

November 29, 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, 4114-4<sup>th</sup> Avenue  
PO 2703, Whitehorse, YT, Y1A 2C6

Attention: Emilie Hamm, A/Project Manager

**RE: Mount Nansen Water Resources Investigations – Monthly Report: October 2016 & Seasonal Analysis - FINAL**

<b>Trip dates:</b>	October 3-5, 2016
<b>EDI field staff:</b>	Alexandre Mischler and Gabriel Rivest
<b>Weather during trip:</b>	Air temperatures ranged from -6 to 2°C, with partly cloudy to clear skies.

This monthly report provides a summary of site conditions and data collected during EDI's October 2016 trip to Mount Nansen as part of the 2016/17 Water Resources Investigation. This report describes site conditions, meteorology, hydrology, water quality data, program recommendations, and additional trip information (Table 1). The October 2016 trip represents the end of the open-water season and thus a more detailed seasonal analysis of hydrology and meteorology data is provided for this period (April 1, 2016 to October 15, 2016).

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

Report Section	Description
Site Conditions	) Summary of weather and general site conditions
Meteorology	) Statement on meteorological station status and identification of any data gaps or QA/QC issues ) Seasonal Meteorological Summary: summary of April – October 2015 meteorology
Hydrology	) Discussion of hydrology data for this month ) Statement of QA/QC for the data collected this month ) Seasonal Hydrological Summary: summary of April – October 2015 hydrology
Water Quality	) Summary of water quality results for this month ) Statement on QA/QC sample results for this month
Program Recommendations	) Program recommendations for meteorological, hydrology and water quality programs



Report Section	Description
Additional Trip Information	<ul style="list-style-type: none"> <li>) Project safety concerns</li> <li>) Wildlife sightings</li> <li>) Budget and schedule considerations</li> </ul>
List of Attachments	<ol style="list-style-type: none"> <li>1. Maps of Hydrometric Stations and Water Quality Sites</li> <li>2. Site and Station Photos (October 2016)</li> <li>3. Meteorology Plots – Open-water Season</li> <li>4. Hydrology Summary Data Tables (October 2016)</li> <li>5. Rating Curves and Hydrographs – Open-water Season</li> <li>6. Water Quality Summary Data Tables (October 2016)</li> <li>7. Laboratory Certificates of Analysis (COA) &amp; Yukon Environmental Health Services Bacteriological Results (October 2016)</li> </ol>

## SITE CONDITIONS

The hydrologic and water quality conditions observed during the October 2016 trip were reflective of late fall conditions. Water levels were moderate to low at most sites and stations, with lower water levels than observed during the September 2016 trip. Ice was forming along most watercourses and water bodies (ice thickness 0.01 to 0.07 m), except along Victoria Creek which was ice free. The weather on all three days of the field visit consisted of temperatures ranging from -6°C to 2°C with partly cloudy skies. Waste rock seeps were dry (WQ-LW-SEEP-01 and WQ-NW-SEEP-02) and several sites were frozen to substrate (WQ-CH-P-13-01, WQ-DESS-01, WQ-DESS-02, WQ-DESS-03). Placer mining construction works have stopped for the season upstream of H-PC-DSP/WQ-PC-U and heavy equipment had been removed from the channel valley at the time of the site visit.

## METEOROLOGY

Meteorological data was collected at the ATM-ROAD station throughout October 2016. EDI conducted a preliminary QA/QC review of the October 2016 data and all sensors appear to be functioning properly. There was no snow below the snow depth sensor during the October investigation which corresponded with a recorded snow depth of 0.42 cm on October 3, 2016 (Table 2). Snow sensor measurements recorded during the field visit range from -0.4 to +0.4 cm, which is within the measurement accuracy of the sensor ( $\pm 1$  cm).



**Table 2. Comparison of snow depth measured at the site with the snow sensor measurement.**

Measurement Date/Time	Manual Snow Depth Measurement (cm)	Meteorological Station Snow Sensor Measurement (cm)	Snow Sensor Quality <sup>1</sup>	Difference (cm)
October 3, 2016 12:45 pm	0.00	0.42	172 (Good)	0.42

Note:

<sup>1</sup>- Snow sensor quality numbers are a proprietary output of the snow sensor and provide an interpretation of the sensor's echo quality used in measuring the snow depth. Values will increase during snowfall events consisting of low-density snow. The manufacturer provides a scale to interpret the meaning of the quality value such that the measurement will fall into one of four categories: Quality Numbers: 0 = Not able to read distance; 152-210 = Good Measurement Quality; 210-300= Reduced Echo Strength; 300-600 = High uncertainty.

## Seasonal Meteorological Summary: April 1, 2016 – October 15, 2016

Air temperatures were recorded between April 1 and October 15, 2016. Early April was characterized by warm days and only six days in the month had a mean air temperature below 0°C (Attachment 3: Figure 3.1). April 1 was the warmest day in April with a mean temperature of 6.9°C and a maximum hourly temperature of 10.2°C (Table 3). The warm temperatures in April contributed to the spring freshet occurring 15 days earlier than in 2015 when the spring freshet occurred on May 10, 2015. Hourly air temperatures were consistently above 0°C starting on May 8, 2016. In the fall, mean daily temperatures fell below 0°C on September 27, 2016. July had the highest daily mean temperature (11.8°C, Table 3) while October (up to October 15) had the lowest daily mean temperature (-2.8°C, Table 3). The mean April temperature was 2.9°C warmer than the mean in April 2015 (-1.1°C, EDI 2015). The maximum hourly air temperature recorded during the season (April to October) was 21.9°C on June 18, 2016, while the lowest recorded temperature was -10.8°C, on October 15, 2016.

The ground surface temperature record followed similar seasonal patterns as air temperature. The daily average ground surface temperature was below 0°C for 13 days in April, and the hourly ground surface temperature was consistently above 0°C starting on May 8, 2016. Temperatures began dropping below 0°C on September 27, 2016. The maximum ground temperature was 26.8°C on June 19, 2016, and the minimum ground temperature was recorded on October 7, 2016 at -7.7°C (Attachment 3: Figure 3.1).

Seasonal rainfall patterns were characteristic of the region for the April 1 to October 15, 2016 period, where summer storms in July represented the most intense and highest total monthly rainfall (Attachment 3: Table 3.1). Total monthly rainfall in the month of July was the highest of the season (107.4 mm) and included 18 rainfall events (Figure 3.2). The highest total daily rainfall (22.9 mm) on May 16, 2016 and the highest hourly rainfall intensity (9.1 mm/hr) was recorded on July 13, 2016 at 13:00; the duration of this storm was two hours producing a total of 9.7 mm of rain. In total, 48 precipitation events occurred during the season.



**Table 3. Mount Nansen hourly air temperature and rainfall statistics by month (April 1 to October 15, 2016).**

Month	Air Temperature			Rainfall		
	Max (°C)	Min (°C)	Daily Mean (°C)	Max Intensity (mm/hr)	Max Daily Total (mm)	Total Monthly (mm)
April	10.2	-3.9	1.8	3.6	7.1	23.0
May	19.1	-3.2	6.8	7.6	22.9	49.6
June	21.9	1.5	10.4	3.2	9.3	42.1
July	21.4	5.3	11.8	9.1	20.1	107.4
August	21.1	3.0	10.7	4.2	8.2	40.9
September	16.0	-4.5	4.8	4.2	4.4	29.0
October	7.0	-10.8	-2.8	0.0	0.0	0.0

The snowpack depth at the meteorological station was 26.0 cm on April 1, 2016 and reached a maximum depth of 27.1 cm on April 13, 2016 (Attachment 3: Table 3.1 and Figure 3.3). All snow had melted at the meteorological station by April 26, 2016. The snow sensor recorded erroneous data (e.g., 2.9 cm) on July 14, 2016 (12:00) and negative snow depths; this data was removed from the final dataset for reporting but remains in the raw data files. One minor snowfall event occurred on October 15, 2016 when there was a total snowfall with an accumulation of 1 cm recorded at the meteorological station.

The dominant wind direction during the season was southerly to south-westerly (Attachment 3: Figure 3.4). The maximum mean hourly wind speed recorded during this period was 10.6 m/s (38.2 km/hr) on May 6, 2016. The month with the highest mean wind speed was April at 2.8 m/s (10.2 km/hr), while August had the lowest mean monthly wind speed at 2.1 m/s (7.4 km/hr) (Attachment 3: Figure 3.5).

Net radiation during the open-water season ranged from a minimum of -85.6 W/m<sup>2</sup>, recorded on May 15, 2016 (at 23:00), to a maximum recorded net radiation of 693.4 W/m<sup>2</sup>, recorded on July 12, 2016 (at 13:00). June had the highest mean monthly net radiation at 127.3 W/m<sup>2</sup>, while October had the lowest monthly mean net radiation (0.968 W/m<sup>2</sup>; Attachment 3: Figure 3.6).

Mean daily relative humidity ranged from 24.4% (May 15) to 96% (July 23). The maximum recorded relative humidity of 99.2% occurred over the periods July 22 to 24 and August 18, 2016. The minimum recorded relative humidity was 14.8% on May 15, 2016 (Attachment 3: Figure 3.7).

## HYDROLOGY

All hydrometric stations provided suitable conditions for discharge measurements during the October 2016 trip. A total of 12 discharge measurements were collected at the Mount Nansen site. Flow rates were lower at all stations in October than during the September 2016 visit. Continuous water level logger records are available for the following seven stations: H-DC-B, H-DC-R, H-VC-U, H-BC, H-VC-DBC, H-VC-UMN



and H-VC-R+290. Loggers at these seven stations were winterized in preparation for winter conditions and re-installed inside the stilling well. The review of the continuous hydrometric and barometric data files indicates that all sensors were functioning properly.

Surface water conditions and hydrometric monitoring tasks completed at each station in October 2016 are summarized in Attachment 4. 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 a Sontek FlowTracker acoustic Doppler velocimeter (ADV) using the velocity-area mid-section method at the four Victoria Creek stations: H-VC-U, H-VC-DBC, H-VC-UMN, and H-VC-R+290. October discharge values along Victoria Creek ranged from 0.416 to 0.547 m<sup>3</sup>/s. The October discharges represent lower flow conditions than during the September 6-8 trip. Thin shelf ice along the banks above the water surface was present along Victoria Creek.
- ) Flows increased in the downstream direction along Victoria Creek as the contributing watershed area increased, with the exception of a 0.131 m<sup>3</sup>/s flow loss between H-VC-DBC and the downstream station at H-VC-UMN. A description of the discharge patterns along Victoria Creek is discussed below in the Seasonal Hydrological Summary.
- ) Discharge measurements were collected at the five stations along Dome Creek. Salt dilution gauging was used to measure the discharge at two stations: H-DC-B and H-DC-R. There was ice within the channels during the salt tracer measurements, which adds uncertainty to the discharge values. Volumetric methods were used at H-DC-DX+105, H-DC-D1b and H-DC-M WP. October discharge values ranged from 0.003 to 0.016 m<sup>3</sup>/s.
- ) At H-DC-M WP, a negligible amount of water was leaking under the V-notch weir plate. The sandbags along the right downstream side continue to stop water from flowing around the weir, as intended. Sediment within the weir pond was frozen and could not be excavated.
- ) The discharge at the Pony Creek station, H-PC-DSP, was measured using volumetric techniques and calculated to be 0.002 m<sup>3</sup>/s.
- ) A discharge measurement was collected at the Back Creek station, H-BC, using salt dilution gauging methods with a discharge value of 0.034 m<sup>3</sup>/s.
- ) The H-SEEP volumetric discharge measurement on October 4, 2016 (0.003 m<sup>3</sup>/s) was identical to the flow rate observed at the pump in the seepage pond shack (0.003 m<sup>3</sup>/s).
- ) Placer mining operations along Pony Creek upstream of H-PC-DSP have stopped for the season. Heavy equipment has been removed from the Pony Creek valley for the season.



## Seasonal Hydrologic Summary: April 1, 2016 to October 15, 2016

The estimated timing of the snowmelt peak discharge at hydrometric stations within the Victoria Creek and Back Creek watersheds was April 25, 2016. Within the Dome Creek watershed, the continuous water level logger at H-DC-M WP recorded a peak stage on April 24, 2016. Small patches of ice and snow were present at the Mount Nansen site until the July 2016 visit. Cold temperatures prior to the October 3 – 5, 2016 trip produced the first observations of snow and ice for the season.

Stage-discharge rating curves were developed for six hydrometric stations with continuous water level loggers at the Mount Nansen site. These include H-DC-B, H-BC, H-VC-U, H-VC-DBC, H-VC-UMN and H-VC-R+290. No rating curve has been developed for H-DC-M WP as this station was converted to a discrete measurement site in June 2016 due to sedimentation concerns in the weir pond and stilling well; the continuous water level logger was removed and tested for damage; the logger appeared to be functioning properly.

The continuous records of stage (water level) were converted to discharge using the 2016 rating curve equations for each station, and discharge hydrographs were produced (Attachment 5). Hydrographs for hydrometric stations where only instantaneous discharge measurements were collected, including the daily instantaneous pump flow out of the seepage pond recorded by Denison Environmental Services (DES), are compiled in Attachment 5.

The hydrographs for the upper Dome Creek watershed stations showed that flows at the downstream station, H-DC-D1b were typically from 0.002 m<sup>3</sup>/s to 0.003 m<sup>3</sup>/s higher than those at H-DC-DX+105 (Attachment 5: Figure 5.1). Prohibitive channel and ground ice conditions at H-DC-R and H-DC-B prevented the re-installation of water level loggers until April 29 and May 10, 2016 respectively and therefore peak freshet flows estimated to have occurred on April 25, 2016 were not recorded. Water level loggers at these stations were in place during the highest daily rainfall event on May 16, 2016 (22.9 mm/day) which produced flows of 0.068 m<sup>3</sup>/s at H-DC-B and 0.135 m<sup>3</sup>/s at H-DC-R. The highest intensity rainfall event on July 24, 2016 produced a hydrologic response of 0.073 m<sup>3</sup>/s at H-DC-B and 0.065 m<sup>3</sup>/s at H-DC-R.

The logger at H-BC recorded the freshet discharge event on April 25, 2016 (0.221 m<sup>3</sup>/s). The largest daily rainfall event occurred on May 16, 2016 producing a higher discharge (0.280 m<sup>3</sup>/s) than the flows associated with snowmelt. The hydrologic response of Back Creek streamflow to the high intensity rainfall event that occurred on July 24, 2016 was moderate; in the peak discharge was estimated to be 0.097 m<sup>3</sup>/s. The influence of placer mining operations on the streamflow (e.g., attenuation) upstream of the Back Creek station could not be quantified.

The hydrographs for stations in the Victoria Creek watershed show that two large peak flows occurred during spring of 2016. The first peak occurred on April 25, 2016 and was associated with snowmelt (spring



freshet). Discharge measurements completed at the Victoria Creek stations on April 27, 2016 appear to have occurred approximately two days after the spring freshet (evening of April 25, 2016). The second peak on May 17, 2016 was larger than the first and was associated with the largest rainfall event of the season (Attachment 3 and Attachment 5, Figures 5.8 to 5.12). The continuous loggers in place at H-VC-DBC, H-VC-UMN, and H-VC-R captured the timing and magnitude of both spring peak flows. Streamflow declined substantially following the snowmelt and May rain event, flows remained low except for large rainfall events on June 6, June 14, July 9-1, July 21-23, August 18-19 and August 25 that increased flow in all watercourses in a step-like fashion. Flows remained moderate from late August to early October (Attachment 5, Figures 5.12 and 5.13).

The following list summarizes the three highest discharges estimated using the rating curve equations developed for each station:

- ) H-VC-U: April 25 = 2.63 m<sup>3</sup>/s; May 17 = 4.37 m<sup>3</sup>/s, July 24 = 1.65 m<sup>3</sup>/s
- ) H-BC: April 25 = 0.22 m<sup>3</sup>/s; May 16 = 0.28 m<sup>3</sup>/s, July 24 = 0.09 m<sup>3</sup>/s
- ) H-VC-DBC: April 25 = 3.17 m<sup>3</sup>/s; May 17 = 4.41 m<sup>3</sup>/s, July 24 = 1.85 m<sup>3</sup>/s
- ) H-DC-B: May 11 = 0.08 m<sup>3</sup>/s, May 16 = 0.13 m<sup>3</sup>/s, July 24 = 0.07 m<sup>3</sup>/s
- ) H-DC-R: May 16 = 0.07 m<sup>3</sup>/s, July 11 = 0.05 m<sup>3</sup>/s, July 24 = 0.06 m<sup>3</sup>/s
- ) H-VC-UMN: April 25 = 4.28 m<sup>3</sup>/s; May 17 = 4.48 m<sup>3</sup>/s, July 24 = 1.86 m<sup>3</sup>/s
- ) H-VC-R+290: April 25 = 3.43 m<sup>3</sup>/s; May 17 = 4.49 m<sup>3</sup>/s, July 24 = 2.38 m<sup>3</sup>/s

The water balance during the open-water season at stations along the Victoria Creek water course (H-VC-U, H-VC-DBC, H-VC-UMN and H-VC-R+290) and at Back Creek (H-BC) was analyzed to investigate gaining and losing reaches associated with groundwater-surface water fluxes. Groundwater influences are most pronounced during the winter season when discharge approaches the baseflow condition; the open-water discharge data provides additional information about the relative influence of groundwater within the Victoria Creek watershed during the open water season (Attachment 5, Figure 5.11).

The measured discharges at H-VC-U, H-BC and H-VC-DBC were analyzed to identify potential groundwater interactions. Back Creek was active throughout the open-water season and contributed surface flow to Victoria Creek at the confluence between H-VC-DBC and H-VC-U. Discharge patterns in June and October upstream and downstream of the confluence suggest that a net gain of groundwater occurred between H-VC-U and H-VC-DBC, because the increase in flows in the downstream direction could not be fully attributed to the surface water contribution from Back Creek. A similar pattern could not be identified during other months in the open-water season. Discharge measurements during the 2015/16 winter also indicated that there was a net gain of groundwater (gaining reach) between these two stations (EDI 2016).

The measured discharges at H-VC-DBC in April, September and October were greater than at the downstream station at H-VC-UMN, where the contributing watershed area is larger and the discharge



would typically be expected to be greater. Discharge measurements during the 2015/16 winter indicated that there is a net loss to groundwater (losing reach) between these two stations.

The groundwater influences were less clearly defined between H-VC-UMN and H-VC-R+290. In May and June 2016, the measured discharges at H-VC-UMN were greater than at the downstream station at H-VC-R+290. However, increased discharges in the downstream direction were observed in April, July, August, September and October 2016.

## WATER QUALITY

Water quality samples and in-situ data were collected at all planned sites with flowing water during the October 2016 trip. A total of 15 sites were sampled (Attachment 6). The drinking water sample, including a bacteriological sample, was collected from the pumphouse well (WQ-PW) on October 5, 2016. 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 6). In-situ and laboratory results summary tables as well as the lab certificates of analysis are attached (Attachment 6 and Attachment 7). 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 in Attachment 6 and discussed below.

Many results reflect typical fall conditions at Mount Nansen when water levels are moderate but lower than the September sampling trip and ice was presented in small channels.

### Water Quality Results Summary

- J The WQ-SEEP samples exceeded CCME-AL guidelines for ammonia, total and dissolved arsenic, total cadmium, total and dissolved iron, total and dissolved zinc. Total iron and manganese exceeded Mount Nansen EQS.
- J Tailings Pond (WQ-TP) samples exceeded CCME-AL guidelines for fluoride, total and dissolved arsenic, total cadmium, total and dissolved copper, total and dissolved zinc.
- J On Upper Dome Creek sites, WQ-DC-DX+105 and WQ-DC-D1b, CCME-AL guidelines were exceeded for fluoride (WQ-DC-DX+105 only), total aluminum, total and dissolved arsenic, total cadmium, dissolved cadmium (WQ-DC-DX+105 only), total iron, dissolved iron (WQ-DC-D1b only), total and dissolved zinc. Total iron and total manganese exceeded Mount Nansen EQS. Total suspended solids also exceeded Mount Nansen EQS at WQ-DC-D1b.
- J On Lower Dome Creek sites, WQ-DC-B, WQ-DC-U and WQ-DC-R, CCME-AL guidelines were exceeded for ammonia (WQ-DC-U only), total aluminum (WQ-DC-B only), total and





dissolved arsenic, total and dissolved iron. Total iron, total manganese, and total zinc exceeded Mount Nansen EQS.

- J On Upper Victoria Creek, site WQ-VC-U no parameters exceeded CCME-AL guidelines.
- J Back Creek (WQ-BC) samples exceeded CCME-AL guidelines for total aluminum, arsenic, cadmium, chromium, copper, iron, and lead. Total iron and suspended solids also exceeded Mount Nansen EQS.
- J On Victoria Creek sites downstream of Back Creek, WQ-VC-DBC, WQ-VC-UMN and WQ-VC-R, CCME-AL guidelines were exceeded for total aluminum and total iron.
- J The upstream (WQ-PC-U) and downstream (WQ-PC-D) Pony Creek sites had samples that exceeded CCME-AL guidelines for total aluminum, arsenic, cadmium, copper, iron, lead, mercury, silver and zinc. Dissolved arsenic also exceeded CCME-AL guidelines at both sites, as well as dissolved zinc for WQ-PC-U. Total suspended solids, total iron and manganese also exceeded Mount Nansen EQS at both sites. Placer mining operations upstream of these sites were stopped for the winter at sampling time.
- J The LC50 sample collected from the WQ-SEEP (100% concentration) had a 96-hour LC50 result of 73.5% trout survival with a 95% confidence limit between 67.8 and 79.7 % (%v/v). All surviving fish appeared healthy with no signs of stress at 96 hours. While there are a number of samples that exceeded applicable guidelines, it is difficult to determine the cause of the fish mortalities.
  - ↓ In response to the October 2016 LC50 sampling results, an LC50 sample and regular water quality sample analysis were collected at WQ-SEEP on November 17, 2016. A summary of the results will be provided in the November monthly report.
- J The bacteriological sample collected at WQ-PW on October 5, 2016 was absent of total coliforms and E. coli. All other sampling results for WQ-PW did not exceed CCME-AL guidelines.

## 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-SEEP-r was 5% with an average difference of 2% for total and 6% for dissolved metals. Cyanate and dissolved chromium had RPD>20%.

The average RPD of the replicate sample WQ-PC-D-r was 2% with an average difference of 2% for total and 2% for dissolved metals. No parameter had RPD>20%.



## PROGRAM RECOMMENDATIONS

- ) During each winter trip, collect photographs and manual snow depth measurements adjacent to the meteorological station compound to confirm snow sensor data.
- ) Where feasible, EDI will collect concurrent discharge measurements whenever salt tracer tests are completed during the 2016/17 winter season using a secondary method (such as velocity-area or volumetric). The secondary measurement is used to validate the winter measurements if poor hydraulic conditions due to complex ice formations are present.

