780519-15
		Description	Water	Water	Water	Water	Water
		Sampled Date	07-JUN-16	07-JUN-16	07-JUN-16	07-JUN-16	08-JUN-16
		Sampled Time	09:15	13:15	08:40	16:15	10:05
		Client ID	WQ-DC-DX	WQ-VC-DBC	WQ-NW-SEEP-02	WQ-PC-U	WQ-DESS-03
Grouping	Analyte						
WATER							
Physical Tests	Conductivity (uS/cm)		399	181	1480	385	49.3
	Hardness (as CaCO3) (mg/L)		204	93.1	950	178	26.0
	pH (pH)		8.00	8.02	7.71	7.20	6.54
	Total Suspended Solids (mg/L)		<3.0	48.7	5.3	1240	<3.0
	Total Dissolved Solids (mg/L)		249	103	1230	242	25.5
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		69.5	67.5	43.4	53.3	6.3
	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)		69.5	67.5	43.4	53.3	6.3
	Ammonia, Total (as N) (mg/L)		<0.0050	0.0201	<0.0050	2.94	0.0072
	Chloride (Cl) (mg/L)		<0.50	<0.50	<2.5 ^{DLDS}	0.65	<0.50
	Fluoride (F) (mg/L)		0.059	0.057	0.34	0.080	0.029
	Nitrate (as N) (mg/L)		<0.0050	0.0775	0.027	0.396	<0.0050
	Nitrite (as N) (mg/L)		<0.0010	<0.0010	<0.0050 ^{DLDS}	0.0470	<0.0010
	Sulfate (SO4) (mg/L)		127	26.3	854	131	9.64
	Anion Sum (meq/L)		4.04	1.91	18.7	3.84	0.33
	Cation Sum (meq/L)		4.33	2.00	19.2	4.12	0.64
	Cation - Anion Balance (%)		3.5	2.4	1.3	3.5	32.5
	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	<0.0050
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	1.05
Total Metals	Aluminum (Al)-Total (mg/L)		0.0128	1.40	0.0877	28.5	0.369
	Antimony (Sb)-Total (mg/L)		0.00118	0.00065	0.00389	0.0131	0.00027
	Arsenic (As)-Total (mg/L)		0.00280	0.00777	0.0127	0.345	0.00139
	Barium (Ba)-Total (mg/L)		0.0364	0.0753	0.0123	0.771	0.0343
	Beryllium (Be)-Total (mg/L)		<0.000020	0.000056	<0.000020	0.00134	<0.000020
	Bismuth (Bi)-Total (mg/L)		<0.000050	0.000087	0.000066	0.00462	<0.000050
	Boron (B)-Total (mg/L)		<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)		0.0000102	0.000219	0.00217	0.00472	0.0000328
	Calcium (Ca)-Total (mg/L)		54.7	24.0	298	59.6	7.52
	Chromium (Cr)-Total (mg/L)		<0.00010	0.00174	0.00011	0.0294	0.00028
	Cobalt (Co)-Total (mg/L)		<0.00010	0.00080	<0.00010	0.0134	<0.00010
	Copper (Cu)-Total (mg/L)		0.00134	0.00471	0.0179	0.0990	0.00346
	Iron (Fe)-Total (mg/L)		0.050	1.98	0.334	50.7	0.159
	Lead (Pb)-Total (mg/L)		<0.000050	0.00618	0.00391	0.302	<0.000050
	Lithium (Li)-Total (mg/L)		<0.0010	0.0013	0.0032	0.0201	<0.0010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	Description	Sampled Date	Sampled Time	Client ID	L1780519-16	L1780519-17	L1780519-18	L1780519-19	L1780519-20
					Water	Water	Water	Water	Water
		08-JUN-16	09:00	WQ-DC-D1B-R	08-JUN-16	08-JUN-16	08-JUN-16	08-JUN-16	07-JUN-16
					09:00	09:00	10:30	10:20	08:50
					WQ-DC-D1B-R	WQ-DC-D1B	WQ-CH-P-13-01	WQ-DESS-01	WQ-NW-SEEP-02
Grouping	Analyte								
WATER									
Physical Tests	Conductivity (uS/cm)	1310	1300	1150	715	1490			
	Hardness (as CaCO3) (mg/L)	825	815	686	402	958			
	pH (pH)	8.41	8.40	6.32	6.18	7.80			
	Total Suspended Solids (mg/L)	22.0	22.0	<3.0	4.0	<3.0			
	Total Dissolved Solids (mg/L)	976	992	868	497	1220			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	225	231	2.8	3.0	44.3			
	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)	225	231	2.8	3.0	44.3			
	Ammonia, Total (as N) (mg/L)	0.220	0.221	0.0146	0.0076	<0.0050			
	Chloride (Cl) (mg/L)	<1.0 ^{DLDS}	<1.0 ^{DLDS}	<1.0 ^{DLDS}	<0.50	<1.0 ^{DLDS}			
	Fluoride (F) (mg/L)	0.154	0.153	0.047	0.043	0.309			
	Nitrate (as N) (mg/L)	0.073	0.068	0.025	0.0147	0.024			
	Nitrite (as N) (mg/L)	0.0023	0.0041	<0.0020 ^{DLDS}	<0.0010	<0.0020 ^{DLDS}			
	Sulfate (SO4) (mg/L)	555	555	629	356	839			
	Anion Sum (meq/L)	16.1	16.2	13.2	7.47	18.4			
	Cation Sum (meq/L)	16.9	17.4	14.0	8.24	19.3			
	Cation - Anion Balance (%)	2.5	3.6	3.2	4.9	2.5			
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	0.56	0.62	<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)	0.340	0.203	0.220	0.254	0.0315			
	Antimony (Sb)-Total (mg/L)	0.00653	0.00594	<0.00010	0.00018	0.00352			
	Arsenic (As)-Total (mg/L)	0.0441	0.0325	0.00080	0.00185	0.00900			
	Barium (Ba)-Total (mg/L)	0.0323	0.0301	0.0128	0.0296	0.0115			
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	0.000037	0.000026	<0.000020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	0.030	0.027	<0.010	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	0.000520	0.000402	0.00944	0.00342	0.00217			
	Calcium (Ca)-Total (mg/L)	179	188	151	86.9	295			
	Chromium (Cr)-Total (mg/L)	0.00051	0.00039	0.00015	0.00031	<0.00010			
	Cobalt (Co)-Total (mg/L)	0.00061	0.00040	<0.00010	0.00015	<0.00010			
	Copper (Cu)-Total (mg/L)	0.00220	0.00179	0.00138	0.00225	0.0127			
	Iron (Fe)-Total (mg/L)	1.86	1.33	0.072	0.310	0.166			
	Lead (Pb)-Total (mg/L)	0.00703	0.00468	0.000070	0.000199	0.00158			
	Lithium (Li)-Total (mg/L)	0.0072	0.0066	0.0018	<0.0010	0.0023			

* 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	L1780519-21	L1780519-22	L1780519-23	L1780519-24
					Water	Water	Water	Water
		07-JUN-16	13:40		07-JUN-16	06-JUN-16	08-JUN-16	
					WQ-VC-U	WQ-DC-U	WQ-BC	TRAVEL BLANK
Grouping	Analyte							
WATER								
Physical Tests	Conductivity (uS/cm)	166	1180	220	<2.0			
	Hardness (as CaCO3) (mg/L)	82.3	721	115	<0.50			
	pH (pH)	8.11	8.32	7.96	5.37			
	Total Suspended Solids (mg/L)	<3.0	281	145	<3.0			
	Total Dissolved Solids (mg/L)	88.2	879	131	<1.0			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	70.7	181	59.3	<1.0			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	70.7	181	59.3	<1.0			
	Ammonia, Total (as N) (mg/L)	<0.0050	0.544	0.0447	<0.0050			
	Chloride (Cl) (mg/L)	<0.50	<1.0 ^{DLDS}	<0.50	<0.50			
	Fluoride (F) (mg/L)	0.058	0.124	0.067	<0.020			
	Nitrate (as N) (mg/L)	0.0788	0.233	0.0528	<0.0050			
	Nitrite (as N) (mg/L)	<0.0010	0.0064	0.0039	<0.0010			
	Sulfate (SO4) (mg/L)	14.3	510	49.6	<0.30			
	Anion Sum (meq/L)	1.72	14.3	2.23	<0.10			
	Cation Sum (meq/L)	1.75	15.0	2.46	<0.10			
	Cation - Anion Balance (%)	1.0	2.6	5.0	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			
	Cyanate (mg/L)	<2.0 ^{DLIS}	<0.20	<0.20	<0.20			
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0745	1.63	4.04	<0.0030			
	Antimony (Sb)-Total (mg/L)	0.00012	0.00374	0.00132	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00039	0.0494	0.0217	<0.00010			
	Barium (Ba)-Total (mg/L)	0.0572	0.0725	0.116	<0.000050			
	Beryllium (Be)-Total (mg/L)	<0.000020	0.000069	0.000146	<0.000020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	0.000462	<0.000050			
	Boron (B)-Total (mg/L)	<0.010	0.022	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	0.0000176	0.000298	0.000673	<0.000050			
	Calcium (Ca)-Total (mg/L)	21.0	170	33.3	<0.050			
	Chromium (Cr)-Total (mg/L)	0.00017	0.00309	0.00492	<0.00010			
	Cobalt (Co)-Total (mg/L)	<0.00010	0.00192	0.00237	<0.00010			
	Copper (Cu)-Total (mg/L)	0.00159	0.00732	0.0109	<0.00050			
	Iron (Fe)-Total (mg/L)	0.119	5.71	5.45	<0.010			
	Lead (Pb)-Total (mg/L)	0.000095	0.00798	0.0168	<0.000050			
	Lithium (Li)-Total (mg/L)	<0.0010	0.0040	0.0032	<0.0010			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1780519-1	L1780519-2	L1780519-3	L1780519-4	L1780519-5
		Description	Water	Water	Water	Water	Water
		Sampled Date	06-JUN-16	06-JUN-16	06-JUN-16	06-JUN-16	07-JUN-16
		Sampled Time	14:55	19:00	14:30	18:40	11:15
		Client ID	WQ-DC-R	WQ-DC-B	WQ-VCR	WQ-TP	WQ-VC-VMN
Grouping	Analyte						
WATER							
Total Metals	Magnesium (Mg)-Total (mg/L)		56.1	66.6	9.25	37.0	10.0
	Manganese (Mn)-Total (mg/L)		0.691	0.585	0.0592	0.220	0.168
	Mercury (Hg)-Total (mg/L)		<0.0000050	0.000028 ^{DLM}	<0.0000050	0.0000136	0.000013 ^{DLM}
	Molybdenum (Mo)-Total (mg/L)		0.000454	0.000686	0.000430	0.00111	0.000587
	Nickel (Ni)-Total (mg/L)		0.00109	0.00532	0.00068	0.00092	0.00186
	Phosphorus (P)-Total (mg/L)		<0.050	0.210	<0.050	<0.050	0.068
	Potassium (K)-Total (mg/L)		2.90	3.09	0.74	10.8	1.15
	Selenium (Se)-Total (mg/L)		0.000124	0.000360	0.000064	0.000078	0.000077
	Silicon (Si)-Total (mg/L)		4.99	9.65	5.51	1.77	7.70
	Silver (Ag)-Total (mg/L)		0.000055	0.000328	<0.000010	0.00125	0.000121
	Sodium (Na)-Total (mg/L)		11.6	6.72	2.86	13.3	2.92
	Strontium (Sr)-Total (mg/L)		0.472	0.480	0.248	0.458	0.249
	Sulfur (S)-Total (mg/L)		150	155	12.4	190	16.3
	Thallium (Tl)-Total (mg/L)		<0.000010	0.000070	<0.000010	0.000194	0.000040
	Tin (Sn)-Total (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)		0.00286	0.148	0.00352	0.00153	0.0556
	Uranium (U)-Total (mg/L)		0.00192	0.00321	0.000576	0.000897	0.000751
	Vanadium (V)-Total (mg/L)		0.00093	0.0190	0.00072	0.00069	0.00484