## ADDITIONAL TRIP INFORMATION

<b>Any changes to project scope (i.e. additional sites sampled):</b>	None. All sampling and monitoring was conducted within scope. The next trip is scheduled for November 7 – 9, 2016. The next trip will be the ninth of the 2016/2017 Water Resources Investigation, and the first of the winter season.
<b>Any alterations to sample schedule/budget:</b>	None
<b>Additional Comments:</b>	None
<b>Wildlife Sightings:</b>	A young bull moose was observed near H-VC-R on October 3. An ermine was observed near H-SEEP on October 4. Spruce grouse were observed at multiple locations on the Mount Nansen site.
<b>Site concerns (safety):</b>	None



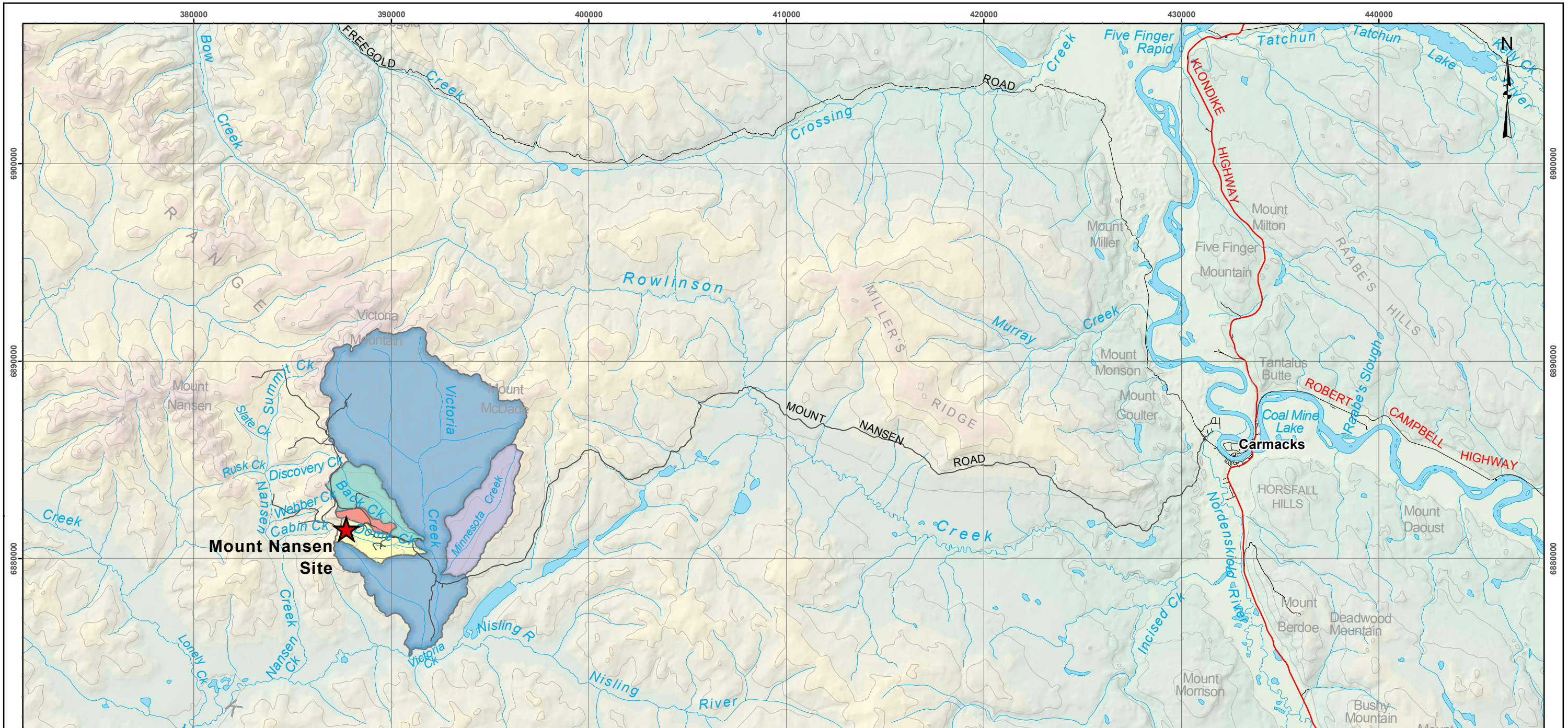
## REFERENCES

EDI Environmental Dynamics Inc. (EDI). 2015. Mount Nansen Water Resources Investigations – Monthly Report: October 2015 & Seasonal Analysis

EDI Environmental Dynamics Inc. (EDI). 2016. Mount Nansen Water Resources Investigations – Monthly Report: March 2016



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



### Regional Overview Map of Mount Nansen Site

#### Legend

##### Local Drainage Area

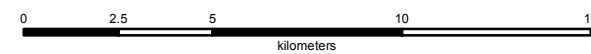
- Back Creek
- Dome Creek
- Minnesota Creek
- Pony Creek
- Victoria Creek

- 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](http://www.geomaticsyukon.ca).

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



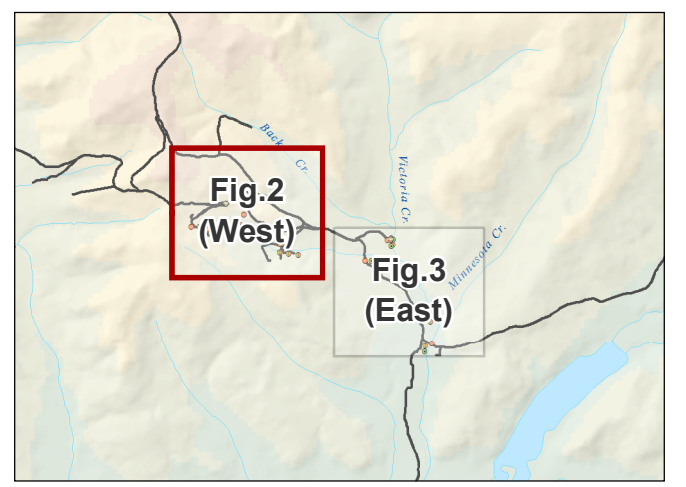
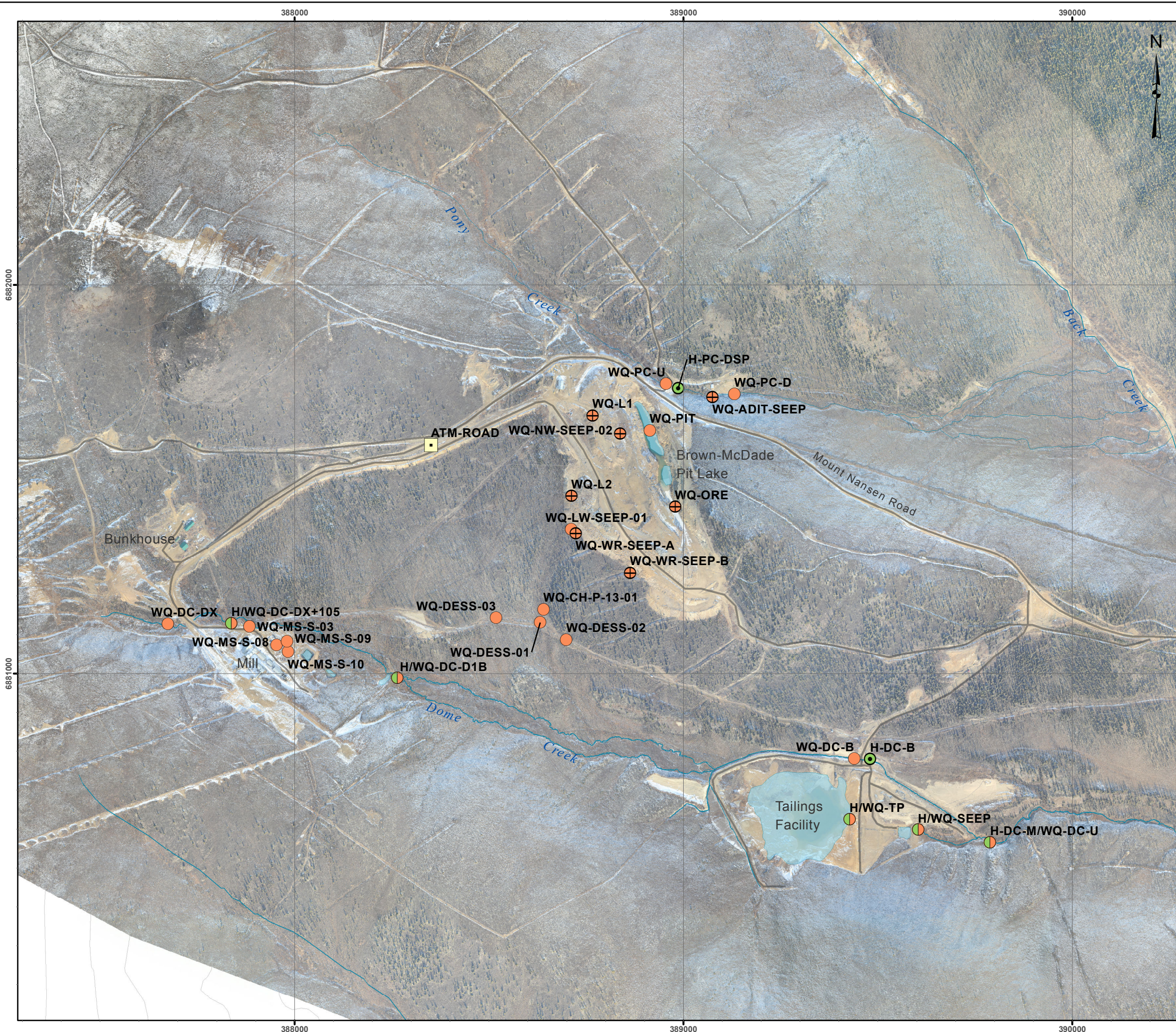
Map Scale: 1:200,000 (printed on 11 x 17)  
 Map Projection: NAD 1983 UTM Zone 8N

Drawn: LG	Checked: MM / JB	Date: 14/07/2016	<b>FIGURE 1</b>
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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**

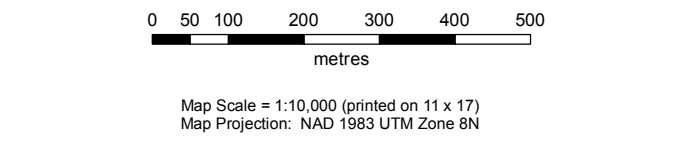
Notes:

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

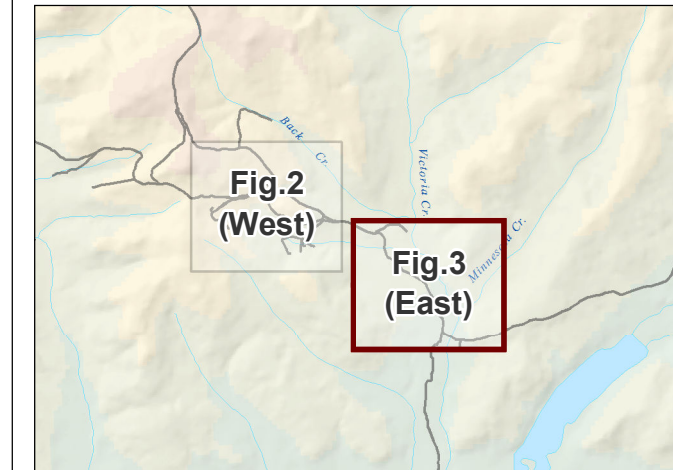
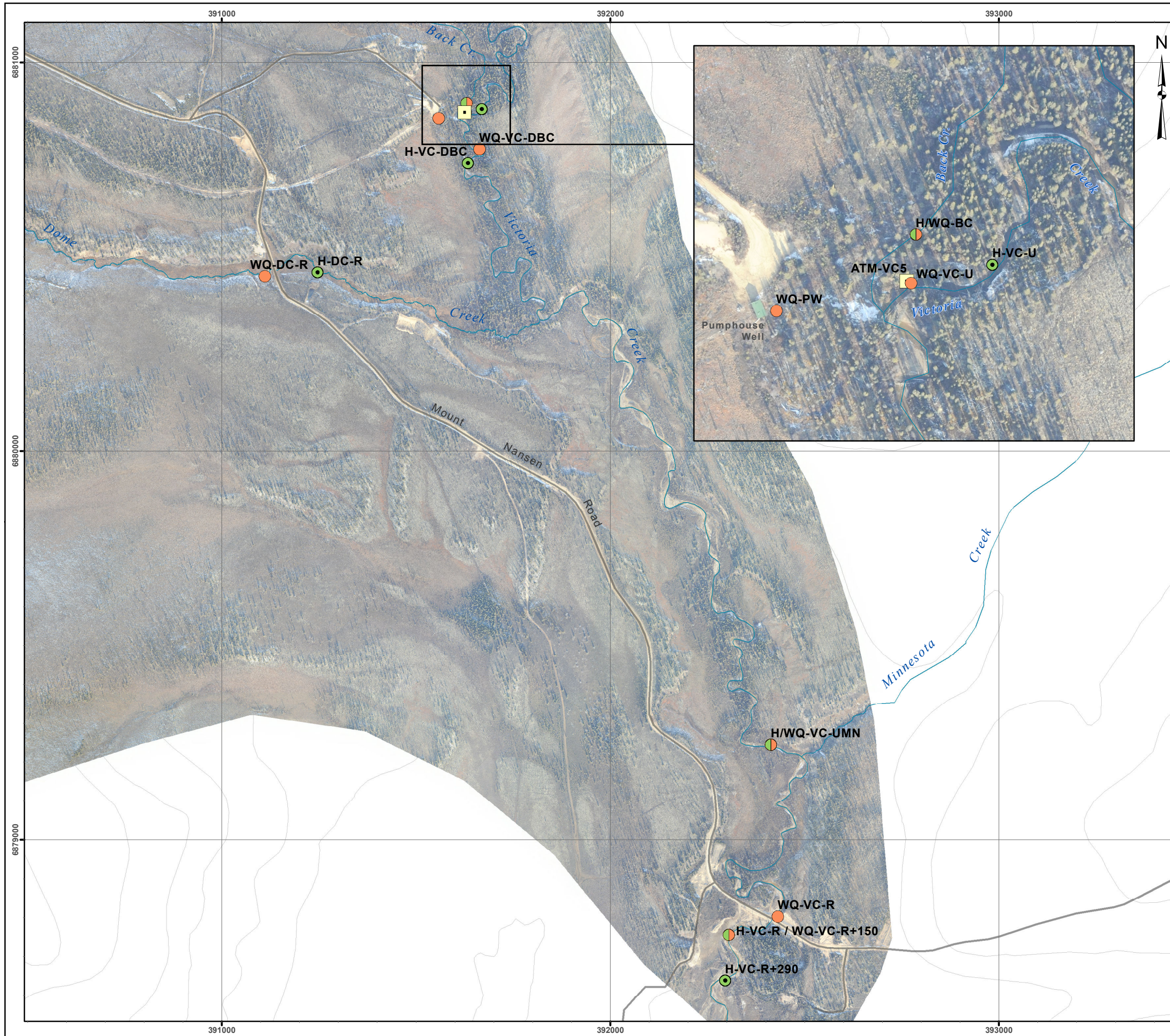
Imagery provided by Yukon Government - Energy, Mines and Resources - Abandoned Mines Branch.

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	<b>FIGURE 2</b>
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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**

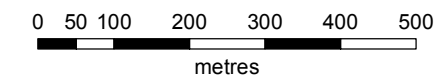
**Notes:**

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	<b>FIGURE 3</b>
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**ATTACHMENT 2:            SITE AND STATION  
   PHOTOS**





Photo 1. WQ-DC-DX – looking upstream (frozen to bed – no sample collected).



Photo 2. H-DC-DX+105 – looking upstream at discharge measurement site.



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



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



Photo 5. WQ-CH-P-13-01 – looking upstream (frozen to bed – no sample collected).



Photo 6. WQ-DC-B – looking upstream.



Photo 7. H-DC-B – looking downstream.



Photo 8. H-DC-B – looking upstream.



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



Photo 10. H-TP – tailings pond lower staff gauge encased in ice.



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



Photo 12. H-DC-M WP – looking downstream from weir pond.



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



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



Photo 15. WQ-DC-R – looking upstream.



Photo 16. H-DC-R – looking upstream.



Photo 17. WQ-PC-U – looking downstream.



Photo 18. WQ-PC-D – looking upstream.



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



Photo 20. H/WQ-BC – looking upstream.



Photo 21. H-VC-U – looking downstream.



Photo 22. WQ-VC-U – looking upstream.



Photo 23. WQ-VC-U – looking downstream at confluence of Victoria Creek and Back Creek.



Photo 24. WQ-VC-DBC – looking downstream.



Photo 25. H-VC-DBC – looking upstream.



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



Photo 27. WQ-VC-R+290 – looking upstream.



Photo 28. H-VC-R+290 – looking upstream.



Photo 29. WQ-NW-SEEP-02 – overview of sample site (insufficient flow rate for sample).



Photo 30. WQ-PW – overview of site.



**ATTACHMENT 3: METEOROLOGY PLOTS – OPEN-WATER  
SEASON**

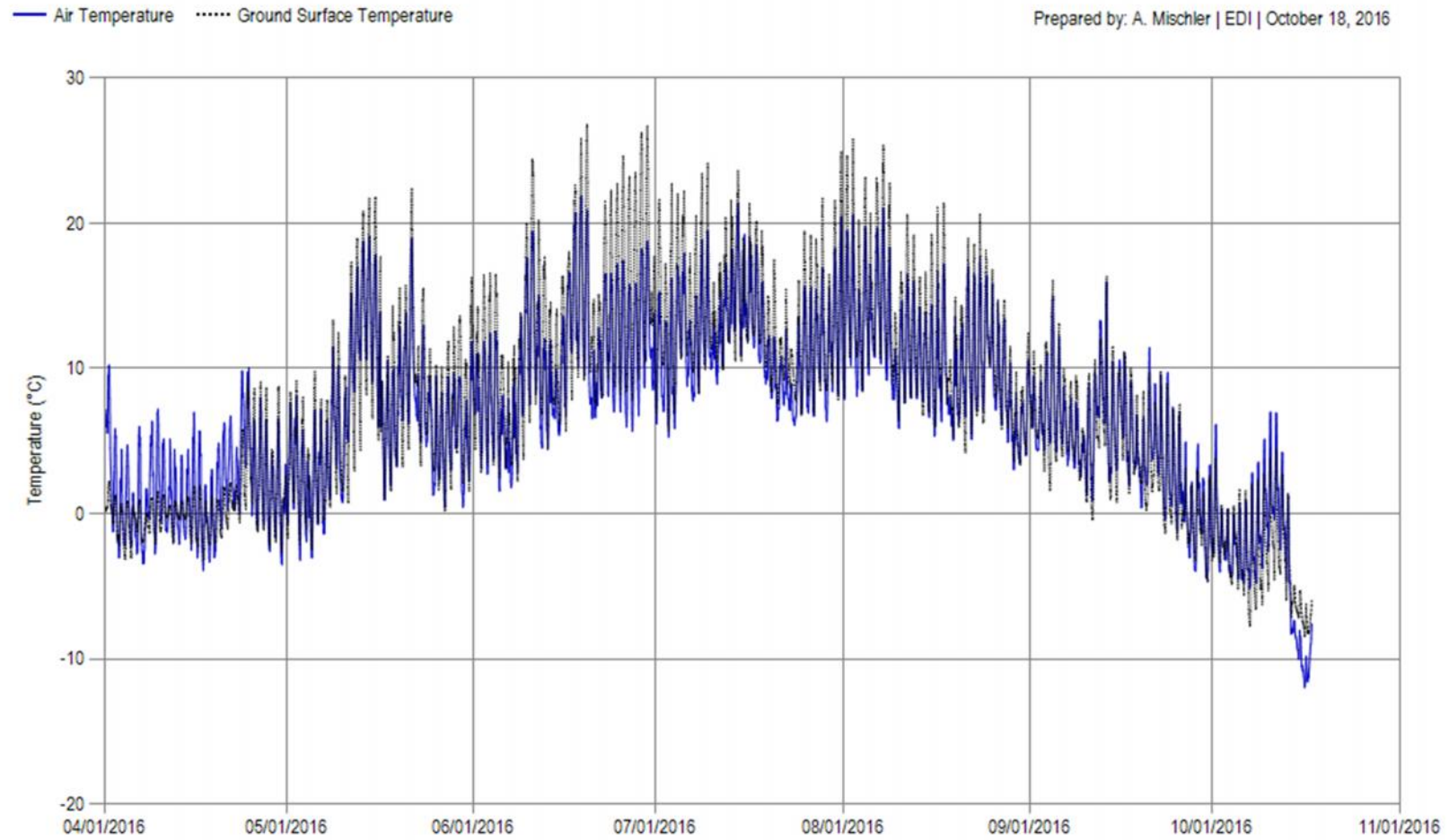


Figure 3. 1    Mount Nansen mean hourly air and ground temperature, April 1 to October 15, 2016.