	Zinc (Zn)-Total (mg/L)		0.0090	0.0763	<0.0030	0.101	0.0207
	Zirconium (Zr)-Total (mg/L)		<0.00030	0.00048	<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)		0.0071	0.0118	0.0184	0.0086	0.0209
	Antimony (Sb)-Dissolved (mg/L)		0.00181	0.00262	0.00021	0.0405	0.00032
	Arsenic (As)-Dissolved (mg/L)		0.00626	0.00541	0.00092	0.0625	0.00144
	Barium (Ba)-Dissolved (mg/L)		0.0447	0.0389	0.0577	0.00715	0.0523
	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)		0.017	0.016	<0.010	0.054	<0.010
	Cadmium (Cd)-Dissolved (mg/L)		0.0000282	0.0000197	0.0000248	0.000717	0.0000408
	Calcium (Ca)-Dissolved (mg/L)		156	155	31.0	193	34.4
	Chromium (Cr)-Dissolved (mg/L)		0.00013	<0.00010	0.00012	<0.00010	0.00011
	Cobalt (Co)-Dissolved (mg/L)		0.00110	0.00037	<0.00010	0.00051	0.00011
	Copper (Cu)-Dissolved (mg/L)		0.00092	0.00082	0.00147	0.0197	0.00165
	Iron (Fe)-Dissolved (mg/L)		0.488	0.115	0.088	0.013	0.054
	Lead (Pb)-Dissolved (mg/L)		0.000077	0.000058	0.000112	0.000517	0.000123
	Lithium (Li)-Dissolved (mg/L)		0.0023	0.0038	<0.0010	0.0074	<0.0010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1780519-6	L1780519-7	L1780519-8	L1780519-9	L1780519-10
		Description	Water	Water	Water	Water	Water
		Sampled Date	06-JUN-16	07-JUN-16	07-JUN-16	07-JUN-16	07-JUN-16
		Sampled Time	18:10	16:40	09:45	09:00	09:35
		Client ID	WQ-SEEP	WQ-PC-D	WQ-DC-DX+105	WQ-FIELD BLANK	WQ-MS-S-03
Grouping	Analyte						
WATER							
Total Metals	Magnesium (Mg)-Total (mg/L)		57.2	16.6	34.0	<0.10	65.0
	Manganese (Mn)-Total (mg/L)		5.86	1.69	0.576	<0.00010	2.00
	Mercury (Hg)-Total (mg/L)		<0.0000050	0.00025	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)		0.000933	0.00181	0.000217	<0.000050	0.000471
	Nickel (Ni)-Total (mg/L)		0.00276	0.0197	0.00107	<0.00050	0.00443
	Phosphorus (P)-Total (mg/L)		<0.050	0.741	<0.050	<0.050	0.320
	Potassium (K)-Total (mg/L)		5.93	7.73	3.31	<0.10	3.95
	Selenium (Se)-Total (mg/L)		0.000210	0.000600	<0.000050	<0.000050	0.000105
	Silicon (Si)-Total (mg/L)		7.53	56.9	5.06	<0.050	9.47
	Silver (Ag)-Total (mg/L)		0.000028	0.00520	<0.000010	<0.000010	0.00165
	Sodium (Na)-Total (mg/L)		35.9	6.01	3.33	<0.050	5.05
	Strontium (Sr)-Total (mg/L)		0.762	0.357	0.254	<0.00020	0.446
	Sulfur (S)-Total (mg/L)		221	41.7	81.2	<0.50	152
	Thallium (Tl)-Total (mg/L)		<0.000010	0.000504	0.000047	<0.000010	0.000230
	Tin (Sn)-Total (mg/L)		<0.00010	0.00021	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)		0.00134	0.320	0.00046	<0.00030	0.110
	Uranium (U)-Total (mg/L)		0.00186	0.00253	0.00211	<0.000010	0.00428
	Vanadium (V)-Total (mg/L)		0.00234	0.0714	<0.00050	<0.00050	0.00938
	Zinc (Zn)-Total (mg/L)		0.0214	0.629	0.374	<0.0030	1.43
	Zirconium (Zr)-Total (mg/L)		0.00061	0.00151	<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)		0.0093	0.0213	0.0106	<0.0010	0.0013
	Antimony (Sb)-Dissolved (mg/L)		0.00039	0.00342	0.00750	<0.00010	0.0174
	Arsenic (As)-Dissolved (mg/L)		0.0390	0.00742	0.00419	<0.00010	0.0425
	Barium (Ba)-Dissolved (mg/L)		0.0632	0.130	0.0222	0.000055	0.0146
	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)		0.053	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)		0.000192	0.0000223	0.000707	<0.0000050	0.00188
	Calcium (Ca)-Dissolved (mg/L)		255	52.6	121	<0.050	207
	Chromium (Cr)-Dissolved (mg/L)		0.00040	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)		0.00704	0.00053	0.00042	<0.00010	0.00121
	Copper (Cu)-Dissolved (mg/L)		0.00165	0.00166	0.00125	<0.00020	0.00027
	Iron (Fe)-Dissolved (mg/L)		5.84	0.131	0.056	<0.010	1.84
	Lead (Pb)-Dissolved (mg/L)		<0.000050	0.000669	<0.000050	<0.000050	0.000080
	Lithium (Li)-Dissolved (mg/L)		0.0012	0.0017	0.0050	<0.0010	0.0104

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1780519-11	L1780519-12	L1780519-13	L1780519-14	L1780519-15
		Description	Water	Water	Water	Water	Water
		Sampled Date	07-JUN-16	07-JUN-16	07-JUN-16	07-JUN-16	08-JUN-16
		Sampled Time	09:15	13:15	08:40	16:15	10:05
		Client ID	WQ-DC-DX	WQ-VC-DBC	WQ-NW-SEEP-02	WQ-PC-U	WQ-DESS-03
Grouping	Analyte						
WATER							
Total Metals	Magnesium (Mg)-Total (mg/L)		14.7	7.25	50.1	17.8	1.56
	Manganese (Mn)-Total (mg/L)		0.0185	0.161	0.0453	1.75	0.00351
	Mercury (Hg)-Total (mg/L)		<0.000050	0.0000076	<0.000050	0.00024 ^{DLM}	0.0000078
	Molybdenum (Mo)-Total (mg/L)		0.000058	0.000574	0.000107	0.00160	<0.000050
	Nickel (Ni)-Total (mg/L)		<0.00050	0.00157	<0.00050	0.0215	0.00136
	Phosphorus (P)-Total (mg/L)		<0.050	<0.050	<0.050	0.907	<0.050
	Potassium (K)-Total (mg/L)		4.95	0.98	2.77	7.88	0.79
	Selenium (Se)-Total (mg/L)		<0.000050	0.000059	0.000466	0.000604	0.000058
	Silicon (Si)-Total (mg/L)		4.13	7.60	4.06	58.5	5.82
	Silver (Ag)-Total (mg/L)		<0.000010	0.000100	0.000116	0.00545	<0.000010
	Sodium (Na)-Total (mg/L)		2.94	2.31	2.09	6.26	1.37
	Strontium (Sr)-Total (mg/L)		0.169	0.221	0.617	0.371	0.0373
	Sulfur (S)-Total (mg/L)		42.6	8.68	287	43.9	3.43
	Thallium (Tl)-Total (mg/L)		<0.000010	0.000033	0.000044	0.000518	<0.000010
	Tin (Sn)-Total (mg/L)		<0.00010	<0.00010	<0.00010	0.00016	<0.00010
	Titanium (Ti)-Total (mg/L)		<0.00030	0.0479	0.00122	0.336	0.00125
	Uranium (U)-Total (mg/L)		0.000110	0.000637	0.000697	0.00282	0.000019
	Vanadium (V)-Total (mg/L)		<0.00050	0.00400	<0.00050	0.0765	<0.00050
	Zinc (Zn)-Total (mg/L)		<0.0030	0.0171	0.0893	0.658	0.0062
	Zirconium (Zr)-Total (mg/L)		<0.00030	0.00033	<0.00030	0.00125	0.00049
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)		0.0093	0.0750	0.0070	0.0201	0.335
	Antimony (Sb)-Dissolved (mg/L)		0.00117	0.00021	0.00332	0.00330	0.00024
	Arsenic (As)-Dissolved (mg/L)		0.00281	0.00128	0.00335	0.00915	0.00133
	Barium (Ba)-Dissolved (mg/L)		0.0364	0.0533	0.0111	0.147	0.0350
	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)		0.0000106	0.0000491	0.00207	0.0000681	0.0000367
	Calcium (Ca)-Dissolved (mg/L)		57.0	25.1	299	52.8	7.77
	Chromium (Cr)-Dissolved (mg/L)		<0.00010	0.00015	<0.00010	<0.00010	0.00024
	Cobalt (Co)-Dissolved (mg/L)		<0.00010	0.00014	<0.00010	0.00102	<0.00010
	Copper (Cu)-Dissolved (mg/L)		0.00126	0.00192	0.00682	0.00144	0.00352
	Iron (Fe)-Dissolved (mg/L)		0.040	0.149	0.012	0.503	0.139
	Lead (Pb)-Dissolved (mg/L)		<0.000050	0.000442	0.000097	0.000477	<0.000050
	Lithium (Li)-Dissolved (mg/L)		<0.0010	<0.0010	0.0031	0.0016	<0.0010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1780519-16	L1780519-17	L1780519-18	L1780519-19	L1780519-20
		Description	Water	Water	Water	Water	Water
		Sampled Date	08-JUN-16	08-JUN-16	08-JUN-16	08-JUN-16	07-JUN-16
		Sampled Time	09:00	09:00	10:30	10:20	08:50
		Client ID	WQ-DC-D1B-R	WQ-DC-D1B	WQ-CH-P-13-01	WQ-DESS-01	WQ-NW-SEEP-02
Grouping	Analyte						
WATER							
Total Metals	Magnesium (Mg)-Total (mg/L)		81.8	82.3	68.0	39.0	49.1
	Manganese (Mn)-Total (mg/L)		0.743	0.659	0.283	0.0721	0.0360
	Mercury (Hg)-Total (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Molybdenum (Mo)-Total (mg/L)		0.000229	0.000273	<0.000050	0.000069	0.000133
	Nickel (Ni)-Total (mg/L)		0.00095	0.00079	0.00670	0.00429	<0.00050
	Phosphorus (P)-Total (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)		3.79	4.07	0.95	0.69	2.61
	Selenium (Se)-Total (mg/L)		0.000115	0.000072	<0.000050	0.000067	0.000414
	Silicon (Si)-Total (mg/L)		5.90	5.68	5.27	5.55	3.90
	Silver (Ag)-Total (mg/L)		0.000094	0.000026	<0.000010	<0.000010	0.000063
	Sodium (Na)-Total (mg/L)		5.87	5.60	3.62	2.44	1.91
	Strontium (Sr)-Total (mg/L)		0.472	0.461	0.353	0.229	0.614
	Sulfur (S)-Total (mg/L)		180	183	204	117	284
	Thallium (Tl)-Total (mg/L)		0.000019	0.000022	<0.000010	<0.000010	0.000040
	Tin (Sn)-Total (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)		0.0171	0.0110	0.00058	0.00402	0.00046
	Uranium (U)-Total (mg/L)		0.00278	0.00265	0.000014	0.000018	0.000678
	Vanadium (V)-Total (mg/L)		0.00200	0.00104	<0.00050	0.00065	<0.00050
	Zinc (Zn)-Total (mg/L)		0.126	0.111	3.35	1.68	0.0837
	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)		0.0042	0.0041	0.207	0.174	0.0059
	Antimony (Sb)-Dissolved (mg/L)		0.00545	0.00553	<0.00010	0.00015	0.00339
	Arsenic (As)-Dissolved (mg/L)		0.0197	0.0199	0.00071	0.00115	0.00357
	Barium (Ba)-Dissolved (mg/L)		0.0274	0.0275	0.0131	0.0283	0.0109
	Beryllium (Be)-Dissolved (mg/L)		<0.000020	<0.000020	0.000037	0.000027	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)		0.028	0.028	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)		0.000107	0.000103	0.0101	0.00318	0.00212
	Calcium (Ca)-Dissolved (mg/L)		190	189	158	93.1	303
	Chromium (Cr)-Dissolved (mg/L)		<0.00010	<0.00010	0.00010	0.00013	<0.00010
	Cobalt (Co)-Dissolved (mg/L)		0.00026	0.00027	<0.00010	0.00012	<0.00010
	Copper (Cu)-Dissolved (mg/L)		0.00075	0.00079	0.00133	0.00192	0.00701
	Iron (Fe)-Dissolved (mg/L)		0.159	0.148	0.061	0.143	0.014
	Lead (Pb)-Dissolved (mg/L)		0.000100	0.000086	<0.000050	<0.000050	0.000103
	Lithium (Li)-Dissolved (mg/L)		0.0075	0.0070	0.0017	<0.0010	0.0024