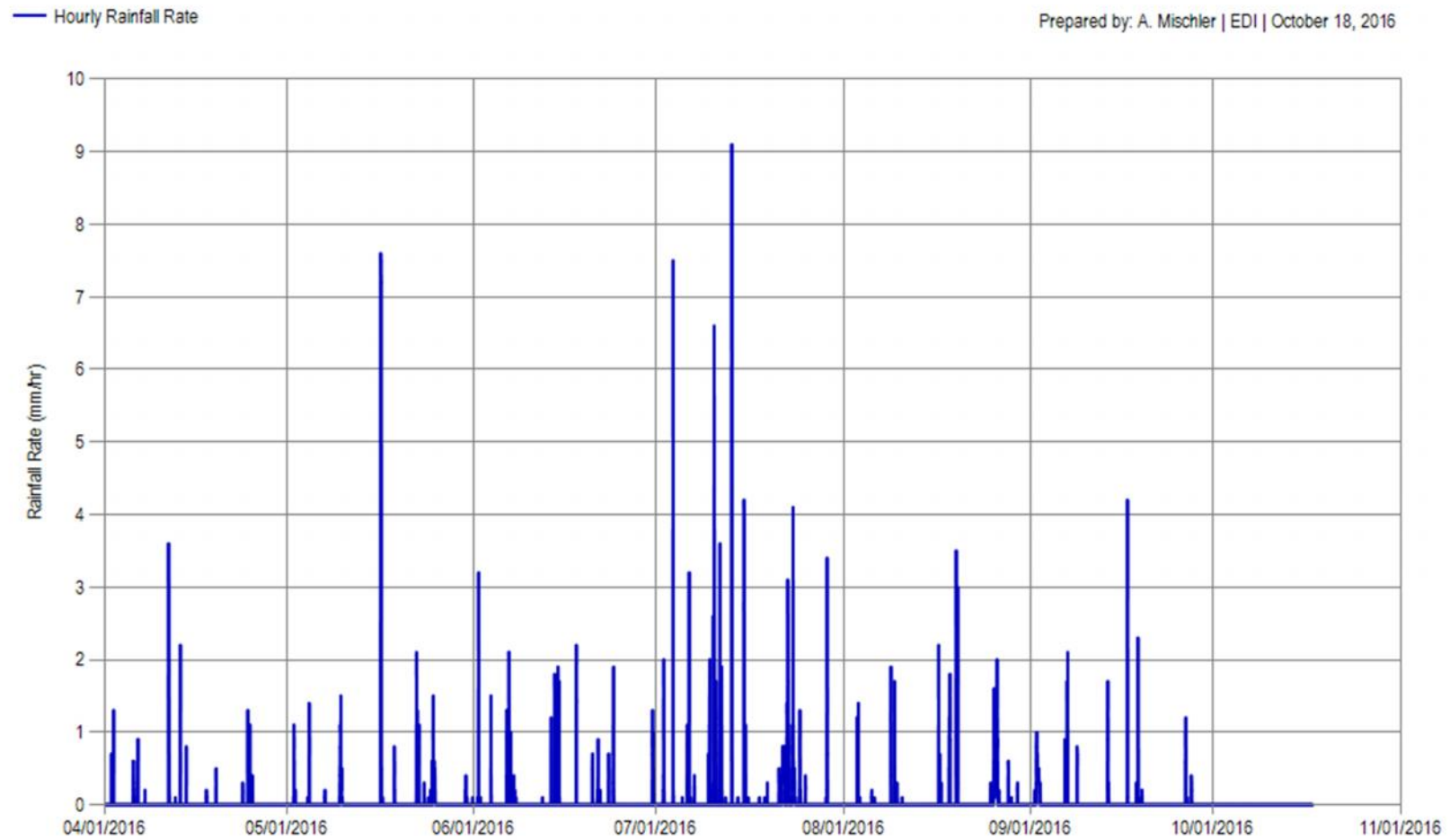


Figure 3. 2 Mount Nansen hourly rainfall rate, April 1 to October 15, 2016.



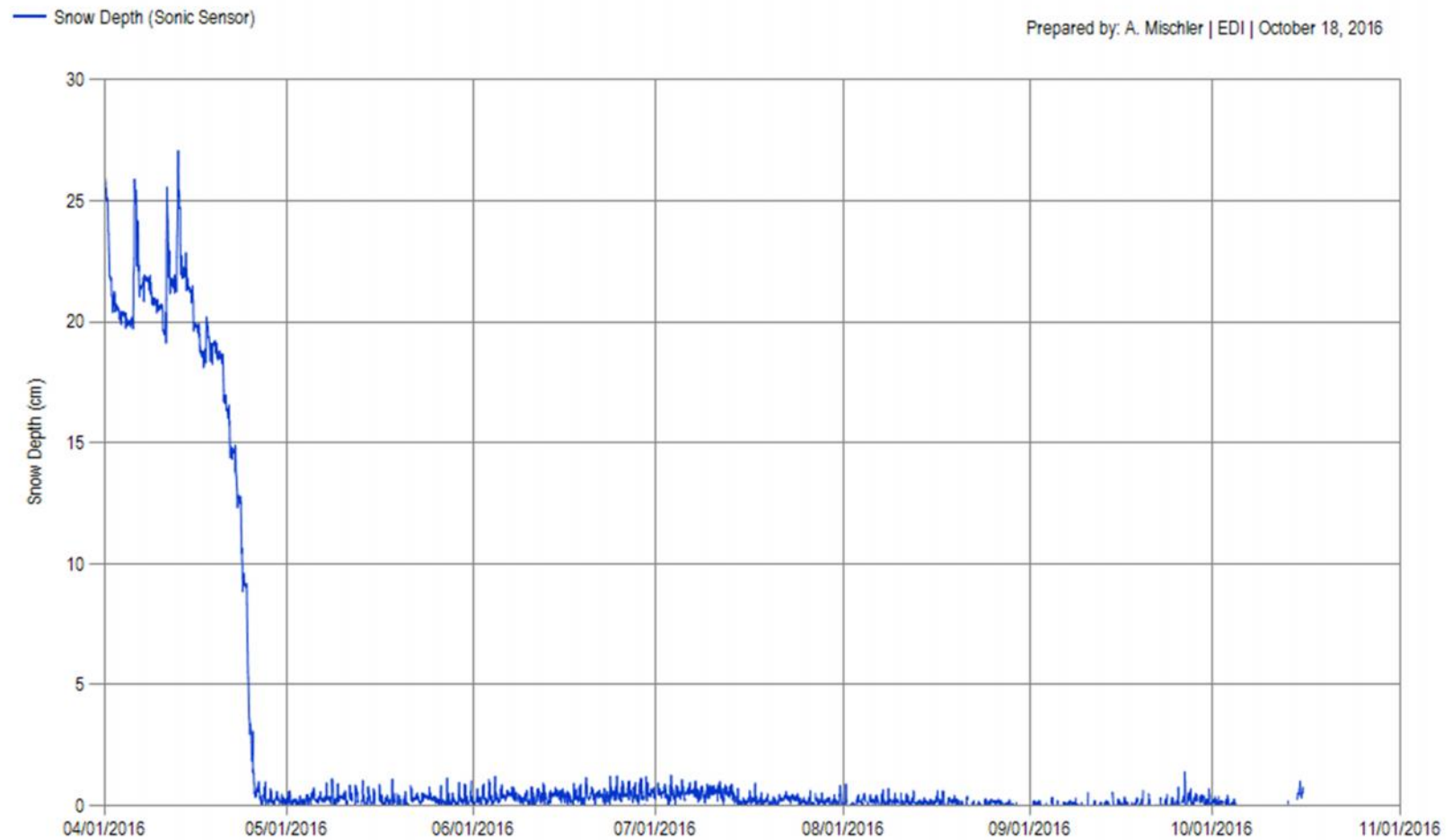


Figure 3.3 Mount Nansen cumulative daily snow depth, April 1 to October 15, 2016.

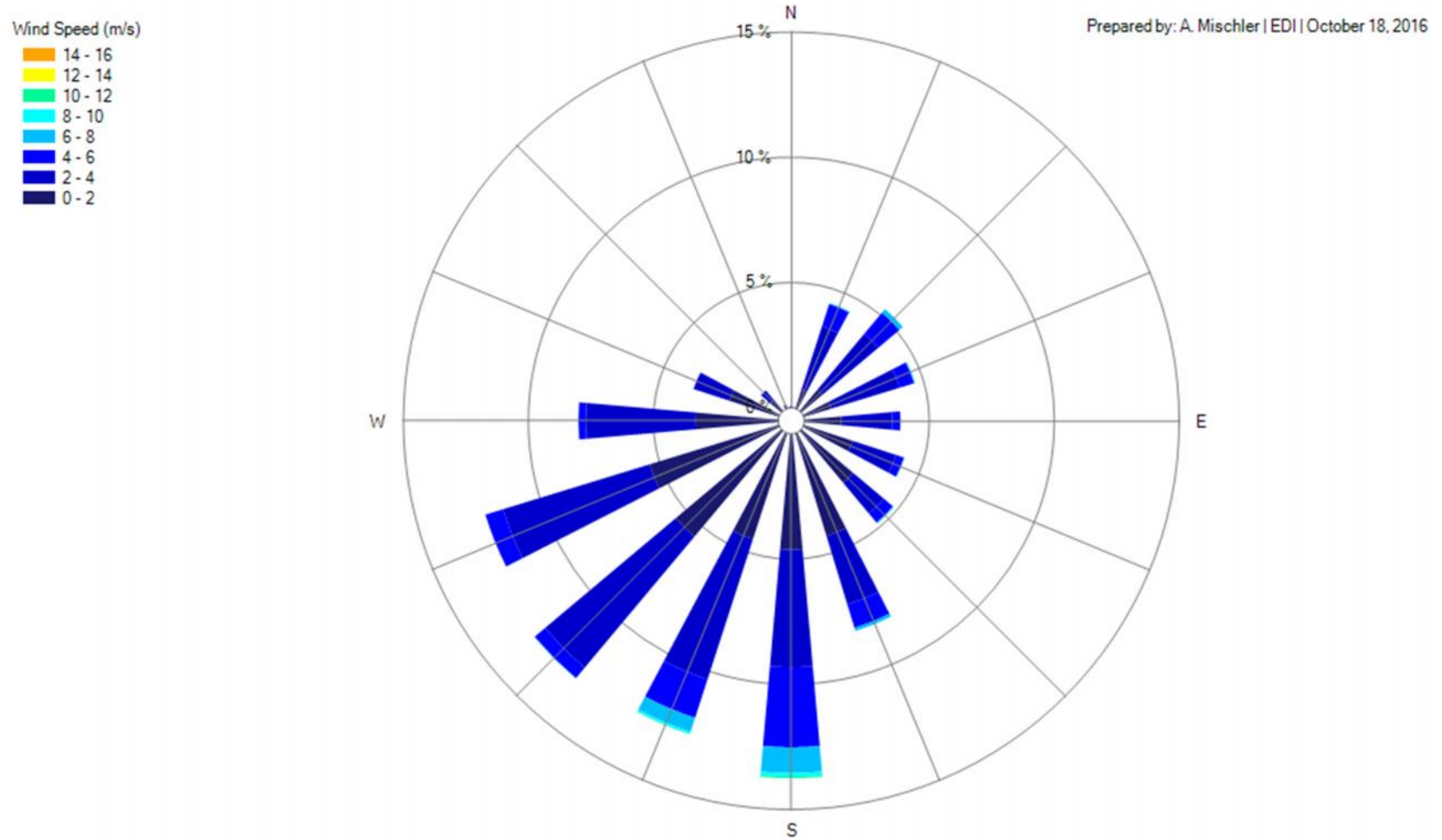


Figure 3. 4 Mount Nansen mean hourly wind speed (m/s) and direction (wind rose diagram), April 1 to October 15, 2016.

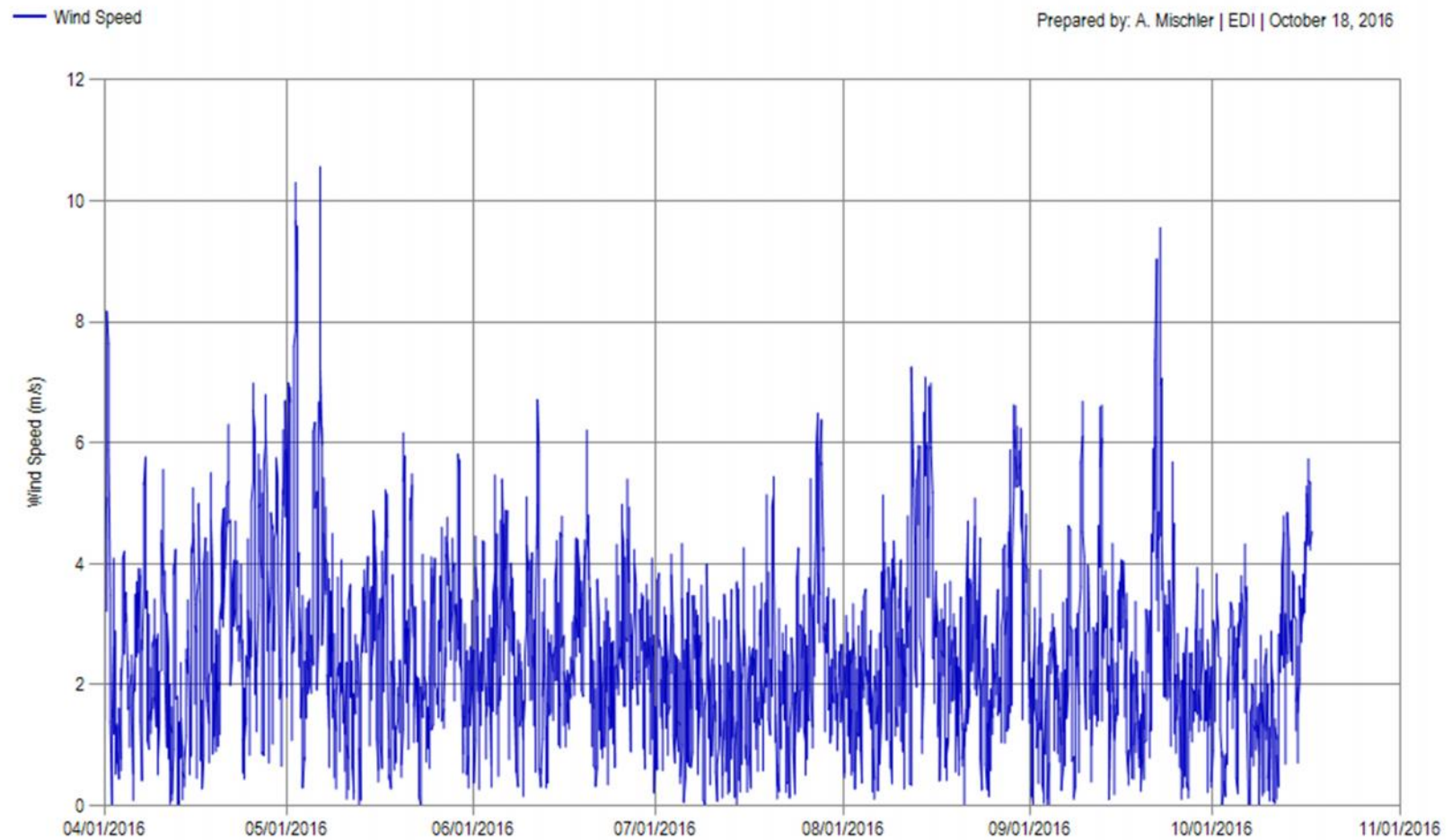


Figure 3. 5 Mount Nansen mean hourly wind speed, April 1 to October 15, 2016.

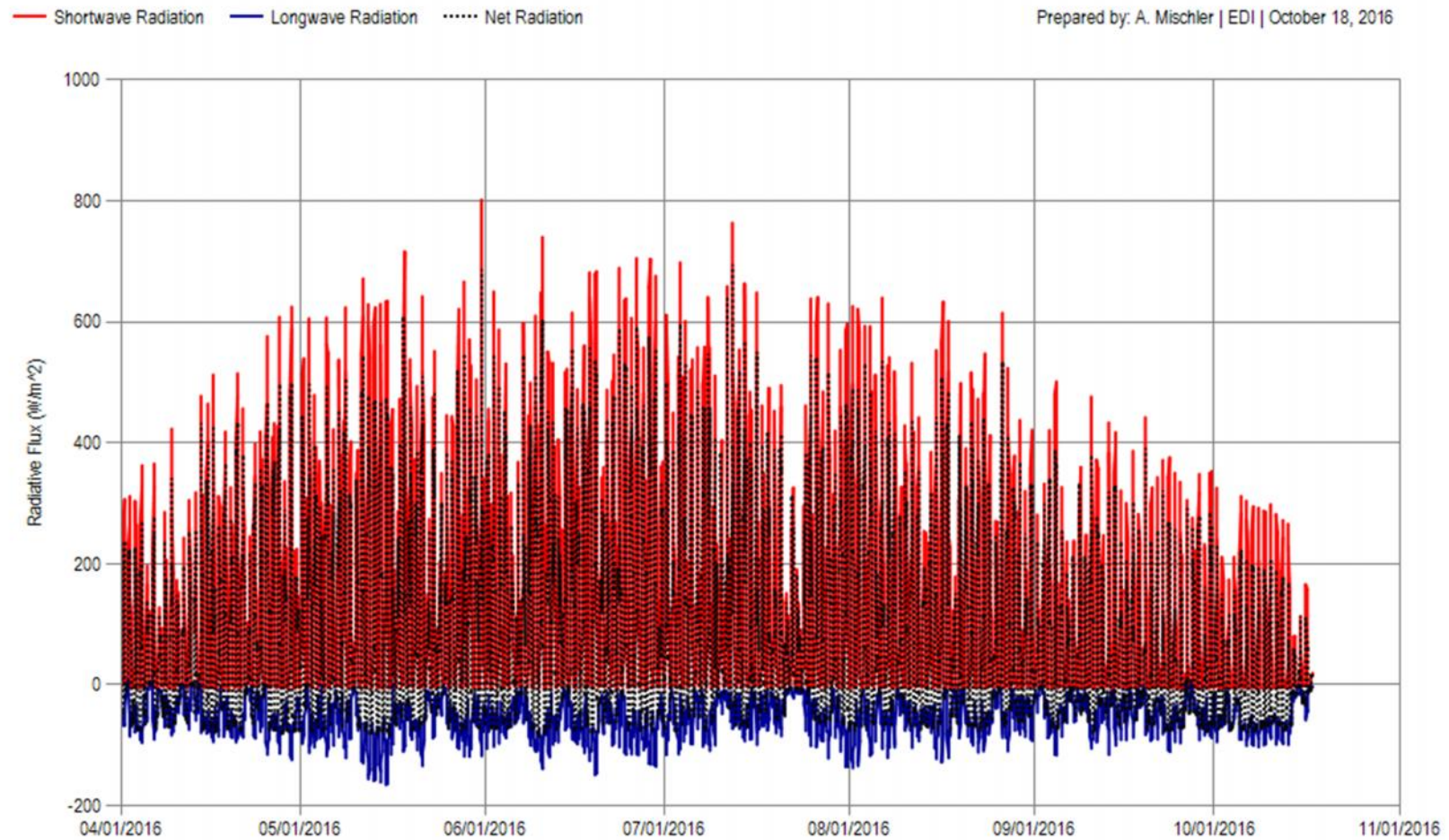


Figure 3. 6 Mount Nansen mean hourly net shortwave, longwave and total radiation, April 1 to October 15, 2016.

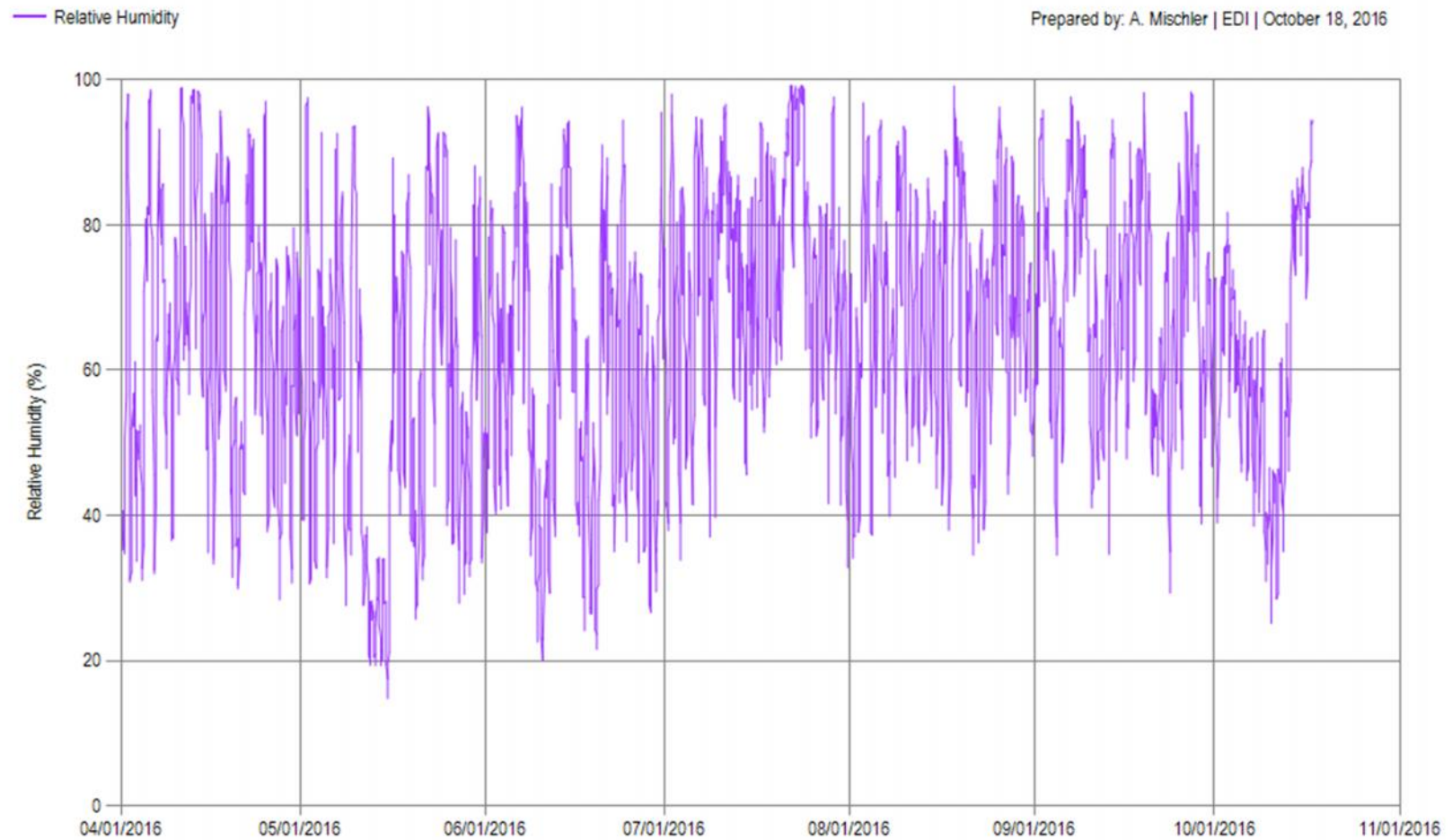


Figure 3. 7 Mount Nansen mean hourly relative humidity, April 1 to October 15, 2016.