* 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	L1780519-21 Water 07-JUN-16 13:40 WQ-VC-U	L1780519-22 Water 06-JUN-16 16:45 WQ-DC-U	L1780519-23 Water 08-JUN-16 14:30 WQ-BC	L1780519-24 Water TRAVEL BLANK
Grouping	Analyte				
WATER					
Total Metals	Magnesium (Mg)-Total (mg/L)	6.83	67.0	8.27	<0.10
	Manganese (Mn)-Total (mg/L)	0.0233	1.19	0.470	<0.00010
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.000025 ^{DLM}	<0.000025 ^{DLM}	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.000369	0.000578	0.000943	<0.000050
	Nickel (Ni)-Total (mg/L)	<0.00050	0.00290	0.00407	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	0.109	0.115	<0.050
	Potassium (K)-Total (mg/L)	0.57	3.37	1.56	<0.10
	Selenium (Se)-Total (mg/L)	<0.000050	0.000209	0.000097	<0.000050
	Silicon (Si)-Total (mg/L)	5.25	7.32	12.0	<0.050
	Silver (Ag)-Total (mg/L)	<0.000010	0.000150	0.000262	<0.000010
	Sodium (Na)-Total (mg/L)	2.15	10.5	2.93	<0.050
	Strontium (Sr)-Total (mg/L)	0.223	0.549	0.212	<0.00020
	Sulfur (S)-Total (mg/L)	4.97	172	17.0	<0.50
	Thallium (Tl)-Total (mg/L)	<0.000010	0.000030	0.000087	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	0.00215	0.0725	0.137	<0.00030
	Uranium (U)-Total (mg/L)	0.000448	0.00284	0.00101	<0.000010
	Vanadium (V)-Total (mg/L)	0.00056	0.00867	0.0113	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	0.0321	0.0477	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	0.00071	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	0.0183	0.0164	0.0658	
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	0.00240	0.00042	
	Arsenic (As)-Dissolved (mg/L)	0.00033	0.00951	0.00308	
	Barium (Ba)-Dissolved (mg/L)	0.0564	0.0438	0.0437	
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	
	Boron (B)-Dissolved (mg/L)	<0.010	0.018	<0.010	
	Cadmium (Cd)-Dissolved (mg/L)	0.0000122	0.0000108	0.0000826	
	Calcium (Ca)-Dissolved (mg/L)	21.4	176	33.5	
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	0.00015	
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	0.00107	0.00020	
	Copper (Cu)-Dissolved (mg/L)	0.00146	0.00067	0.00262	
	Iron (Fe)-Dissolved (mg/L)	0.042	0.222	0.153	
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	0.000229	
	Lithium (Li)-Dissolved (mg/L)	<0.0010	0.0028	<0.0010	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1780519-1	L1780519-2	L1780519-3	L1780519-4	L1780519-5
		Description	Water	Water	Water	Water	Water
		Sampled Date	06-JUN-16	06-JUN-16	06-JUN-16	06-JUN-16	07-JUN-16
		Sampled Time	14:55	19:00	14:30	18:40	11:15
		Client ID	WQ-DC-R	WQ-DC-B	WQ-VCR	WQ-TP	WQ-VC-VMN
Grouping	Analyte						
WATER							
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)		56.5	67.7	9.59	37.6	10.3
	Manganese (Mn)-Dissolved (mg/L)		0.660	0.451	0.0492	0.161	0.0609
	Mercury (Hg)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Molybdenum (Mo)-Dissolved (mg/L)		0.000383	0.000414	0.000405	0.00105	0.000460
	Nickel (Ni)-Dissolved (mg/L)		0.00093	0.00077	<0.00050	0.00080	<0.00050
	Phosphorus (P)-Dissolved (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)		2.98	2.85	0.75	11.0	0.77
	Selenium (Se)-Dissolved (mg/L)		0.000096	0.000083	<0.000050	0.000077	0.000061
	Silicon (Si)-Dissolved (mg/L)		4.87	4.77	5.49	1.55	5.21
	Silver (Ag)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	0.000026	<0.000010
	Sodium (Na)-Dissolved (mg/L)		11.6	6.65	2.81	13.4	2.96
	Strontium (Sr)-Dissolved (mg/L)		0.469	0.468	0.248	0.453	0.246
	Sulfur (S)-Dissolved (mg/L)		147	156	12.4	185	17.1
	Thallium (Tl)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	0.000171	<0.000010
	Tin (Sn)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)		<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)		0.00192	0.00252	0.000561	0.000855	0.000605
	Vanadium (V)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)		0.0047	0.0116	0.0053	0.0402	0.0012
	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	L1780519-6	L1780519-7	L1780519-8	L1780519-9	L1780519-10
		Description	Water	Water	Water	Water	Water
		Sampled Date	06-JUN-16	07-JUN-16	07-JUN-16	07-JUN-16	07-JUN-16
		Sampled Time	18:10	16:40	09:45	09:00	09:35
		Client ID	WQ-SEEP	WQ-PC-D	WQ-DC-DX+105	WQ-FIELD BLANK	WQ-MS-S-03
Grouping	Analyte						
WATER							
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)		57.4	11.1	38.5	<0.10	67.1
	Manganese (Mn)-Dissolved (mg/L)		5.60	0.835	0.633	<0.00010	1.35
	Mercury (Hg)-Dissolved (mg/L)		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)		0.000811	0.000738	0.000191	<0.000050	0.000267
	Nickel (Ni)-Dissolved (mg/L)		0.00259	0.00077	0.00117	<0.00050	0.00211
	Phosphorus (P)-Dissolved (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)		6.00	2.47	3.66	<0.10	3.51
	Selenium (Se)-Dissolved (mg/L)		0.000246	0.000091	0.000065	<0.000050	0.000062
	Silicon (Si)-Dissolved (mg/L)		7.30	4.57	5.69	<0.050	6.63
	Silver (Ag)-Dissolved (mg/L)		<0.000010	0.000021	0.000013	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)		34.6	5.01	3.69	<0.050	5.06
	Strontium (Sr)-Dissolved (mg/L)		0.723	0.255	0.277	<0.00020	0.435