**Table 3.1** Mount Nansen precipitation events for the open-water season, April 1 to October 15, 2016.

Start Date and Time	Duration (hours)	Precipitation Type	Total Accumulation (mm)
April 05, 14:00	6	Snow	2
April 11, 11:00	5	Snow	7.1
April 13, 09:00	2	Snow	3.5
May 02, 02:00	7	Rain	2.3
May 09, 17:00	12	Rain	6.2
May 16, 12:00	4	Rain	22.8
May 22, 09:00	6	Rain	6.3
May 25, 03:00	10	Rain	4.7
June 01, 16:00	1	Rain	3.2
June 06, 07:00	5	Rain	4.2
June 06, 16:00	2	Rain	4.2
June 06, 22:00	5	Rain	2.3
June 14, 05:00	3	Rain	3.5
June 14, 18:00	6	Rain	5.5
June 17, 19:00	2	Rain	3.6
June 21, 07:00	5	Rain	1.5
June 23, 21:00	5	Rain	3.2
June 30, 09:00	5	Rain	4.3
July 02, 04:00	5	Rain	3.7
July 03, 18:00	4	Rain	7.9
July 06, 03:00	4	Rain	1.9
July 06, 10:00	2	Rain	3.3
July 09, 19:00	5	Rain	5.2
July 10, 10:00	3	Rain	3.7
July 10, 14:00	4	Rain	13.6
July 10, 22:00	4	Rain	3.7
July 11, 12:00	2	Rain	4.8



Start Date and Time	Duration (hours)	Precipitation Type	Total Accumulation (mm)
July 11, 20:00	2	Rain	2.2
July 13, 12:00	2	Rain	9.7
July 15, 12:00	2	Rain	8.2
July 21, 07:00	6	Rain	1.6
July 21, 19:00	10	Rain	5.6
July 22, 14:00	2	Rain	2.5
July 22, 17:00	9	Rain	7.9
July 23, 11:00	11	Rain	10.6
July 29, 05:00	3	Rain	4.3
August 03, 05:00	3	Rain	3
August 08, 19:00	2	Rain	2.3
August 16, 16:00	1	Rain	2.2
August 18, 09:00	6	Rain	6.6
August 19, 14:00	3	Rain	4
August 19, 19:00	2	Rain	3.3
August 25, 18:00	17	Rain	11.3
September 01, 18:00	15	Rain	6.9
September 06, 22:00	3	Rain	4.7
September 13, 14:00	6	Rain	3.5
September 16, 20:00	3	Rain	4.4
September 18, 15:00	1	Rain	2.3

Note: Rain precipitation events are periods of rainfall greater than or equal to 4 hours, and/or have greater than or equal to 2.0 mm; snow precipitation events are periods of snowfall greater than or equal to 4 hours and/or greater than or equal to 1 cm (10.0 mm).

**ATTACHMENT 4:**                      **HYDROLOGY  
SUMMARY DATA  
TABLES**



Measurement ID	Hydrometric Identifier (HID)	Measurement Date	Measurement Time	Discharge Measurement Method	Discharge (m <sup>3</sup> /s)	Discharge Data Flag	Surveyed Water Elevation (m)	Survey Data Flag	Comments
1508	ATM-VC5	04/10/2016	-	-	-	-	-	-	Barologger downloaded successfully and functioning properly.
1509	H-BC	04/10/2016	18:56	SS	0.034	B	1.796	S	Logger downloaded and functioning properly. Logger winterized in preparation for winter. Discontinuous ice up to 0.03 m thick in throughout channel with thicker ice along banks. Water flowing above and below ice surface. Ice removed from channel prior to completing salt tracer discharge measurement.
1506	H-DC-B	04/10/2016	13:15	SS	0.005	B	1.942	S	Logger downloaded and functioning properly. Logger winterized in preparation for winter. Sediment cleared from inside stilling well. No staff gauge reading due to ice accumulation within channel.
1497	H-DC-D1b	03/10/2016	19:35	V	0.006	-	-	-	Volumetric discharge completed. Water goes to ground approximately 1 m downstream of small waterfall. Discontinuous ice formations within channel and along banks.
1498	H-DC-DX+105	03/10/2016	18:42	V	0.003	-	-	-	Volumetric discharge measurement completed upstream of metal trough. Minor ice formations within channel upstream of measurement site.
1502	H-DC-M WP	04/10/2016	11:10	V	0.008	-	-	-	Volumetric at 11:10. Ice forming on banks in weir pond. Channel remains open. Flow rate low to moderate.
1499	H-DC-R	03/10/2016	17:16	SS	0.016	B	0.493	S	Logger downloaded and functioning properly. Logger winterized in preparation for winter. Thin ice (up to 0.01 m thick) present along banks and across channel in vicinity of stilling well.
1507	H-PC-DSP	04/10/2016	9:57	V	0.002	-	-	-	Volumetric discharge measurement completed at culvert outlet. Placer mining activities have stopped upstream of site.
1503	H-SEEP	04/10/2016	11:50	V	0.003	-	-	-	Volumetric discharge measurement collected at pipe outlet. Flow rate at pump meter at 11:45 177.181 L/min (0.003 m <sup>3</sup> /s). Seepage pond surface covered with layer of ice.
1501	H-TP	04/10/2016	-	-	-	B	-	-	Low water level in pond with ice up to 0.02 m thick on surface. No staff gauge reading collected due to ice layer at lower staff gauge.
1504	H-VC-DBC	04/10/2016	15:37	ADV-MID	0.547	-	1.852	-	Logger downloaded and functioning properly. Logger winterized in preparation for winter. Minor ice formation along banks above water surface. Minor ice inside stilling well was removed.
1496	H-VC-R+290	03/10/2016	13:01	ADV-MID	0.484	-	2.435	-	Logger downloaded and functioning properly. Logger winterized in preparation for winter. Minor amount of sediment accumulated inside stilling well. Minor ice accumulating on banks above water surface.
1505	H-VC-U	04/10/2016	17:14	ADV-MID	0.447	-	2.093	-	Logger downloaded and functioning properly. Logger winterized in preparation for winter. Channel remains fully open.
1500	H-VC-UMN	03/10/2016	15:06	ADV-MID	0.416	-	1.653	-	Logger downloaded and functioning properly. Logger winterized in preparation for winter. Channel remains fully open. Minor ice along banks 50 m upstream of discharge measurement site.

Discharge Measurement Method Legend

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

Hydrometric Stations

Hydrometric ID	Hydrometric Stations
ATM-VC5	Atmospheric Barologger (5) at Victoria Creek
H-BC	Back Creek
H-DC-B	Diversion Channel at Bridge
H-DC-D1B	Dome Creek at D1b
H-DC-DX	Dome Creek at DX
H-DC-DX+105	Dome Creek at DX+105
H-DC-M-WP	Middle Dome Creek at Weir Pond
H-DC-R	Dome Creek at Road
H-PC-DSP	Pony Creek Downstream of Pit
H-SEEP	Seepage Pond Outflow
H-TP	Tailings Pond
H-VC-DBC	Victoria Creek Downstream of Back Creek
H-VC-R	Victoria Creek at Road
H-VC-R+290	Victoria Creek at Road + 290
H-VC-U	Upper Victoria Creek
H-VC-UMN	Victoria Creek Upstream of Minnesota Creek

Discharge Data Flag Legend

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

Survey Data Flag Legend

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



**ATTACHMENT 5:                      RATING CURVES AND HYDROGRAPHS –  
OPEN-WATER SEASON**

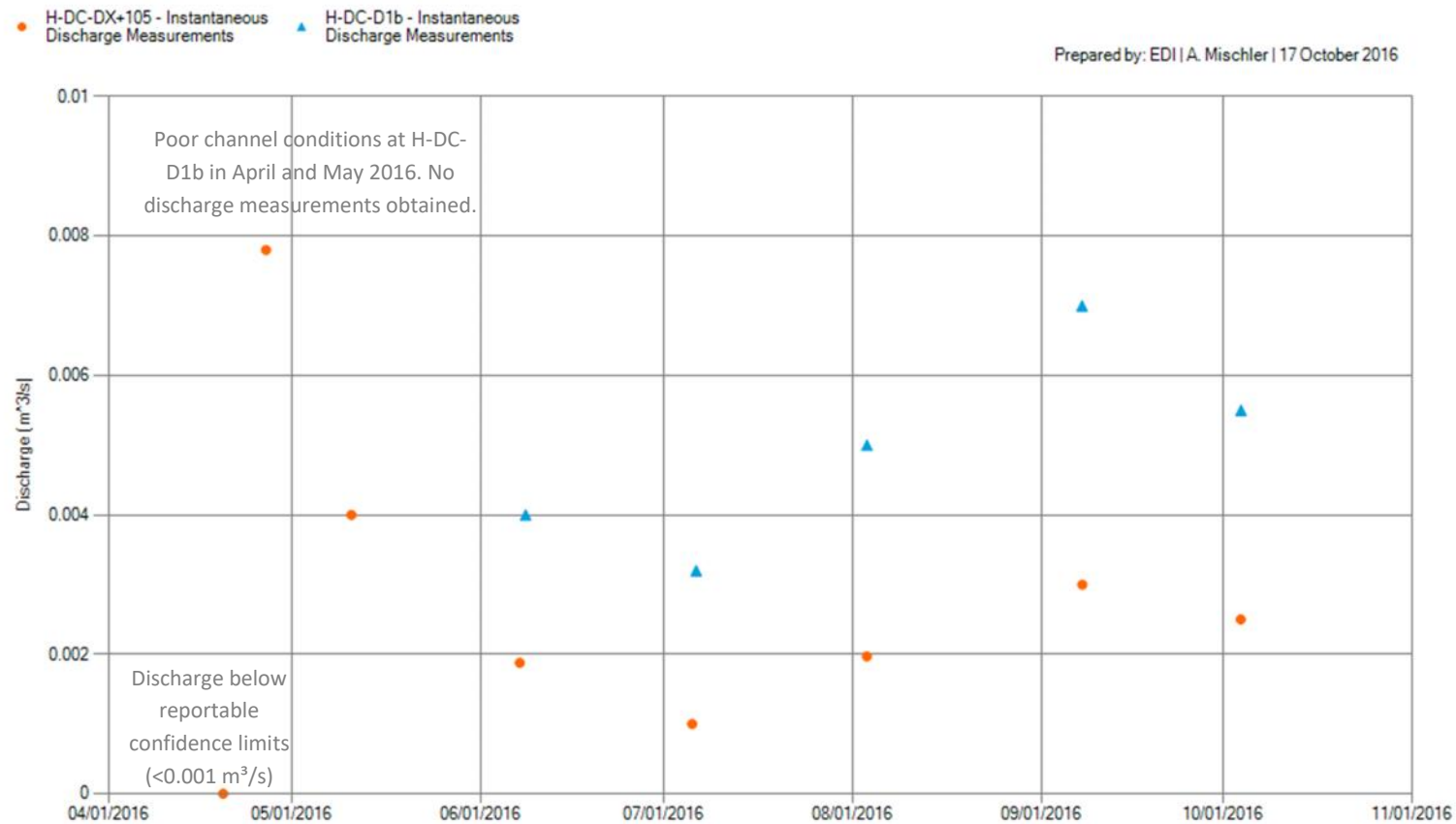


Figure 5.1 Hydrographs for upper Dome Creek hydrometric stations, H-DC-DX+105 and H-DC-D1b, April 1 to October 15, 2016 (no continuous data loggers or rating curves).



Table 5.1 Rating curve equation for the Diversion Channel at the Bridge (H-DC-B).

Stage (m)	Discharge (m <sup>3</sup> /s)	Offset (m)	Slope	Equation
1.820	0.00015	1.722	-----	-----
2.170	0.3	1.722	5.001	$X = 16.637 * (Y - 1.722)^{5.001}$

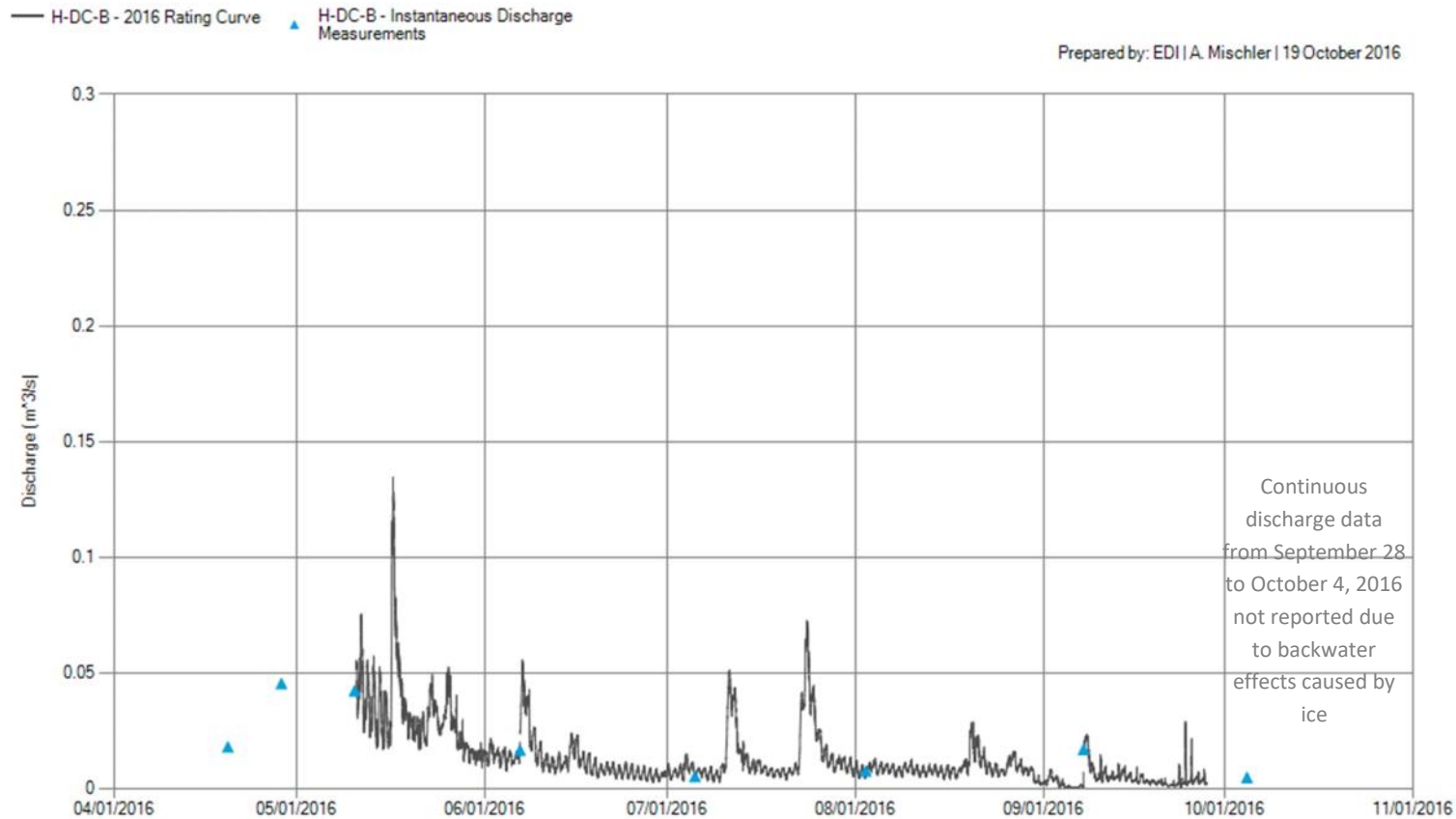


Figure 5.2 Hydrograph for the Diversion Channel at the Bridge (H-DC-B), April 1 to October 15, 2016. Rating curve equation developed using 2015 and 2016 rating measurements.

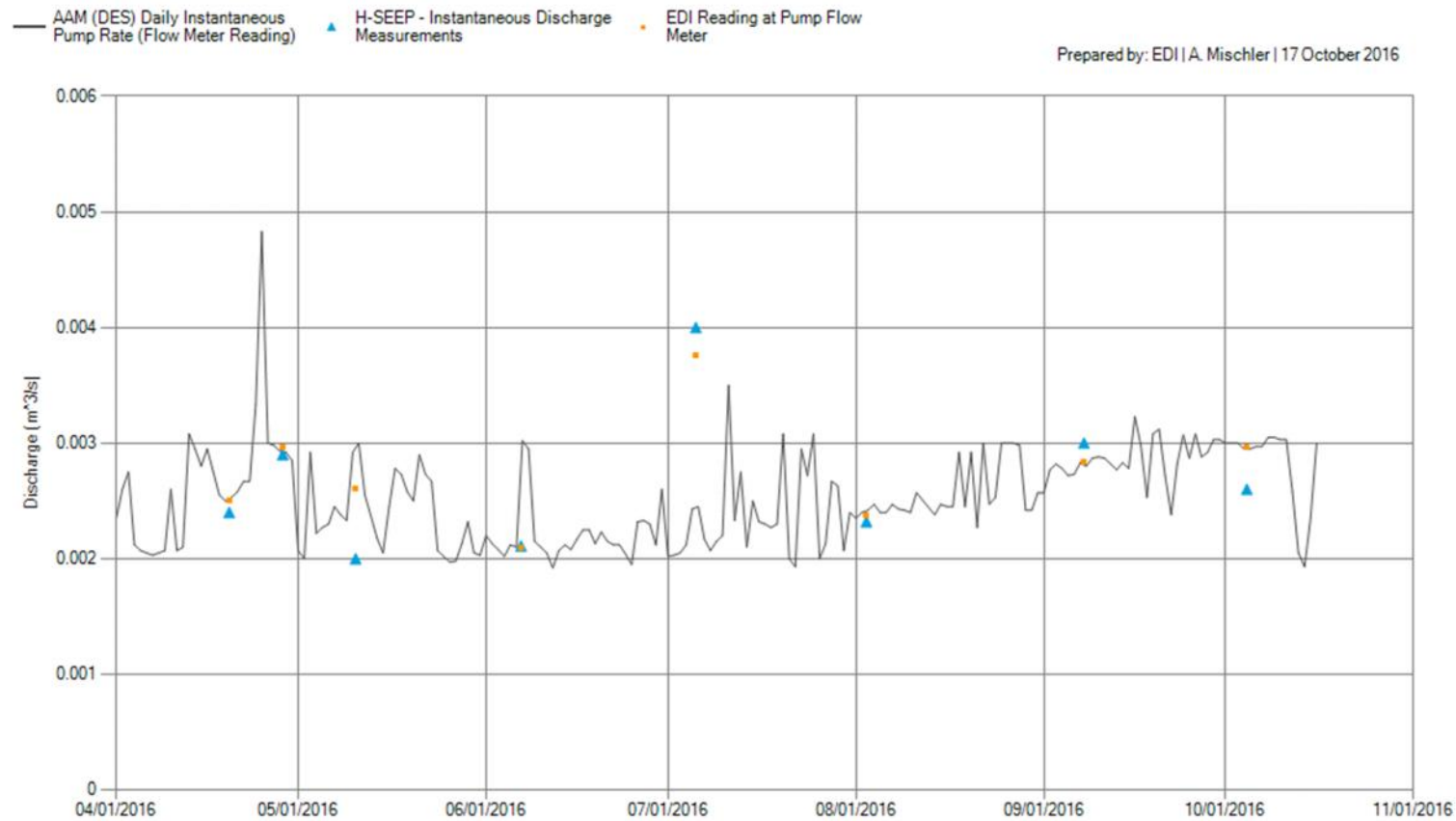


Figure 5.3 Hydrograph for the Seepage Pond Outlet (H-SEEP), April 1 to October 15, 2016.

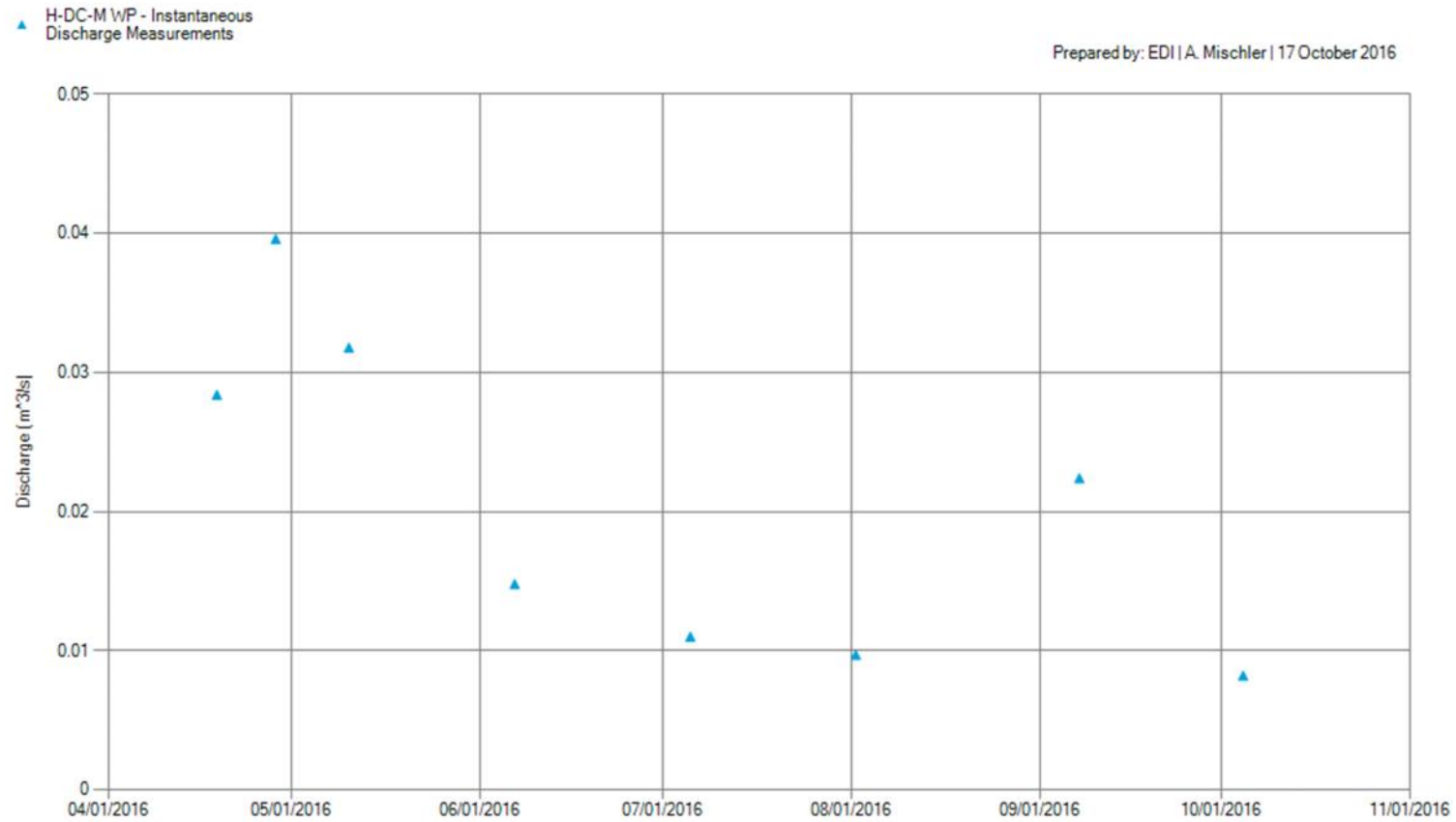


Figure 5. 4 Hydrograph for the Middle Dome Creek at the Weir Pond, H-DC-M WP, April 1 to October 15, 2016 (no continuous data loggers or rating curves).



Table 5.2 Rating curve equation for the Dome Creek at the Road (H-DC-R).

Stage (m)	Discharge (m <sup>3</sup> /s)	Offset (m)	Slope	Equation
0.230	0.0001	0.198	-----	-----
0.900	0.09	0.198	2.203	$X = 0.196 * (Y-0.198)^{2.203}$

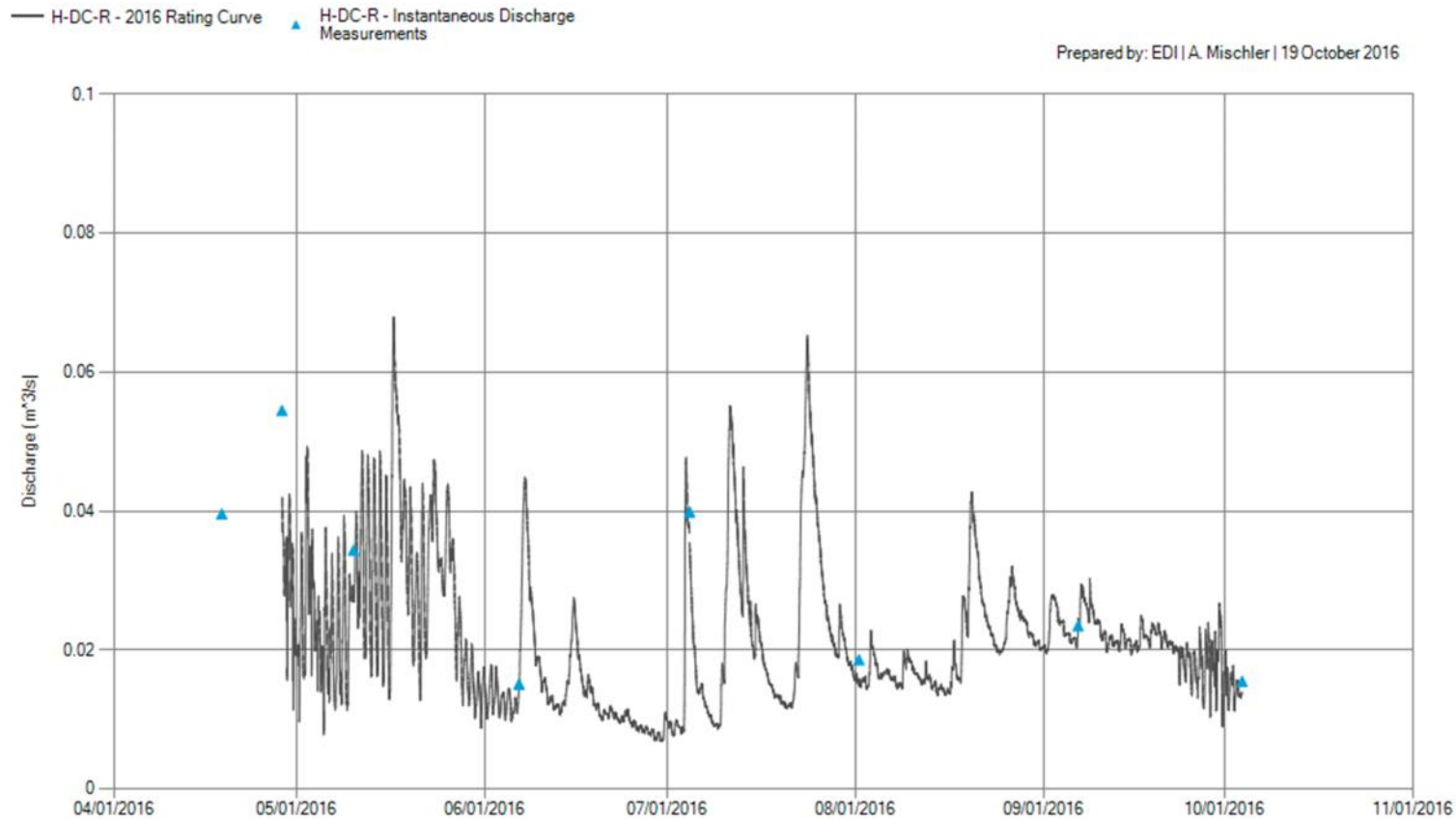


Figure 5.5 Hydrograph for the Dome Creek at the Road (H-DC-R), April 1 to October 15, 2016. Rating curve equation developed using 2015 and 2016 rating measurements.



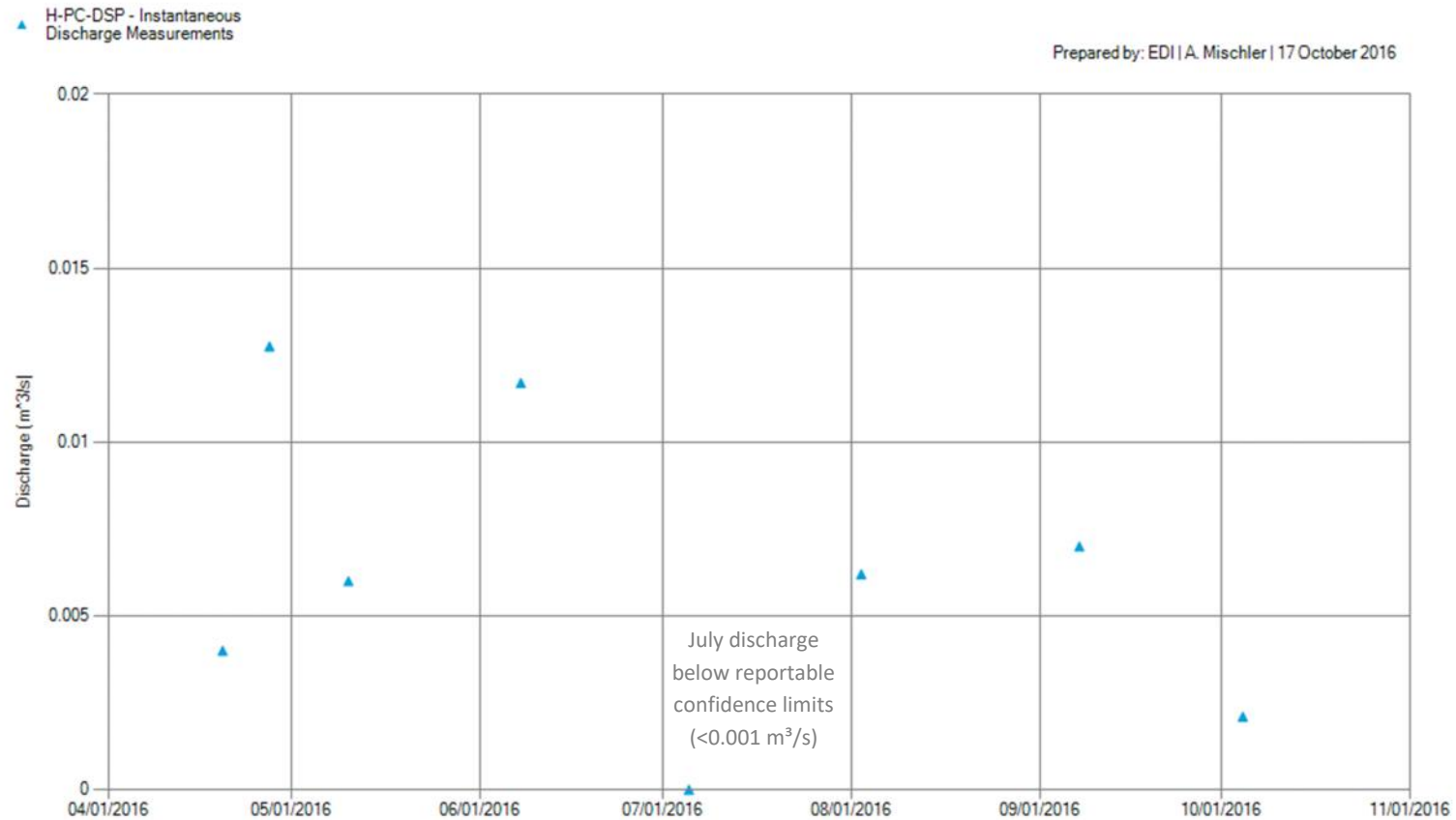


Figure 5. 6 Hydrograph for the Pony Creek Downstream of the Pit, H-PC-DSP, April 1 to October 15, 2016 (no continuous data loggers or rating curves).



Table 5.3 Rating curve equation for the Back Creek at the Road (H-BC).

Stage (m)	Discharge (m <sup>3</sup> /s)	Offset (m)	Slope	Equation
1.650	0.0001	1.649	-----	-----
2.150	0.3	1.649	1.288	$X = 0.731 * (Y - 1.649)^{1.288}$

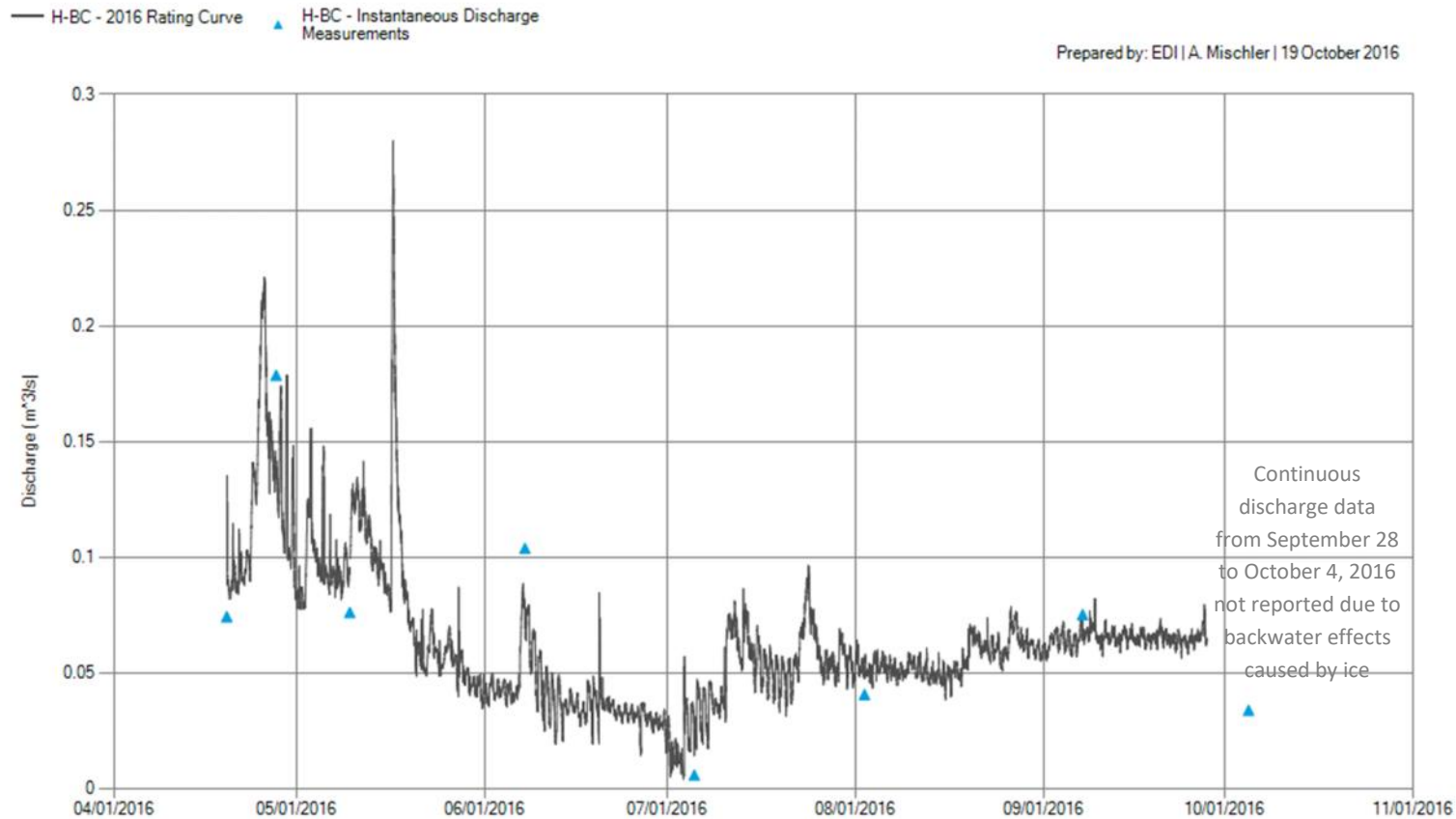


Figure 5.7 Hydrograph for Back Creek (H-BC), April 1 to October 15, 2016. Rating curve equation developed using 2015 and 2016 rating measurements.



Table 5.4 Rating curve equation for the Upper Victoria Creek at the Road (H-VC-U).

Stage (m)	Discharge (m <sup>3</sup> /s)	Offset (m)	Slope	Equation
1.890	0.008	1.81	-----	-----
2.466	4.4	1.81	2.999	$X = 15.580 * (Y - 1.81)^{2.999}$

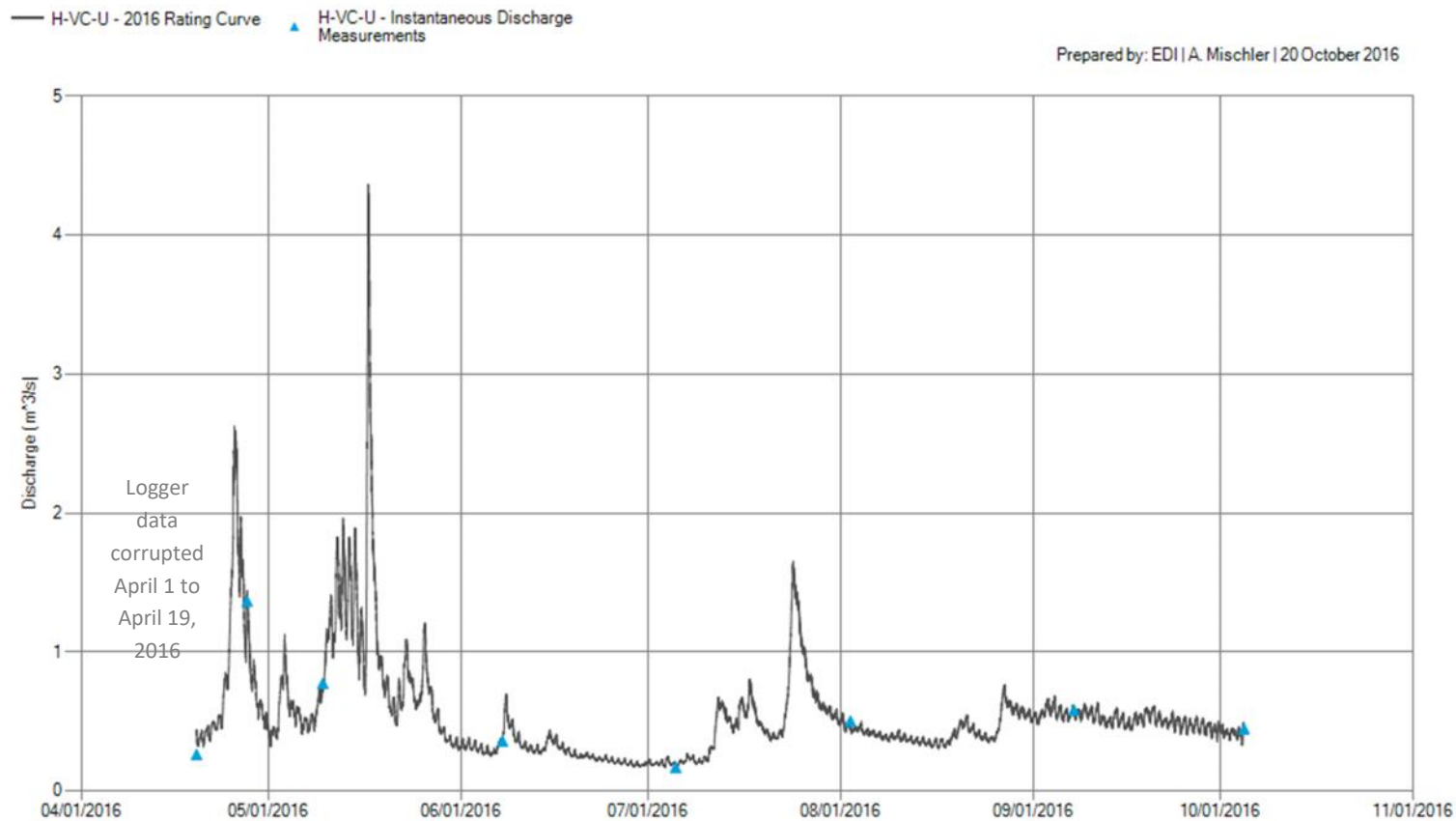


Figure 5.8 Hydrograph for Upper Victoria Creek (H-VC-U), April 1 to October 15, 2016. Rating curve equation developed using 2014, 2015 and 2016 rating measurements.



Table 5.5 Rating curve equation for the Victoria Creek downstream of Back Creek (H-VC-DBC).

Stage (m)	Discharge (m <sup>3</sup> /s)	Offset (m)	Slope	Equation
1.640	0.02	1.55	-----	-----
2.130	3.02	1.55	2.693	$X = 13.095 * (Y-1.55)^{2.693}$
2.300	4.50	1.55	1.552	$X = 7.033 * (Y-1.55)^{1.552}$

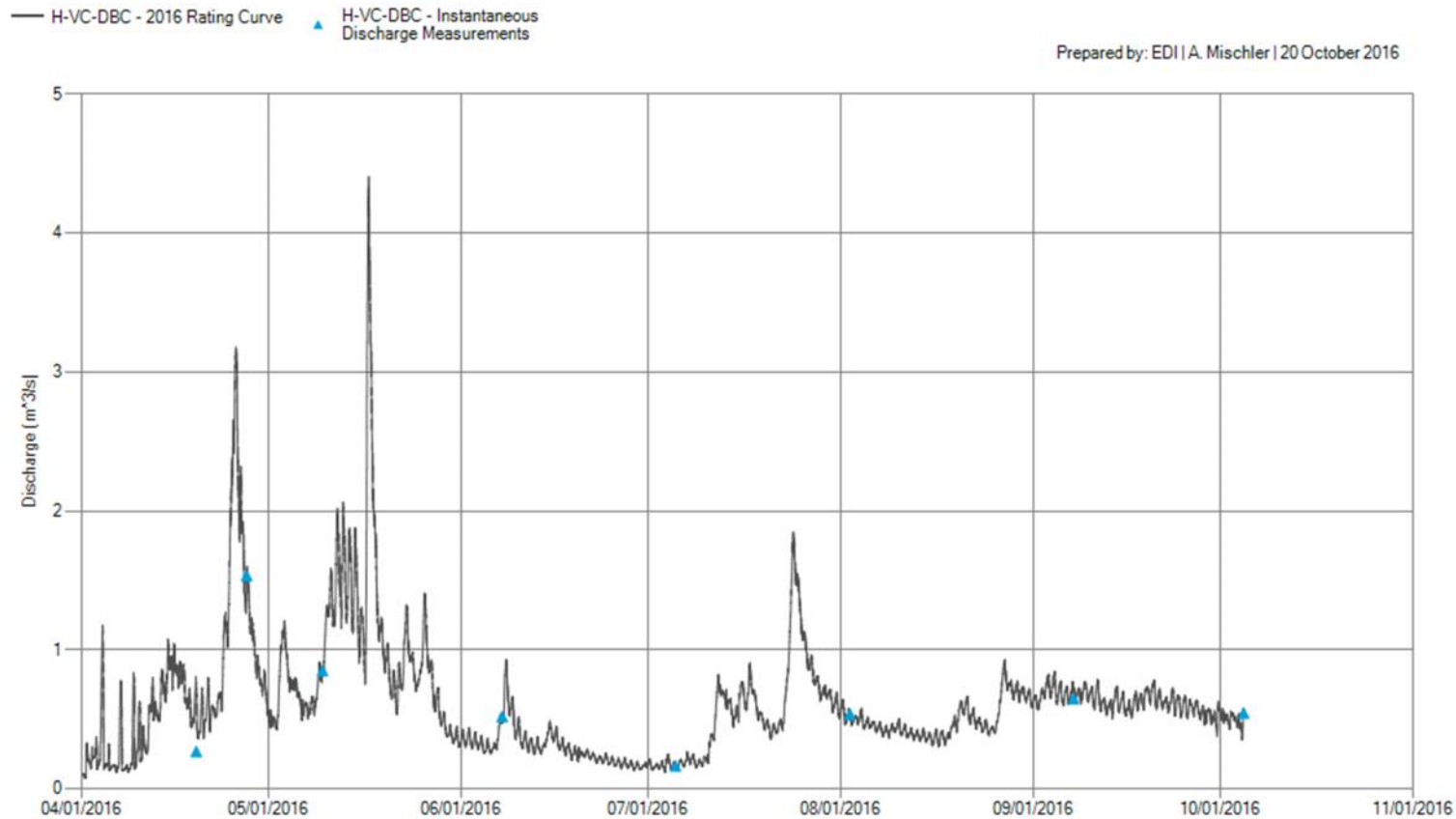


Figure 5.9 Hydrograph for Victoria Creek downstream of Back Creek (H-VC-DBC), April 1 to October 15, 2016. Rating curve equation developed using 2015 and 2016 rating measurements.



Table 5.6 Rating curve equation for the Victoria Creek upstream of Minnesota Creek (H-VC-UMN).