	Sulfur (S)-Dissolved (mg/L)		214	43.8	90.6	<0.50	156
	Thallium (Tl)-Dissolved (mg/L)		<0.000010	<0.000010	0.000050	<0.000010	0.000093
	Tin (Sn)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)		0.00061	0.00095	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)		0.00175	0.000325	0.00227	<0.000010	0.00403
	Vanadium (V)-Dissolved (mg/L)		0.00122	0.00058	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)		0.0190	0.0080	0.423	<0.0010	1.16
	Zirconium (Zr)-Dissolved (mg/L)		0.00048	<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	L1780519-11	L1780519-12	L1780519-13	L1780519-14	L1780519-15
		Description	Water	Water	Water	Water	Water
		Sampled Date	07-JUN-16	07-JUN-16	07-JUN-16	07-JUN-16	08-JUN-16
		Sampled Time	09:15	13:15	08:40	16:15	10:05
		Client ID	WQ-DC-DX	WQ-VC-DBC	WQ-NW-SEEP-02	WQ-PC-U	WQ-DESS-03
Grouping	Analyte						
WATER							
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)		15.0	7.38	49.5	11.3	1.61
	Manganese (Mn)-Dissolved (mg/L)		0.0181	0.0887	0.0335	0.922	0.00198
	Mercury (Hg)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	0.000087
	Molybdenum (Mo)-Dissolved (mg/L)		<0.000050	0.000430	0.000092	0.000672	<0.000050
	Nickel (Ni)-Dissolved (mg/L)		<0.00050	0.00052	<0.00050	0.00117	0.00137
	Phosphorus (P)-Dissolved (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)		4.85	0.67	2.67	2.49	0.78
	Selenium (Se)-Dissolved (mg/L)		<0.000050	<0.000050	0.000464	0.000111	0.000058
	Silicon (Si)-Dissolved (mg/L)		4.26	5.48	3.89	4.65	5.93
	Silver (Ag)-Dissolved (mg/L)		<0.000010	<0.000010	0.000015	0.000025	<0.000010
	Sodium (Na)-Dissolved (mg/L)		2.97	2.30	2.03	5.00	1.35
	Strontium (Sr)-Dissolved (mg/L)		0.169	0.224	0.597	0.250	0.0367
	Sulfur (S)-Dissolved (mg/L)		43.7	8.69	279	44.2	3.43
	Thallium (Tl)-Dissolved (mg/L)		<0.000010	<0.000010	0.000036	<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	0.00153	<0.00030	0.00065	0.00077
	Uranium (U)-Dissolved (mg/L)		0.000098	0.000531	0.000656	0.000164	0.000018
	Vanadium (V)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)		0.0024	0.0020	0.0790	0.0156	0.0053
	Zirconium (Zr)-Dissolved (mg/L)		<0.00030	<0.00030	<0.00030	<0.00030	0.00050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1780519-16	L1780519-17	L1780519-18	L1780519-19	L1780519-20
		Description	Water	Water	Water	Water	Water
		Sampled Date	08-JUN-16	08-JUN-16	08-JUN-16	08-JUN-16	07-JUN-16
		Sampled Time	09:00	09:00	10:30	10:20	08:50
		Client ID	WQ-DC-D1B-R	WQ-DC-D1B	WQ-CH-P-13-01	WQ-DESS-01	WQ-NW-SEEP-02
Grouping	Analyte						
WATER							
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)		85.3	83.6	70.5	41.1	48.8
	Manganese (Mn)-Dissolved (mg/L)		0.633	0.632	0.292	0.0720	0.0320
	Mercury (Hg)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Molybdenum (Mo)-Dissolved (mg/L)		0.000217	0.000212	<0.000050	<0.000050	0.000081
	Nickel (Ni)-Dissolved (mg/L)		0.00059	0.00059	0.00706	0.00422	<0.00050
	Phosphorus (P)-Dissolved (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)		3.95	3.90	0.97	0.70	2.61
	Selenium (Se)-Dissolved (mg/L)		0.000097	0.000059	0.000062	<0.000050	0.000437
	Silicon (Si)-Dissolved (mg/L)		5.60	5.55	5.44	5.66	3.86
	Silver (Ag)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010	0.000016
	Sodium (Na)-Dissolved (mg/L)		5.90	21.8 ^{DTC}	3.61	2.60	1.88
	Strontium (Sr)-Dissolved (mg/L)		0.480	0.485	0.367	0.233	0.597
	Sulfur (S)-Dissolved (mg/L)		187	183	207	121	285
	Thallium (Tl)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)		<0.00030	<0.00030	<0.00030	0.00041	<0.00030
	Uranium (U)-Dissolved (mg/L)		0.00272	0.00269	<0.000010	<0.000010	0.000641
	Vanadium (V)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)		0.0844	0.0837	3.74	1.71	0.0780
	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	L1780519-21	L1780519-22	L1780519-23	L1780519-24
		Description	Water	Water	Water	Water
		Sampled Date	07-JUN-16	06-JUN-16	08-JUN-16	
		Sampled Time	13:40	16:45	14:30	
		Client ID	WQ-VC-U	WQ-DC-U	WQ-BC	TRAVEL BLANK
Grouping	Analyte					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)		6.97	68.6	7.66	
	Manganese (Mn)-Dissolved (mg/L)		0.0177	1.05	0.218	
	Mercury (Hg)-Dissolved (mg/L)		<0.0000050	<0.0000050	<0.0000050	
	Molybdenum (Mo)-Dissolved (mg/L)		0.000389	0.000426	0.000696	
	Nickel (Ni)-Dissolved (mg/L)		<0.00050	0.00077	0.00068	
	Phosphorus (P)-Dissolved (mg/L)		<0.050	<0.050	<0.050	
	Potassium (K)-Dissolved (mg/L)		0.57	3.32	0.83	
	Selenium (Se)-Dissolved (mg/L)		<0.000050	0.000087	0.000065	
	Silicon (Si)-Dissolved (mg/L)		5.25	5.15	5.70	
	Silver (Ag)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)		2.02	9.90	2.60	
	Strontium (Sr)-Dissolved (mg/L)		0.238	0.526	0.197	
	Sulfur (S)-Dissolved (mg/L)		4.99	174	17.5	
	Thallium (Tl)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)		<0.00030	<0.00030	0.00095	
	Uranium (U)-Dissolved (mg/L)		0.000415	0.00242	0.000711	
	Vanadium (V)-Dissolved (mg/L)		<0.00050	<0.00050	0.00070	
	Zinc (Zn)-Dissolved (mg/L)		0.0031	0.0028	0.0053	
	Zirconium (Zr)-Dissolved (mg/L)		<0.00030	<0.00030	<0.00030	