Stage (m)	Discharge (m <sup>3</sup> /s)	Offset (m)	Slope	Equation
1.450	0.025	0.999	-----	-----
1.730	0.24	0.999	8.100	$X = 12.655 * (Y-0.999)^{8.100}$
1.850	1.00	0.999	4.723	$X = 4.392 * (Y-0.999)^{4.723}$
2.100	6.00	0.999	3.053	$X = 3.355 * (Y-0.999)^{3.053}$

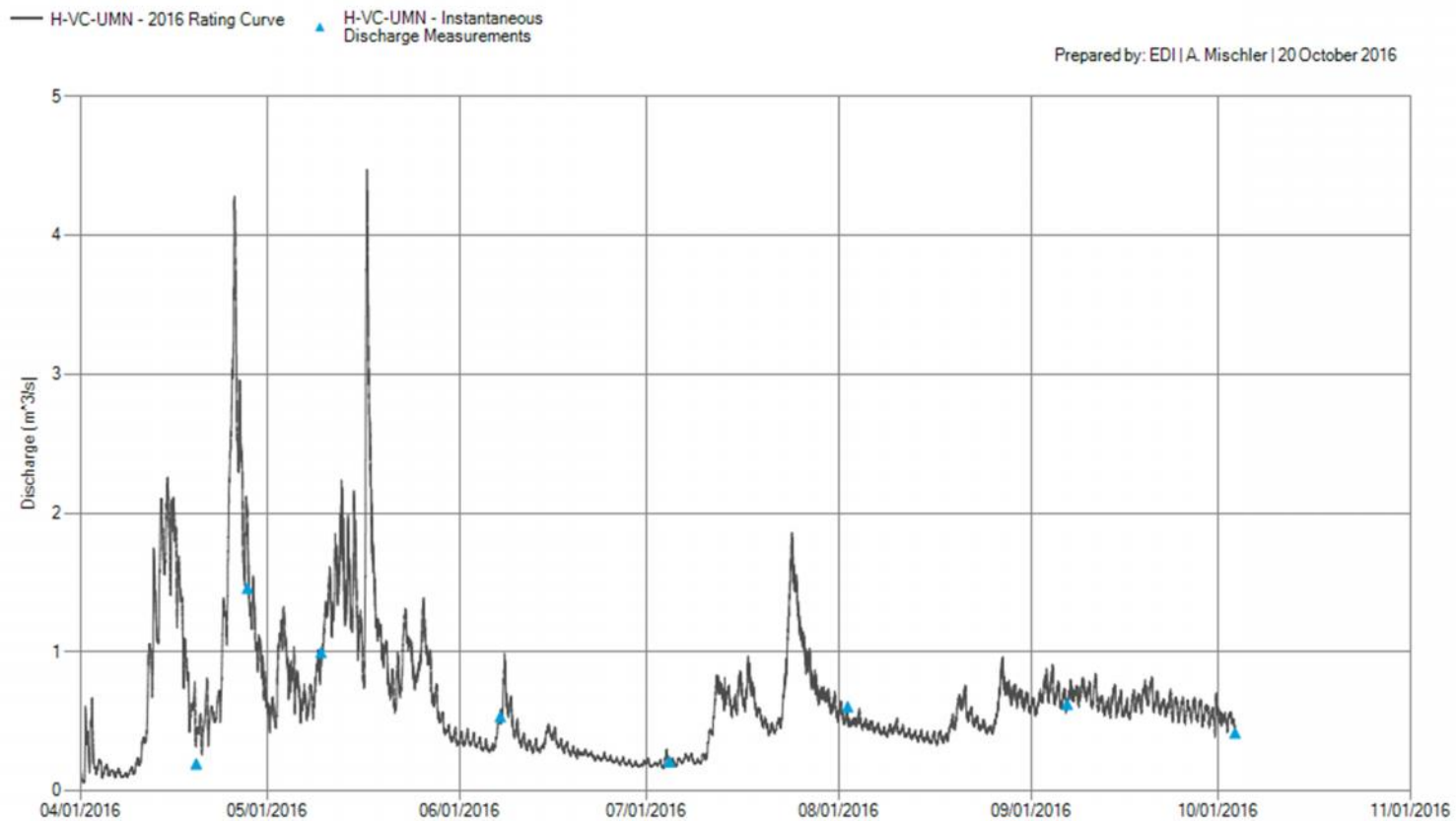


Figure 5.10 Hydrograph for the Victoria Creek upstream of Minnesota Creek (H-VC-UMN), April 1 to October 15, 2016. Rating curve equation developed using 2015 and 2016 rating measurements.



Table 5.7 Rating curve equation for the Victoria Creek at the Road + 290 m Downstream (H-VC-R+290).

Stage (m)	Discharge (m <sup>3</sup> /s)	Offset (m)	Slope	Equation
2.270	0.025	2.17	-----	-----
2.570	1.76	2.17	3.306	$X = 36.400 * (Y-2.17)^{3.306}$
2.800	4.5	2.17	2.067	$X = 11.694 * (Y-2.17)^{2.067}$

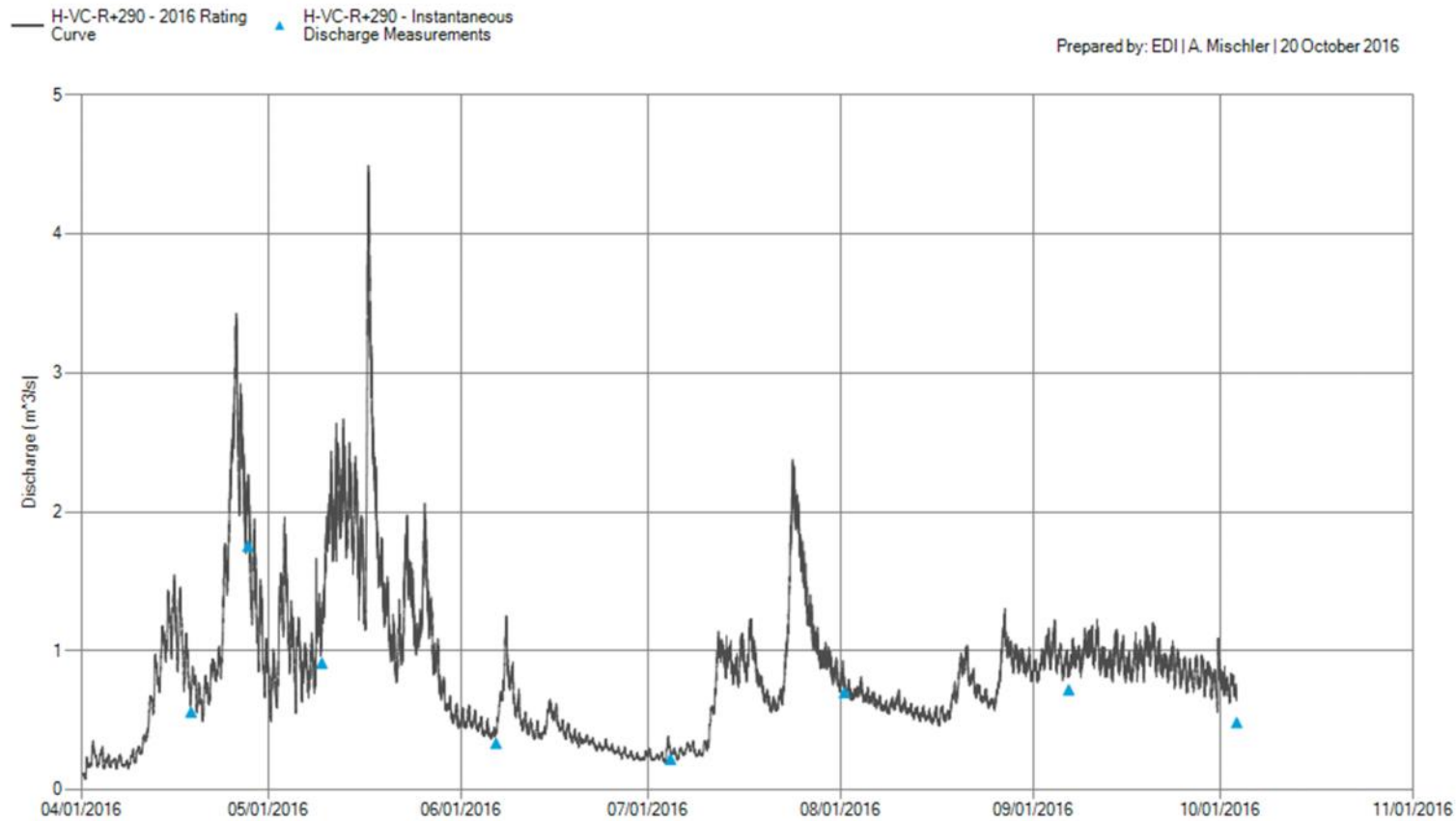


Figure 5.11 Hydrograph for Victoria Creek at the Road + 290 m Downstream (H-VC-R+290), April 1 to October 15, 2016. Rating curve equation developed using 2015 and 2016 rating measurements.

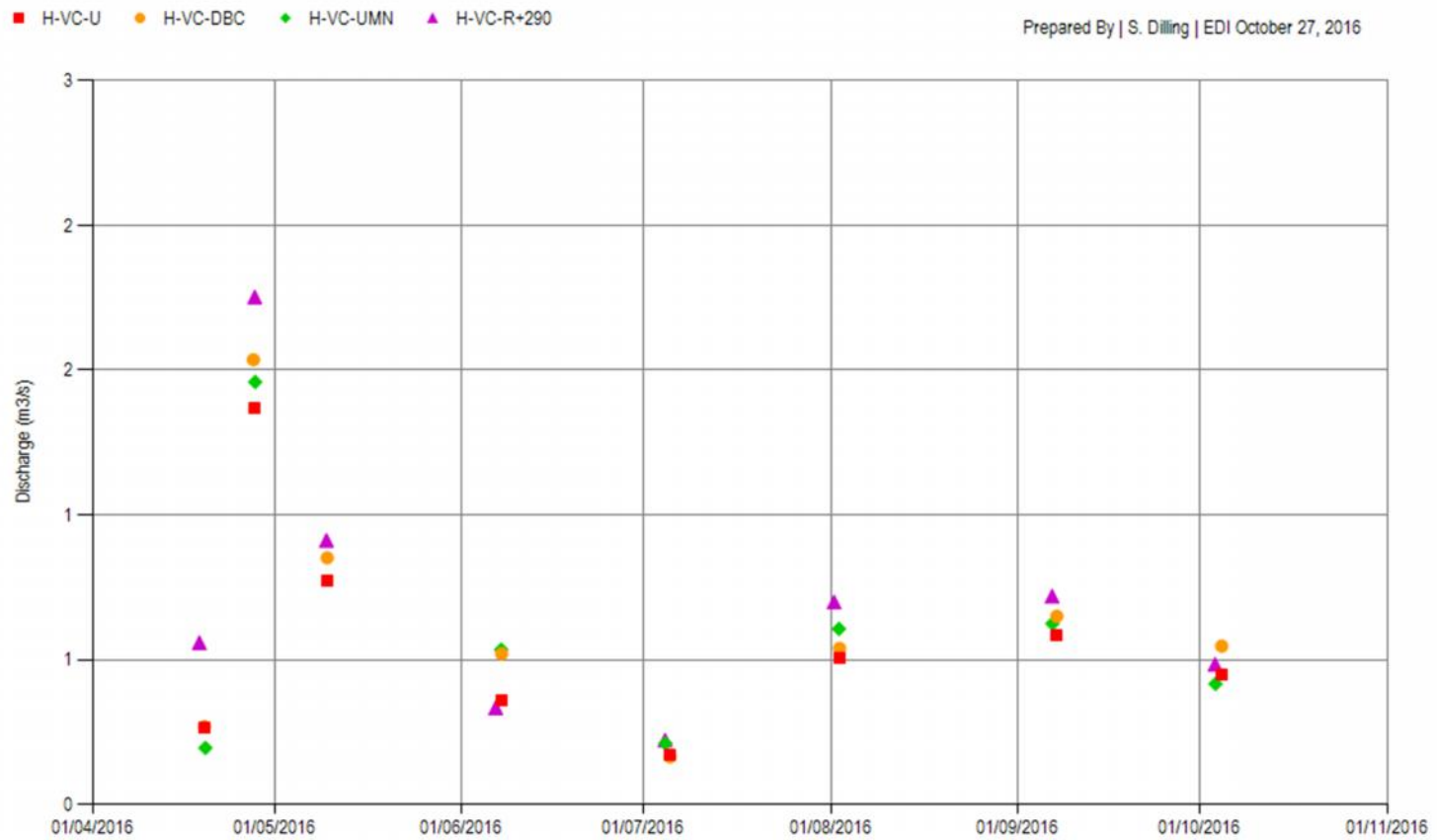


Figure 5. 12 Instantaneous Discharge Measurements along Victoria Creek, April 1 to October 15, 2016



Table 5. 8 Mount Nansen Hydrometric Network Rating Measurements for the period April 1 to October 15, 2015.

HID	Date	Time	Measurement	Discharge	Discharge Data Flag	Accuracy	Water Surface Elevation	Survey Data Flag	Staff Gauge
	(MM/DD/YY YY)	(HH:MM)	Type	(m <sup>3</sup> /s)		(%)	(m, L.D.)		(m)
ATM-VC5	04/19/2016	10:00	N	-	-	-	-	-	-
ATM-VC5	04/27/2016	15:45	N	-	-	-	-	-	-
ATM-VC5	05/09/2016	17:50	N	-	-	-	-	-	-
ATM-VC5	06/07/2016	13:35	N	-	-	-	-	-	-
ATM-VC5	08/02/2016	12:20	N	-	-	-	-	-	-
ATM-VC5	09/07/2016	09:45	N	-	-	-	-	-	-
ATM-VC5	10/04/2016	18:13	N	-	-	-	-	-	-
H-PC-DSP	04/19/2016	16:40	V	0.004	-	-	-	-	-
H-PC-DSP	04/27/2016	09:30	V	0.013	E	-	-	-	-
H-PC-DSP	05/10/2016	09:00	V	0.006	E	-	-	-	-
H-PC-DSP	06/07/2016	16:57	SS	0.012	-	-	-	-	-
H-PC-DSP	07/05/2016	08:30	V	0.000	-	-	-	-	-
H-PC-DSP	08/02/2016	16:18	SS	0.006	-	-	-	-	-
H-PC-DSP	09/07/2016	12:43	V	0.007	-	-	-	-	-
H-PC-DSP	10/04/2016	09:57	V	0.002	-	-	-	-	-
H-DC-DX+105	04/19/2016	17:40	V	0.000	-	-	-	-	-
H-DC-DX+105	04/26/2016	18:25	V	0.008	-	-	-	-	-
H-DC-DX+105	05/10/2016	18:50	V	0.004	-	-	-	-	-
H-DC-DX+105	06/07/2016	10:20	V	0.002	-	-	-	-	-
H-DC-DX+105	07/05/2016	17:20	V	0.001	-	-	-	-	-
H-DC-DX+105	08/03/2016	09:30	V	0.002	-	-	-	-	-
H-DC-DX+105	09/07/2016	18:12	V	0.003	-	-	-	-	-
H-DC-DX+105	10/03/2016	18:42	V	0.003	-	-	-	-	-
H-DC-D1b	04/19/2016	09:10	N	-	X	-	-	-	-
H-DC-D1b	04/28/2016	16:00	N	-	X	-	-	-	-





HID	Date	Time	Measurement	Discharge	Discharge Data Flag	Accuracy	Water Surface Elevation	Survey Data Flag	Staff Gauge
	(MM/DD/YY YY)	(HH:MM)	Type	(m <sup>3</sup> /s)		(%)	(m, L.D.)		(m)
H-DC-D1b	05/10/2016	17:10	N	-	X	-	-	-	-
H-DC-D1b	06/08/2016	09:17	SS	0.004	-	-	-	-	-
H-DC-D1b	07/06/2016	09:20	SS	0.003	-	-	-	-	-
H-DC-D1b	08/03/2016	10:24	SS	0.005	-	-	-	-	-
H-DC-D1b	09/07/2016	17:25	V	0.007	-	-	-	-	-
H-DC-D1b	10/03/2016	19:35	V	0.006	-	-	-	-	-
H-DC-D1b	10/03/2016	19:35	V	0.006	-	-	-	-	-
H-DC-D1b	10/03/2016	19:35	V	0.006	-	-	-	-	-
H-DC-B	19/04/2016	16:20	SS	0.0181	B	-	-	-	-
H-DC-B	28/04/2016	12:30	SS	0.0455	B	-	-	-	-
H-DC-B	05/10/2016	13:22	SS	0.042	-	-	2.061	-	0.259
H-DC-B	06/06/2016	19:18	SS	0.017	-	-	1.974	-	0.230
H-DC-B	07/05/2016	15:10	SS	0.005	-	-	1.926	-	0.201
H-DC-B	08/02/2016	18:42	SS	0.008	-	-	1.926	-	0.204
H-DC-B	09/07/2016	15:25	SS	0.017	-	-	1.956	-	0.229
H-DC-B	10/04/2016	13:15	SS	0.005	-	-	1.942	S	0.210
H-DC-M WP	04/18/2016	18:15	SS	0.028	B	-	-	-	-
H-DC-M WP	04/28/2016	09:55	SS	0.040	E	-	-	-	-
H-DC-M WP	05/10/2016	10:52	SS	0.032	E	-	-	-	-
H-DC-M WP	06/06/2016	17:26	SS	0.015	-	-	-	-	-
H-DC-M WP	07/05/2016	14:00	V	0.011	-	-	-	-	-
H-DC-M WP	08/01/2016	18:45	SS	0.010	-	-	-	-	-
H-DC-M WP	09/07/2016	13:08	SS	0.022	E	-	-	-	-
H-DC-M WP	10/04/2016	11:10	V	0.008	-	-	-	-	-
H-DC-R	04/28/2016	14:10	SS	0.055	-	-	0.709	-	0.488
H-DC-R	05/10/2016	09:42	SS	0.034	-	-	0.632	-	0.408



HID	Date	Time	Measurement	Discharge	Discharge Data Flag	Accuracy	Water Surface Elevation	Survey Data Flag	Staff Gauge
	(MM/DD/YY YY)	(HH:MM)	Type	(m <sup>3</sup> /s)		(%)	(m, L.D.)		(m)
H-DC-R	06/06/2016	15:13	SS	0.015	-	-	0.507	O	0.308
H-DC-R	07/04/2016	17:20	SS	0.040	-	-	0.648	-	0.451
H-DC-R	08/01/2016	15:32	SS	0.019	-	-	0.490	-	0.308
H-DC-R	09/06/2016	17:23	SS	0.024	-	-	0.573	-	0.372
H-DC-R	10/03/2016	17:16	SS	0.016	B	-	0.493	S	0.316
H-BC	04/19/2016	11:50	ADV-MID	0.074	-	5.3	1.735	-	0.264
H-BC	04/27/2016	15:10	ADV-MID	0.179	-	2.4	1.938	-	0.288
H-BC	05/09/2016	18:26	ADV-MID	0.076	-	7.1	1.888	-	0.203
H-BC	06/07/2016	15:04	ADV-MID	0.104	-	3.5	1.817	-	0.178
H-BC	07/05/2016	12:15	SS	0.006	-	-	1.704	-	0.069
H-BC	08/02/2016	13:08	SS	0.041	-	-	1.766	-	-
H-BC	09/07/2016	11:15	SS	0.075	-	-	1.795	-	0.149
H-BC	10/04/2016	18:56	SS	0.034	B	-	1.800	S	0.160
H-VC-U	04/19/2016	10:30	ADV-MID	0.263	-	2.8	2.083	-	0.266
H-VC-U	04/27/2016	13:35	ADV-MID	1.367	-	1.9	2.239	-	0.417
H-VC-U	05/09/2016	17:37	ADV-MID	0.775	-	1.6	2.164	-	0.349
H-VC-U	06/07/2016	14:08	ADV-MID	0.359	-	2.7	2.088	-	0.262
H-VC-U	07/05/2016	10:35	ADV-MID	0.170	-	2.1	2.039	-	0.202
H-VC-U	08/02/2016	12:12	ADV-MID	0.503	-	1.9	2.119	-	0.292
H-VC-U	09/07/2016	10:00	ADV-MID	0.583	-	1.9	2.132	-	0.304
H-VC-U	10/04/2016	17:14	ADV-MID	0.447	-	2.2	2.093	-	0.280
H-VC-U	10/04/2016	17:14	ADV-MID	0.447	-	2.2	2.089	-	0.280
H-VC-DBC	04/19/2016	09:35	ADV-MID	0.268	B	2.6	1.869	-	0.508
H-VC-DBC	04/27/2016	11:55	ADV-MID	1.536	-	2.0	1.988	-	0.611
H-VC-DBC	05/09/2016	16:54	ADV-MID	0.852	-	3.1	1.917	-	0.541
H-VC-DBC	06/07/2016	13:02	ADV-MID	0.520	-	1.8	1.850	-	0.488



HID	Date	Time	Measurement	Discharge	Discharge Data Flag	Accuracy	Water Surface Elevation	Survey Data Flag	Staff Gauge
	(MM/DD/YY YY)	(HH:MM)	Type	(m <sup>3</sup> /s)		(%)	(m, L.D.)		(m)
H-VC-DBC	07/05/2016	09:45	ADV-MID	0.164	-	2.5	1.764	-	0.399
H-VC-DBC	08/02/2016	10:48	ADV-MID	0.539	-	3.4	1.859	-	0.498
H-VC-DBC	09/07/2016	09:00	ADV-MID	0.650	-	2.3	1.889	-	0.526
H-VC-DBC	10/04/2016	15:37	ADV-MID	0.547	-	1.6	1.852	-	0.485
H-VC-UMN	04/19/2016	13:30	ADV-MID	0.195	-	6.0	1.622	-	0.619
H-VC-UMN	04/27/2016	19:15	ADV-MID	1.460	-	3.8	1.796	-	0.797
H-VC-UMN	05/09/2016	15:17	ADV-MID	0.997	-	3.8	1.721	-	0.731
H-VC-UMN	05/09/2016	15:17	ADV-MID	0.997	-	3.8	1.722	-	0.731
H-VC-UMN	06/07/2016	11:25	ADV-MID	0.534	-	2.4	1.662	-	0.671
H-VC-UMN	07/04/2016	15:55	ADV-MID	0.210	-	4.1	1.597	-	0.596
H-VC-UMN	08/02/2016	08:38	ADV-MID	0.606	-	2.5	1.675	-	0.668
H-VC-UMN	09/06/2016	15:40	ADV-MID	0.624	-	3.2	1.688	-	0.682
H-VC-UMN	10/03/2016	15:06	ADV-MID	0.416	-	2.9	1.653	-	0.640
H-VC-R+290	04/18/2016	13:35	ADV-MID	0.559	-	1.9	2.448	-	0.275
H-VC-R+290	04/27/2016	17:10	ADV-MID	1.754	-	2.0	2.563	-	0.396
H-VC-R+290	05/09/2016	13:44	ADV-MID	0.912	-	4.1	2.493	-	0.326
H-VC-R+290	06/06/2016	13:21	ADV-MID	0.334	-	2.4	2.417	-	0.245
H-VC-R+290	07/04/2016	14:05	ADV-MID	0.221	-	2.2	2.396	-	0.219
H-VC-R+290	08/01/2016	13:18	ADV-MID	0.699	-	2.3	2.470	-	0.295
H-VC-R+290	09/06/2016	14:05	ADV-MID	0.719	-	3.7	2.489	-	0.310
H-VC-R+290	10/03/2016	13:01	ADV-MID	0.484	-	2.2	2.435	-	0.264
H-SEEP	04/19/2016	15:00	V	0.002	-	-	-	-	-
H-SEEP	04/28/2016	10:50	V	0.003	-	-	-	-	-
H-SEEP	05/10/2016	11:30	V	0.002	-	-	-	-	-
H-SEEP	06/06/2016	18:20	V	0.002	-	-	-	-	0.266
H-SEEP	07/05/2016	14:20	V	0.004	-	-	-	-	-



HID	Date	Time	Measurement	Discharge	Discharge Data Flag	Accuracy	Water Surface Elevation	Survey Data Flag	Staff Gauge
	(MM/DD/YY YY)	(HH:MM)	Type	(m <sup>3</sup> /s)		(%)	(m, L.D.)		(m)
H-SEEP	08/02/2016	17:20	V	0.002	-	-	-	-	0.278
H-SEEP	09/07/2016	14:37	V	0.003	-	-	-	-	-
H-SEEP	10/04/2016	11:50	V	0.003	-	-	-	-	0.325
H-TP	04/19/2016	15:20	N	-	-	-	-	-	-
H-TP	04/28/2016	11:40	N	-	-	-	-	-	-
H-TP	05/10/2016	16:40	N	-	-	-	-	-	0.834
H-TP	06/06/2016	18:40	N	-	-	-	-	-	0.791
H-TP	07/05/2016	16:00	N	-	-	-	-	-	-
H-TP	08/02/2016	18:00	N	-	-	-	-	-	0.706
H-TP	09/07/2016	16:04	N	-	-	-	-	-	0.706
H-TP	10/04/2016	12:20	N	-	-	-	-	-	0.705

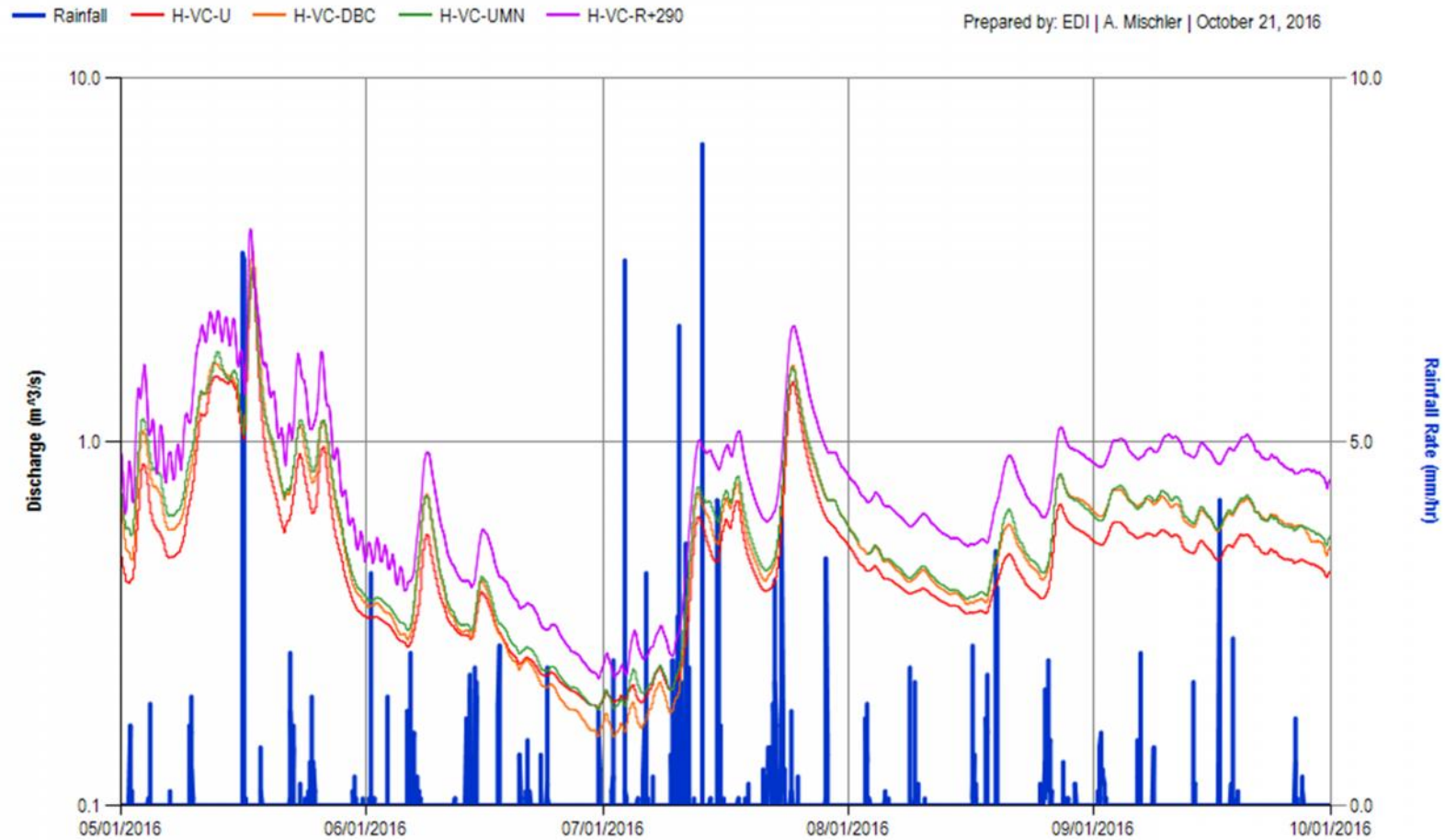


Figure 5.13 Hydrologic Response of the Victoria Creek hydrometric stations to rainfall events between May 1, 2016 and September 30, 2016.

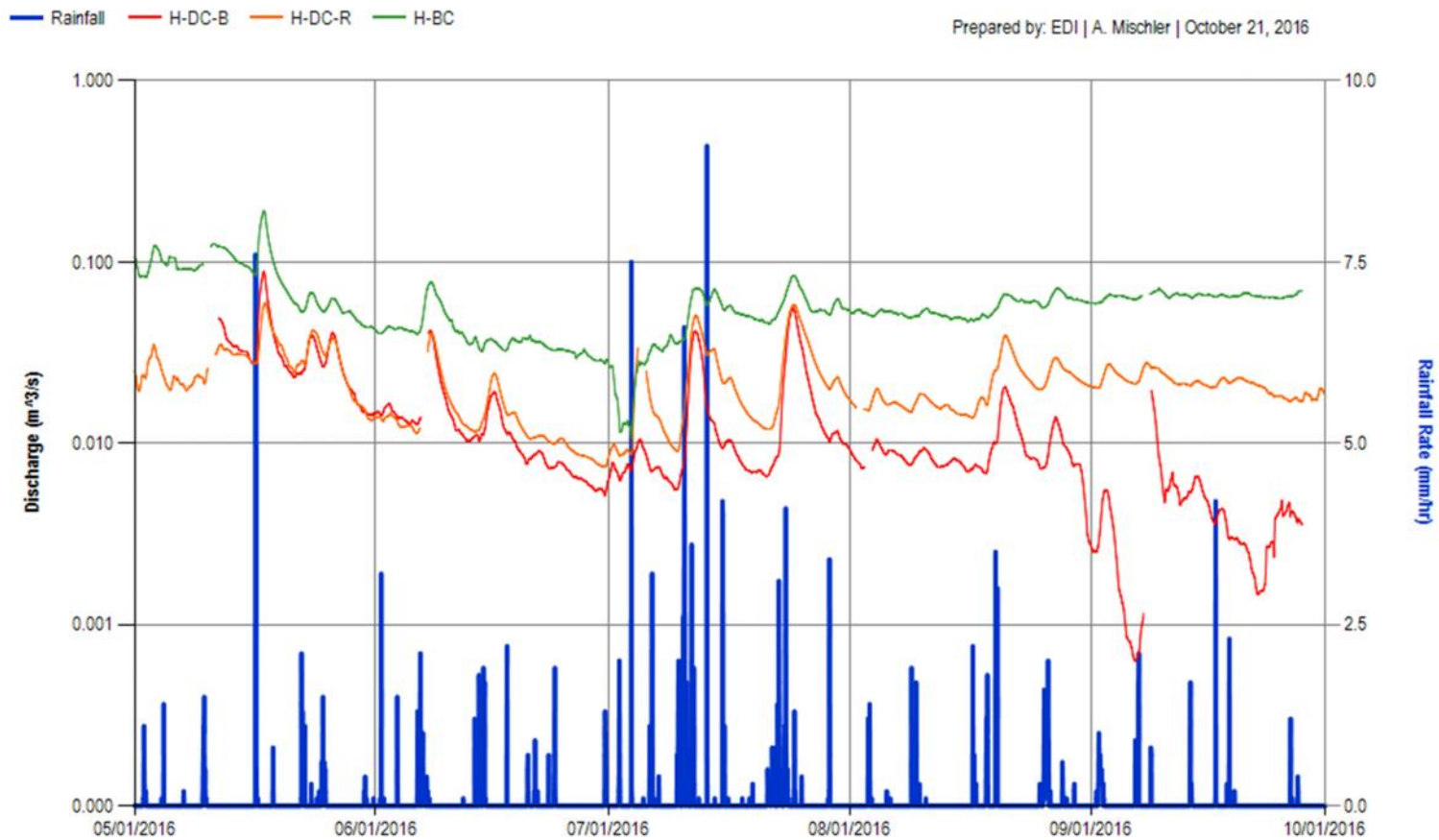


Figure 5. 14 Hydrologic Response of the Dome Creek and Back Creek hydrometric stations to rainfall events between May 1, 2016 and September 30, 2016.



**ATTACHMENT 6:                    WATER QUALITY SUMMARY DATA  
TABLES TABLES**

Water Quality Site	Sample Collected? (Y/N)	Measurement Date	Comments
WQ-SEEP	Yes	04/10/2016	Low to moderate flow. Ice forming downstream of pipe. Seepage pond frozen. Replicate collected. LCS0 collected.
WQ-TP	Yes	04/10/2016	Low water level with clear water. Pond covered with ice up to 0.02 m thick.
WQ-DC-DX	No	05/10/2016	Site frozen to substrate.
WQ-DC-DX+105	Yes	03/10/2016	Moderate flow rate with clear water. Ice forming on banks upstream.
WQ-DC-D1b	Yes	03/10/2016	Moderate flow rate with lightly turbid water. Ice forming in channel but not continuous. Stream goes underground past waterfall.
WQ-DC-B	Yes	04/10/2016	Low water level with lightly turbid water. Channel partly covered with ice.
WQ-DC-U	Yes	04/10/2016	Low flow rate with lightly turbid water. Thin ice on channel banks. Open water at sampling location. Single channel. Ground and wetland around creek is frozen.
WQ-DC-R	Yes	03/10/2016	Moderate flow with lightly turbid water. Channel covered with ice up to 0.07 m thick.
WQ-VC-U	Yes	04/10/2016	Moderate flow rate with clear water.
WQ-VC-R	Yes	03/10/2016	Moderate flow rate with clear water. Thin ice along banks.
WQ-VC-DBC	Yes	04/10/2016	Moderate flow with lightly turbid water. Back Creek contributing suspended sediment into Victoria Creek at confluence.
WQ-VC-UMN	Yes	03/10/2016	Moderate flow rate with clear water. Ice forming along banks upstream of site but not at sampling location. Ground is frozen.
WQ-BC	Yes	04/10/2016	Moderate flow and turbidity. Ice up to 0.03 m covering channel. Water flowed above and below the ice layer. Ice was broken to conduct discharge measurement. Stream banks were frozen with thicker ice layer.
WQ-PC-U	Yes	04/10/2016	Low flow with highly turbid water. Ice in channel with some patches of open water. No active placer operations at time of sampling.
WQ-PC-D	Yes	04/10/2016	Low flow with highly turbid water. Ice forming in creek. Some open water patches at sampling location. No active placer mining operations at time of sampling. Replicate collected.
WQ-CH-P-13-01	No	03/10/2016	Site frozen to substrate.
WQ-DESS-01	No	03/10/2016	Site frozen to substrate.
WQ-DESS-02	No	03/10/2016	Site frozen to substrate.
WQ-DESS-03	No	03/10/2016	Site dry. No evidence of recent flow.
WQ-LW-SEEP-01	No	05/10/2016	Site dry. No evidence of recent flow.
WQ-NW-SEEP-02	No	04/10/2016	Site frozen. No evidence of recent flow; pipe outlet is dry.
WQ-PW	Yes	05/10/2016	Moderate flow rate with clear water. Some ice at pipe outlet. Drinking water and bacteriological samples collected.









Summary of Water Quality Results for the October 3 - 5, 2016 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID WQ Site ID Date Sampled Detection Limit	L1840282-3 WQ-VC-DBC 04/10/2016 16:45	L1840282-1 WQ-VC-UMN 03/10/2016 15:15	L1840282-4 WQ-BC 04/10/2016 18:30	L1840282-8 WQ-PC-U 04/10/2016 09:40	L1840282-9 WQ-PC-D 04/10/2016 09:00	L1840282-10 WQ-PC-D-r 04/10/2016 09:10	QA/QC WQ-PC-D Replicate Analysis	L1840282-7 WQ-PW 05/10/2016 09:30	L1840282-12 FIELD BLANK 05/10/2016 08:50	L1840282-13 TRAVEL BLANK 05/10/2016 00:00
Aluminum (Al)-Dissolved	mg/L	0.1	-	0.001	0.0138	0.0144	0.0134	0.0065	0.0077	0.008	4%	-	<0.0010	<0.0010
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	0.00012	0.00017	0.0004	0.00164	0.00194	0.00194	0%	-	<0.00010	<0.00010
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	0.00054	0.00088	0.00288	0.00684	0.00704	0.007	1%	-	<0.00010	<0.00010
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.062	0.0634	0.0557	0.0783	0.0801	0.0795	1%	-	<0.000050	<0.000050
Beryllium (Be)-Dissolved	mg/L	-	-	0.00002	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<DL	-	<0.000020	<0.000020
Bismuth (Bi)-Dissolved	mg/L	-	-	0.0005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<DL	-	<0.000050	<0.000050
Boron (B)-Dissolved	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<DL	-	<0.010	<0.010
Cadmium (Cd)-Dissolved (Lab Result)	mg/L	0.00009	-	0.00001	0.0000206	0.000022	0.0000534	0.000204	0.000184	0.000189	3%	-	<0.000050	<0.000050
Cadmium (Cd)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.00001	0.00015	0.00018	0.00023	0.00037	0.00037	0.00037	-	-	0.00037	0.00037
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	25.6	30	46.2	94.7	95	94.9	0%	-	<0.050	<0.050
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<DL	-	<0.00010	<0.00010
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	0.00018	0.00153	0.00118	0.00115	3%	-	<0.00010	<0.00010
Copper (Cu)-Dissolved (Lab Result)	mg/L	0.002	-	0.0002	0.0011	0.00103	0.00138	0.00114	0.00144	0.00139	4%	-	<0.00020	<0.00020
Copper (Cu)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.002	0.002	0.002	0.004	0.004	0.004	0.004	-	-	0.004	0.004
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	0.04	0.047	0.055	0.065	0.038	0.037	<2xDL	-	<0.010	<0.010
Lead (Pb)-Dissolved (Lab Result)	mg/L	0.001	-	0.00005	<0.000050	0.000058	0.000126	0.00026	0.000229	0.00024	<2xDL	-	<0.000050	<0.000050
Lead (Pb)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.00005	0.00301	0.00372	0.00579	0.00700	0.00700	0.00700	-	-	0.00700	0.00700
Lithium (Li)-Dissolved	mg/L	-	-	0.0005	<0.0010	<0.0010	0.0014	0.0019	0.0019	0.0018	<2xDL	-	<0.0010	<0.0010
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	7.4	9.17	11	22.8	23.2	23.3	0%	-	<0.10	<0.10
Manganese (Mn)-Dissolved	mg/L	-	-	0.00005	0.0558	0.0654	0.304	1.33	1.29	1.26	2%	-	<0.00010	<0.00010
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
Molybdenum (Mo)-Dissolved	mg/L	0.0073	-	0.00005	0.000422	0.00039	0.000962	0.000474	0.000501	0.000492	2%	-	<0.000050	<0.000050
Nickel (Ni)-Dissolved (Lab Result)	mg/L	0.025	-	0.0005	<0.00050	<0.00050	<0.00050	0.00091	0.00076	0.00076	<2xDL	-	<0.00050	<0.00050
Nickel (Ni)-Diss. (Hardness Adjusted Guideline)	mg/L	-	-	0.0005	0.0924	0.1049	0.1366	0.1500	0.1500	0.1500	-	-	0.1500	0.1500
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<DL	-	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	-	-	0.1	0.58	0.66	0.93	1.28	1.39	1.35	3%	-	<0.10	<0.10
Selenium (Se)-Dissolved	mg/L	0.001	-	0.0001	<0.000050	<0.000050	<0.000050	0.000066	0.000072	0.000069	<2xDL	-	<0.000050	<0.000050
Silicon (Si)-Dissolved	mg/L	-	-	0.05	5.99	6.1	6.55	6.46	6.58	6.51	1%	-	<0.050	<0.050
Silver (Ag)-Dissolved	mg/L	0.00025	-	0.00001	<0.000010	<0.000010	<0.000010	0.000012	<0.000010	<0.000010	<DL	-	<0.000010	<0.000010
Sodium (Na)-Dissolved	mg/L	-	-	0.05	2.39	2.79	3.67	6.29	6.46	6.54	1%	-	<0.050	<0.050
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	0.269	0.278	0.305	0.523	0.531	0.533	0%	-	<0.00020	<0.00020
Sulfur (S)-Dissolved	mg/L	-	-	0.5	6.94	11.9	23.1	79.5	80.4	80	0%	-	<0.50	<0.50
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	<0.000010	<0.000010	<0.000010	0.000019	0.000012	0.000012	<2xDL	-	<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
Titanium (Ti)-Dissolved	mg/L	-	-	0.0003	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<DL	-	<0.00030	<0.00030
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.000678	0.000646	0.00184	0.00212	0.00222	0.00226	2%	-	<0.000010	<0.000010
Vanadium (V)-Dissolved	mg/L	-	-	0.001	<0.00050	<0.00050	0.00051	<0.00050	0.00051	0.00051	<2xDL	-	<0.00050	<0.00050
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	0.0012	0.0016	0.0021	0.0036	0.0287	0.0259	10%	-	<0.0010	<0.0010
Zirconium (Zr)-Dissolved	mg/L	-	-	0.0003	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<DL	-	<0.00030	<0.00030

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

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



**ATTACHMENT 7:**

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



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

Date Received: 06-OCT-16  
Report Date: 26-OCT-16 18:07 (MT)  
Version: FINAL

Client Phone: 867-393-4882

## Certificate of Analysis

Lab Work Order #: L1840282  
Project P.O. #: NOT SUBMITTED  
Job Reference: MOUNT NANSEN 16-Y-0089  
C of C Numbers:  
Legal Site Desc:

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

Can Dang  
Senior Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700  
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## ALS ENVIRONMENTAL ANALYTICAL REPORT

26-OCT-16 18:07 (MT)

Version: FINAL

Sample ID	Description	Sampled Date	Sampled Time	Client ID	L1840282-1	L1840282-2	L1840282-3	L1840282-4	L1840282-5
					Water	Water	Water	Water	Water
		03-OCT-16	15:15	WQ-VC-UMN	03-OCT-16	03-OCT-16	04-OCT-16	04-OCT-16	04-OCT-16
					15:15	14:30	16:45	18:30	18:10
					WQ-VC-UMN	WQ-VC-R	WQ-VC-DBC	WQ-BC	WQ-VC-U
Grouping	Analyte								
<b>WATER</b>									
<b>Physical Tests</b>	Colour, True (CU)								
	Conductivity (uS/cm)	232	209	198	325	178			
	Hardness (as CaCO3) (mg/L)	113	104	95.7	160	86.1			
	pH (pH)	7.99	7.94	7.94	8.09	7.91			
	Total Suspended Solids (mg/L)	6.2	5.8	22.8	54.1	<3.0			
	Total Dissolved Solids (mg/L)								
	TDS (Calculated) (mg/L)	134	122	111	199	98.9			
	Turbidity (NTU)								
<b>Anions and Nutrients</b>	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	89.5	82.1	87.2	106	83.7			
	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)	89.5	82.1	87.2	106	83.7			
	Ammonia, Total (as N) (mg/L)	0.0075	0.0086	0.0065	0.0325	<0.0050			
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050			
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50			
	Fluoride (F) (mg/L)	0.056	0.053	0.052	0.079	0.048			
	Nitrate (as N) (mg/L)	0.111	0.104	0.102	0.0813	0.0978			
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010			
	Sulfate (SO4) (mg/L)	37.5	32.9	21.6	73.1	15.6			
	Anion Sum (meq/L)	2.58	2.34	2.20	3.65	2.01			
	Cation Sum (meq/L)	2.40	2.22	2.04	3.41	1.83			
	Cation - Anion Balance (%)	-3.7	-2.6	-3.9	-3.4	-4.6			
<b>Cyanides</b>	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	0.23			
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50			
<b>Bacteriological Tests</b>	E. coli (MPN/100mL)								
	Coliform Bacteria - Total (MPN/100mL)								
<b>Total Metals</b>	Aluminum (Al)-Total (mg/L)	0.154	0.147	0.329	0.821	0.0507			
	Antimony (Sb)-Total (mg/L)	0.00029	0.00027	0.00030	0.00096	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00236	0.00220	0.00282	0.0124	0.00037			
	Barium (Ba)-Total (mg/L)	0.0690	0.0671	0.0726	0.0793	0.0652			
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	0.000021	0.000050	<0.000020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	0.000092	<0.000050			
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	0.0000537	0.0000482	0.0000735	0.000255	0.0000214			

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

26-OCT-16 18:07 (MT)