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Alkalinity, Total (as CaCO ₃)	B	L1780519-24
Method Blank	Alkalinity, Total (as CaCO ₃)	B	L1780519-24
Method Blank	Alkalinity, Total (as CaCO ₃)	B	L1780519-24
Duplicate	Beryllium (Be)-Total	DLA	L1780519-1, -2, -3, -4
Duplicate	Bismuth (Bi)-Total	DLA	L1780519-1, -2, -3, -4
Duplicate	Tin (Sn)-Total	DLA	L1780519-1, -2, -3, -4
Duplicate	Zirconium (Zr)-Total	DLA	L1780519-1, -2, -3, -4
Duplicate	Bismuth (Bi)-Total	DLA	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Duplicate	Cadmium (Cd)-Total	DLA	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Duplicate	Chromium (Cr)-Total	DLA	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Duplicate	Cobalt (Co)-Total	DLA	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Duplicate	Copper (Cu)-Total	DLA	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Duplicate	Lead (Pb)-Total	DLA	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Duplicate	Nickel (Ni)-Total	DLA	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Duplicate	Selenium (Se)-Total	DLA	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Duplicate	Silver (Ag)-Total	DLA	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Duplicate	Tin (Sn)-Total	DLA	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Duplicate	Titanium (Ti)-Total	DLA	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Duplicate	Vanadium (V)-Total	DLA	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Duplicate	Zinc (Zn)-Total	DLA	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Duplicate	Zirconium (Zr)-Total	DLA	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Duplicate	Cadmium (Cd)-Dissolved	DLM	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO ₄)	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Total	MS-B	L1780519-1, -2, -3, -4
Matrix Spike	Magnesium (Mg)-Total	MS-B	L1780519-1, -2, -3, -4
Matrix Spike	Potassium (K)-Total	MS-B	L1780519-1, -2, -3, -4
Matrix Spike	Silicon (Si)-Total	MS-B	L1780519-1, -2, -3, -4
Matrix Spike	Sulfur (S)-Total	MS-B	L1780519-1, -2, -3, -4
Matrix Spike	Aluminum (Al)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Aluminum (Al)-Total	MS-B	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Matrix Spike	Barium (Ba)-Total	MS-B	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Matrix Spike	Manganese (Mn)-Total	MS-B	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -

Reference Information

	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Sodium (Na)-Total	MS-B	23, -24 L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Matrix Spike	Strontium (Sr)-Total	MS-B	L1780519-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1780519-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
DLA	Detection Limit adjusted for required dilution
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).
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
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.			
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)

Reference Information

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

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

CL-IC-N-WR Water Chloride in Water by IC EPA 300.1 (mod)

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

CN-CNO-WT Water Cyanate APHA 4500-CN-L

This analysis is carried out using procedures adapted from APHA method 4500-CN "Cyanide". Cyanate is determined by the Cyanate hydrolysis method using an ammonia selective electrode

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

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

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.

F-SIE-VA Water Fluoride by SIE APHA 4500-F "Fluoride"

This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode. This method has a significant negative interference (i.e. results could be biased low) when Al³⁺ is present in the sample at a concentration greater than 2.5 mg/L.

F-SIE-VA Water Fluoride by SIE APHA 4500-F Fluoride

This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode. This method has a significant negative interference (i.e. results could be biased low) when Al³⁺ is present in the sample at a concentration greater than 2.5 mg/L.

HARDNESS-CALC-VA Water Hardness APHA 2340B

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

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

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

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

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

IONBALANCE-VA Water Ion Balance Calculation APHA 1030E

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

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

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

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

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

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

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

Reference Information

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

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

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

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

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

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

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

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.



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

Date Received: 08-JUN-16
Report Date: 21-JUN-16 12:14 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1780529
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
		L1780529-1	Water	08-JUN-16	12:30	WQ-PW
WATER						
Physical Tests	Colour, True (CU)					<5.0
	Conductivity (uS/cm)					368
	Hardness (as CaCO3) (mg/L)					201
	pH (pH)					8.45
	Total Dissolved Solids (mg/L)					211
	Turbidity (NTU)					0.13
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)					171
	Chloride (Cl) (mg/L)					<0.50
	Fluoride (F) (mg/L)					0.110
	Nitrate (as N) (mg/L)					0.122
	Nitrite (as N) (mg/L)					<0.0010
	Sulfate (SO4) (mg/L)					35.0
	Anion Sum (meq/L)					4.16
	Cation Sum (meq/L)					4.25
	Cation - Anion Balance (%)					1.1
Total Metals	Aluminum (Al)-Total (mg/L)					<0.010
	Antimony (Sb)-Total (mg/L)					<0.00050
	Arsenic (As)-Total (mg/L)					0.00038
	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)					46.7
	Chromium (Cr)-Total (mg/L)					<0.0020
	Copper (Cu)-Total (mg/L)					<0.0010
	Iron (Fe)-Total (mg/L)					<0.030
	Lead (Pb)-Total (mg/L)					0.00058
	Magnesium (Mg)-Total (mg/L)					20.5
	Manganese (Mn)-Total (mg/L)					<0.0020
	Mercury (Hg)-Total (mg/L)					<0.00020
	Potassium (K)-Total (mg/L)					0.94
	Selenium (Se)-Total (mg/L)					<0.0010
	Sodium (Na)-Total (mg/L)					5.0
	Uranium (U)-Total (mg/L)					0.00186
	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)
Matrix Spike	Sulfate (SO4)	MS-B	L1780529-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
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)
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)

Reference Information

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.



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Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



L1780529-COFC

COC Number: 14 -

Page 2 of 2

Form containing various fields for Report To, Invoice To, Project Information, Sample Identification, Analysis Request, and Shipping/Reception details.