Version: FINAL

Sample ID	Description	Sampled Date	Sampled Time	Client ID	L1840282-6	L1840282-7	L1840282-8	L1840282-9	L1840282-10
					Water	Water	Water	Water	Water
		04-OCT-16	05-OCT-16	04-OCT-16	04-OCT-16	05-OCT-16	04-OCT-16	04-OCT-16	04-OCT-16
		12:15	09:30	09:40	09:00	09:10	09:40	09:00	09:10
		WQ-TP	WQ-PW	WQ-PC-U	WQ-PC-D	WQ-PC-D-R	WQ-PC-U	WQ-PC-D	WQ-PC-D-R
Grouping	Analyte								
<b>WATER</b>									
<b>Physical Tests</b>	Colour, True (CU)		<5.0						
	Conductivity (uS/cm)	1280	345	667	671	652			
	Hardness (as CaCO3) (mg/L)	714	177 <sup>HTC</sup>	330	333	333			
	pH (pH)	8.10	8.06	7.97	8.06	8.03			
	Total Suspended Solids (mg/L)	4.7		294	190	194			
	Total Dissolved Solids (mg/L)		205						
	TDS (Calculated) (mg/L)	1020		446	436	450			
	Turbidity (NTU)		0.12						
<b>Anions and Nutrients</b>	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	110		117	120	117			
	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)	110	163	117	120	117			
	Ammonia, Total (as N) (mg/L)	0.0371		0.683	0.616	0.624			
	Bromide (Br) (mg/L)	<0.25 <sup>DLDS</sup>		<0.25 <sup>DLDS</sup>	<0.25 <sup>DLDS</sup>	<0.25 <sup>DLDS</sup>			
	Chloride (Cl) (mg/L)	<2.5 <sup>DLDS</sup>	<0.50	<2.5 <sup>DLDS</sup>	<2.5 <sup>DLDS</sup>	<2.5 <sup>DLDS</sup>			
	Fluoride (F) (mg/L)	0.22	0.102	<0.10	<0.10	<0.10			
	Nitrate (as N) (mg/L)	0.034	0.123	0.084	0.107	0.113			
	Nitrite (as N) (mg/L)	<0.0050 <sup>DLDS</sup>	<0.0010	<0.0050	<0.0050	<0.0050			
	Sulfate (SO4) (mg/L)	660	31.0	248	235	251			
	Anion Sum (meq/L)	16.0		7.50	7.30	7.57			
	Cation Sum (meq/L)	15.2		7.01	7.06	7.07			
	Cation - Anion Balance (%)	-2.3		-3.4	-1.7	-3.4			
<b>Cyanides</b>	Cyanide, Weak Acid Diss (mg/L)	<0.0050		<0.0050	<0.0050	<0.0050			
	Cyanide, Total (mg/L)	<0.0050		<0.0050	<0.0050	<0.0050			
	Cyanate (mg/L)	<0.20		<0.20	0.75	0.40			
	Thiocyanate (SCN) (mg/L)	<0.50		<0.50	<0.50	<0.50			
<b>Bacteriological Tests</b>	E. coli (MPN/100mL)		<1 <sup>PEHR</sup>						
	Coliform Bacteria - Total (MPN/100mL)		<1 <sup>PEHR</sup>						
<b>Total Metals</b>	Aluminum (Al)-Total (mg/L)	0.0230	<0.010	4.63	3.25	3.15			
	Antimony (Sb)-Total (mg/L)	0.0326	<0.00050	0.00844	0.00649	0.00653			
	Arsenic (As)-Total (mg/L)	0.112	0.00036	0.118	0.0779	0.0763			
	Barium (Ba)-Total (mg/L)	0.0128	0.081	0.180	0.149	0.145			
	Beryllium (Be)-Total (mg/L)	<0.000020		0.000361	0.000233	0.000235			
	Bismuth (Bi)-Total (mg/L)	0.000079		0.00155	0.000883	0.000886			
	Boron (B)-Total (mg/L)	0.075	<0.10	<0.010	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	0.000469	<0.00020	0.00202	0.00134	0.00129			

\* 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	L1840282-11 Water 03-OCT-16 16:40 WQ-DC-R	L1840282-12 Water 05-OCT-16 08:50 FIELD BLANK	L1840282-13 Water 05-OCT-16 TRAVEL BLANK	L1840282-15 Water 04-OCT-16 11:30 WQ-SEEP	L1840282-16 Water 04-OCT-16 11:40 WQ-SEEP-R	
Grouping	Analyte					
<b>WATER</b>						
<b>Physical Tests</b>	Colour, True (CU)					
	Conductivity (uS/cm)	1040	<2.0	<2.0	1450	1470
	Hardness (as CaCO3) (mg/L)	578	<0.50	<0.50	824	785
	pH (pH)	7.89	5.33	5.33	7.52	7.46
	Total Suspended Solids (mg/L)	6.8	<3.0	<3.0	24.2	26.9
	Total Dissolved Solids (mg/L)					
	TDS (Calculated) (mg/L)	764	<1.0	<1.0	1140	1130
	Turbidity (NTU)					
<b>Anions and Nutrients</b>	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	183	<1.0	<1.0	279	278
	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)	183	<1.0	<1.0	279	278
	Ammonia, Total (as N) (mg/L)	0.384	<0.0050	0.0085	4.21	4.25
	Bromide (Br) (mg/L)	<0.25 <sup>DLDS</sup>	<0.050	<0.050	<0.50 <sup>DLDS</sup>	<0.50 <sup>DLDS</sup>
	Chloride (Cl) (mg/L)	<2.5 <sup>DLDS</sup>	<0.50	<0.50	<5.0 <sup>DLDS</sup>	<5.0 <sup>DLDS</sup>
	Fluoride (F) (mg/L)	<0.10 <sup>DLDS</sup>	<0.020	<0.020	<0.20 <sup>DLDS</sup>	<0.20 <sup>DLDS</sup>
	Nitrate (as N) (mg/L)	0.573	<0.0050	<0.0050	0.841	0.847
	Nitrite (as N) (mg/L)	0.0084	<0.0010	<0.0010	0.033	0.032
	Sulfate (SO4) (mg/L)	438	<0.30	<0.30	616	622
	Anion Sum (meq/L)	12.8	<0.10	<0.10	18.5	18.6
	Cation Sum (meq/L)	12.2	<0.10	<0.10	19.2	18.3
	Cation - Anion Balance (%)	-2.5	0.0	0.0	2.1	-0.7
<b>Cyanides</b>	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	0.0152	0.0153
	Cyanate (mg/L)	<0.20	<0.20		1.14	0.60
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	5.10	5.09
<b>Bacteriological Tests</b>	E. coli (MPN/100mL)					
	Coliform Bacteria - Total (MPN/100mL)					
<b>Total Metals</b>	Aluminum (Al)-Total (mg/L)	0.0516	<0.0030	<0.0030	0.0234	0.0240
	Antimony (Sb)-Total (mg/L)	0.00126	<0.00010	<0.00010	0.00056	0.00050
	Arsenic (As)-Total (mg/L)	0.0151	<0.00010	<0.00010	0.0536	0.0525
	Barium (Ba)-Total (mg/L)	0.0482	<0.000050	<0.000050	0.0608	0.0604
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	0.016	<0.010	<0.010	0.050	0.049
	Cadmium (Cd)-Total (mg/L)	0.0000440	<0.0000050	<0.0000050	0.000419	0.000411

\* 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	L1840282-17 Water 03-OCT-16 18:25 WQ-DC-DX+105	L1840282-18 Water 03-OCT-16 19:25 WQ-DC-D16	L1840282-19 Water 04-OCT-16 12:40 WQ-DC-B	L1840282-20 Water 04-OCT-16 10:55 WQ-DC-U	
Grouping	Analyte				
<b>WATER</b>					
<b>Physical Tests</b>	Colour, True (CU)				
	Conductivity (uS/cm)	1090	1450	1350	1350
	Hardness (as CaCO3) (mg/L)	617	887	800	724
	pH (pH)	7.89	8.18	7.89	8.04
	Total Suspended Solids (mg/L)	4.2	62.8	25.2	13.0
	Total Dissolved Solids (mg/L)				
	TDS (Calculated) (mg/L)	783	1130	1040	1030
	Turbidity (NTU)				
<b>Anions and Nutrients</b>	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	278	296	210	242
	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)	278	296	210	242
	Ammonia, Total (as N) (mg/L)	0.0218	0.172	0.199	1.57
	Bromide (Br) (mg/L)	<0.25 <sup>DLDS</sup>	<0.50 <sup>DLDS</sup>	<0.25 <sup>DLDS</sup>	<0.25 <sup>DLDS</sup>
	Chloride (Cl) (mg/L)	<2.5 <sup>DLDS</sup>	<5.0 <sup>DLDS</sup>	<2.5 <sup>DLDS</sup>	<2.5 <sup>DLDS</sup>
	Fluoride (F) (mg/L)	0.17	<0.20	<0.10	<0.10
	Nitrate (as N) (mg/L)	<0.025 <sup>DLDS</sup>	0.105	0.126	0.443
	Nitrite (as N) (mg/L)	<0.0050 <sup>DLDS</sup>	<0.010 <sup>DLDS</sup>	<0.0050 <sup>DLDS</sup>	0.0084
	Sulfate (SO4) (mg/L)	393	646	633	602
	Anion Sum (meq/L)	13.7	19.4	17.4	17.4
	Cation Sum (meq/L)	12.7	18.2	16.7	15.5
	Cation - Anion Balance (%)	-4.0	-3.1	-2.1	-5.6
<b>Cyanides</b>	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanate (mg/L)	<0.20	0.33	<0.20	1.08
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	0.56
<b>Bacteriological Tests</b>	E. coli (MPN/100mL)				
	Coliform Bacteria - Total (MPN/100mL)				
<b>Total Metals</b>	Aluminum (Al)-Total (mg/L)	0.141	0.626	0.216	0.0860
	Antimony (Sb)-Total (mg/L)	0.0103	0.00912	0.00187	0.00110
	Arsenic (As)-Total (mg/L)	0.103	0.0206	0.0125	0.0221
	Barium (Ba)-Total (mg/L)	0.0134	0.0380	0.0529	0.0514
	Beryllium (Be)-Total (mg/L)	<0.000020	0.000026	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	0.028	0.013	0.030
	Cadmium (Cd)-Total (mg/L)	0.00423	0.000823	0.0000540	0.0000457

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

26-OCT-16 18:07 (MT)

Version: FINAL

		Sample ID	L1840282-1	L1840282-2	L1840282-3	L1840282-4	L1840282-5
		Description	Water	Water	Water	Water	Water
		Sampled Date	03-OCT-16	03-OCT-16	04-OCT-16	04-OCT-16	04-OCT-16
		Sampled Time	15:15	14:30	16:45	18:30	18:10
		Client ID	WQ-VC-UMN	WQ-VC-R	WQ-VC-DBC	WQ-BC	WQ-VC-U
Grouping	Analyte						
<b>WATER</b>							
<b>Total Metals</b>	Calcium (Ca)-Total (mg/L)		30.7	27.5	25.9	47.3	23.3
	Chromium (Cr)-Total (mg/L)		0.00030	0.00033	0.00059	0.00112	0.00018
	Cobalt (Co)-Total (mg/L)		0.00019	0.00023	0.00032	0.00069	0.00013
	Copper (Cu)-Total (mg/L)		0.00162	0.00192	0.00213	0.00399	0.00126
	Iron (Fe)-Total (mg/L)		0.321	0.417	0.584	1.70	0.164
	Lead (Pb)-Total (mg/L)		0.00124	0.000952	0.00173	0.00747	0.000087
	Lithium (Li)-Total (mg/L)		<0.0010	<0.0010	<0.0010	0.0017	<0.0010
	Magnesium (Mg)-Total (mg/L)		9.45	8.49	8.19	11.4	7.64
	Manganese (Mn)-Total (mg/L)		0.0763	0.0805	0.0873	0.350	0.0445
	Mercury (Hg)-Total (mg/L)		<0.0000050	<0.0000050	0.0000050	0.0000081	<0.0000050
	Molybdenum (Mo)-Total (mg/L)		0.000404	0.000368	0.000401	0.000911	0.000351
	Nickel (Ni)-Total (mg/L)		0.00058	0.00078	0.00069	0.00130	<0.00050
	Phosphorus (P)-Total (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)		0.70	0.68	0.67	1.13	0.56
	Selenium (Se)-Total (mg/L)		<0.000050	0.000053	<0.000050	0.000057	<0.000050
	Silicon (Si)-Total (mg/L)		6.68	6.78	6.69	8.40	6.09
	Silver (Ag)-Total (mg/L)		0.000015	<0.000010	0.000019	0.000079	<0.000010
	Sodium (Na)-Total (mg/L)		2.92	2.75	2.53	3.83	2.34
	Strontium (Sr)-Total (mg/L)		0.285	0.255	0.280	0.319	0.271
	Sulfur (S)-Total (mg/L)		12.8	11.1	7.21	24.7	5.14
	Thallium (Tl)-Total (mg/L)		<0.000010	<0.000010	<0.000010	0.000026	<0.000010
	Tin (Sn)-Total (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)		0.00471	0.00437	0.0106	0.0264	0.00135
	Uranium (U)-Total (mg/L)		0.000699	0.000606	0.000744	0.00203	0.000562
	Vanadium (V)-Total (mg/L)		0.00072	0.00073	0.00133	0.00340	<0.00050
	Zinc (Zn)-Total (mg/L)		0.0046	0.0052	0.0058	0.0197	<0.0030
	Zirconium (Zr)-Total (mg/L)		<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
<b>Dissolved Metals</b>	Dissolved Mercury Filtration Location		FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location		FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)		0.0144	0.0222	0.0138	0.0134	0.0114
	Antimony (Sb)-Dissolved (mg/L)		0.00017	0.00017	0.00012	0.00040	<0.00010
	Arsenic (As)-Dissolved (mg/L)		0.00088	0.00090	0.00054	0.00288	0.00026
	Barium (Ba)-Dissolved (mg/L)		0.0634	0.0636	0.0620	0.0557	0.0623
	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)		0.0000220	0.0000242	0.0000206	0.0000534	0.0000113

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1840282-6	L1840282-7	L1840282-8	L1840282-9	L1840282-10
		Description	Water	Water	Water	Water	Water
		Sampled Date	04-OCT-16	05-OCT-16	04-OCT-16	04-OCT-16	04-OCT-16
		Sampled Time	12:15	09:30	09:40	09:00	09:10
		Client ID	WQ-TP	WQ-PW	WQ-PC-U	WQ-PC-D	WQ-PC-D-R
Grouping	Analyte						
<b>WATER</b>							
<b>Total Metals</b>	Calcium (Ca)-Total (mg/L)		227	41.3	98.2	96.5	96.8
	Chromium (Cr)-Total (mg/L)		0.00080	<0.0020	0.00508	0.00347	0.00346
	Cobalt (Co)-Total (mg/L)		0.00047		0.00482	0.00334	0.00331
	Copper (Cu)-Total (mg/L)		0.0210	<0.0010	0.0260	0.0175	0.0166
	Iron (Fe)-Total (mg/L)		0.225	<0.030	12.8	8.48	8.34
	Lead (Pb)-Total (mg/L)		0.00694	0.00064	0.0928	0.0536	0.0540
	Lithium (Li)-Total (mg/L)		0.0113		0.0048	0.0036	0.0036
	Magnesium (Mg)-Total (mg/L)		43.0	17.8	24.3	24.6	24.7
	Manganese (Mn)-Total (mg/L)		0.146	<0.0020	1.65	1.46	1.42
	Mercury (Hg)-Total (mg/L)		0.0000145	<0.00020	0.000034	0.000034	0.000033
	Molybdenum (Mo)-Total (mg/L)		0.00126		0.000926	0.000778	0.000814
	Nickel (Ni)-Total (mg/L)		0.00101		0.00539	0.00382	0.00378
	Phosphorus (P)-Total (mg/L)		<0.050		0.156	0.086	0.119
	Potassium (K)-Total (mg/L)		15.1	0.84	2.26	2.05	2.01
	Selenium (Se)-Total (mg/L)		0.000057	<0.0010	0.000173	0.000139	0.000142
	Silicon (Si)-Total (mg/L)		3.39		16.2	13.2	13.6
	Silver (Ag)-Total (mg/L)		0.000206		0.00127	0.000802	0.000811
	Sodium (Na)-Total (mg/L)		14.8	4.5	6.61	6.79	6.81
	Strontium (Sr)-Total (mg/L)		0.618		0.561	0.551	0.562
	Sulfur (S)-Total (mg/L)		244		82.9	82.8	91.2
	Thallium (Tl)-Total (mg/L)		0.000138		0.000177	0.000115	0.000112
	Tin (Sn)-Total (mg/L)		<0.00010		<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)		0.00043		0.0811	0.0628	0.0640
	Uranium (U)-Total (mg/L)		0.00101	0.00165	0.00270	0.00256	0.00255
	Vanadium (V)-Total (mg/L)		<0.00050		0.0155	0.0111	0.0110
	Zinc (Zn)-Total (mg/L)		0.0513	<0.050	0.247	0.164	0.158
	Zirconium (Zr)-Total (mg/L)		<0.00030		<0.00030	<0.00030	<0.00030
<b>Dissolved Metals</b>	Dissolved Mercury Filtration Location		FIELD		FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location		FIELD		FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)		0.0027		0.0065	0.0077	0.0080
	Antimony (Sb)-Dissolved (mg/L)		0.0314		0.00164	0.00194	0.00194
	Arsenic (As)-Dissolved (mg/L)		0.0855		0.00684	0.00704	0.00700
	Barium (Ba)-Dissolved (mg/L)		0.0122		0.0783	0.0801	0.0795
	Beryllium (Be)-Dissolved (mg/L)		<0.000020		<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)		<0.000050		<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)		0.068		<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)		0.000367		0.000204	0.000184	0.000189

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1840282-11	L1840282-12	L1840282-13	L1840282-15	L1840282-16
		Description	Water	Water	Water	Water	Water
		Sampled Date	03-OCT-16	05-OCT-16	05-OCT-16	04-OCT-16	04-OCT-16
		Sampled Time	16:40	08:50		11:30	11:40
		Client ID	WQ-DC-R	FIELD BLANK	TRAVEL BLANK	WQ-SEEP	WQ-SEEP-R
Grouping	Analyte						
<b>WATER</b>							
<b>Total Metals</b>	Calcium (Ca)-Total (mg/L)		149	<0.050	<0.050	241	234
	Chromium (Cr)-Total (mg/L)		0.00035	<0.00010	<0.00010	0.00058	0.00061
	Cobalt (Co)-Total (mg/L)		0.00114	<0.00010	<0.00010	0.00789	0.00794
	Copper (Cu)-Total (mg/L)		0.00107	<0.00050	<0.00050	0.00339	0.00343
	Iron (Fe)-Total (mg/L)		1.90	<0.010	<0.010	9.62	9.52
	Lead (Pb)-Total (mg/L)		0.000308	<0.000050	<0.000050	0.000122	0.000066
	Lithium (Li)-Total (mg/L)		0.0018	<0.0010	<0.0010	0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)		51.8	<0.10	<0.10	56.9	56.1
	Manganese (Mn)-Total (mg/L)		0.901	<0.00010	<0.00010	5.40	5.38
	Mercury (Hg)-Total (mg/L)		<0.0000050	<0.0000050	<0.0000050	0.0000083	0.0000069
	Molybdenum (Mo)-Total (mg/L)		0.000356	<0.000050	<0.000050	0.000988	0.000979
	Nickel (Ni)-Total (mg/L)		0.00108	<0.00050	<0.00050	0.00343	0.00338
	Phosphorus (P)-Total (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)		2.76	<0.10	<0.10	6.21	6.02
	Selenium (Se)-Total (mg/L)		0.000110	<0.000050	<0.000050	0.000313	0.000328
	Silicon (Si)-Total (mg/L)		6.18	<0.050	<0.050	8.49	8.17
	Silver (Ag)-Total (mg/L)		<0.000010	<0.000010	<0.000010	0.000023	0.000022
	Sodium (Na)-Total (mg/L)		11.3	<0.050	<0.050	38.6	38.4
	Strontium (Sr)-Total (mg/L)		0.481	<0.00020	<0.00020	0.729	0.720
	Sulfur (S)-Total (mg/L)		148	<0.50	<0.50	249	242
	Thallium (Tl)-Total (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)		0.00221	<0.00030	<0.00030	0.00105	0.00104
	Uranium (U)-Total (mg/L)		0.00159	<0.000010	<0.000010	0.00216	0.00217
	Vanadium (V)-Total (mg/L)		0.00079	<0.00050	<0.00050	0.00229	0.00229
	Zinc (Zn)-Total (mg/L)		0.0121	<0.0030	<0.0030	0.0381	0.0372
	Zirconium (Zr)-Total (mg/L)		<0.00030	<0.00030	<0.00030	0.00067	0.00074
<b>Dissolved Metals</b>	Dissolved Mercury Filtration Location		FIELD	FIELD	LAB	FIELD	FIELD
	Dissolved Metals Filtration Location		FIELD	FIELD	LAB	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)		0.0117	<0.0010	<0.0010	0.0167	0.0151
	Antimony (Sb)-Dissolved (mg/L)		0.00114	<0.00010	<0.00010	0.00044	0.00043
	Arsenic (As)-Dissolved (mg/L)		0.00749	<0.00010	<0.00010	0.0435	0.0425
	Barium (Ba)-Dissolved (mg/L)		0.0452	<0.000050	<0.000050	0.0591	0.0575
	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)		0.015	<0.010	<0.010	0.047	0.046
	Cadmium (Cd)-Dissolved (mg/L)		0.0000316	<0.0000050	<0.0000050	0.000353	0.000353

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1840282-17	L1840282-18	L1840282-19	L1840282-20
		Description	Water	Water	Water	Water
		Sampled Date	03-OCT-16	03-OCT-16	04-OCT-16	04-OCT-16
		Sampled Time	18:25	19:25	12:40	10:55
		Client ID	WQ-DC-DX+105	WQ-DC-D16	WQ-DC-B	WQ-DC-U
Grouping	Analyte					
<b>WATER</b>						
<b>Total Metals</b>	Calcium (Ca)-Total (mg/L)		168	209	186	196
	Chromium (Cr)-Total (mg/L)		0.00023	0.00103	0.00053	0.00038
	Cobalt (Co)-Total (mg/L)		0.00095	0.00073	0.00057	0.00249
	Copper (Cu)-Total (mg/L)		0.00111	0.00242	0.00113	0.00128
	Iron (Fe)-Total (mg/L)		1.26	2.02	4.72	2.68
	Lead (Pb)-Total (mg/L)		0.000863	0.00137	0.000323	0.000133
	Lithium (Li)-Total (mg/L)		0.0085	0.0078	0.0032	0.0030
	Magnesium (Mg)-Total (mg/L)		55.3	90.4	84.7	62.5
	Manganese (Mn)-Total (mg/L)		1.16	0.816	0.727	2.30
	Mercury (Hg)-Total (mg/L)		<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)		0.000339	0.000271	0.000302	0.000558
	Nickel (Ni)-Total (mg/L)		0.00174	0.00152	0.00097	0.00158
	Phosphorus (P)-Total (mg/L)		<0.050	0.058	<0.050	<0.050
	Potassium (K)-Total (mg/L)		3.69	4.27	3.19	3.96
	Selenium (Se)-Total (mg/L)		<0.000050	0.000081	0.000082	0.000146
	Silicon (Si)-Total (mg/L)		7.23	7.24	6.65	6.95
	Silver (Ag)-Total (mg/L)		0.000014	0.000027	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)		5.12	6.99	9.53	17.7
	Strontium (Sr)-Total (mg/L)		0.410	0.545	0.632	0.627
	Sulfur (S)-Total (mg/L)		146	228	228	203
	Thallium (Tl)-Total (mg/L)		0.000109	0.000048	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)		0.00993	0.0347	0.0115	0.00454
	Uranium (U)-Total (mg/L)		0.00416	0.00339	0.00239	0.00193
	Vanadium (V)-Total (mg/L)		0.00088	0.00291	0.00145	0.00096
	Zinc (Zn)-Total (mg/L)		0.856	0.314	0.0242	0.0138
	Zirconium (Zr)-Total (mg/L)		<0.00030	<0.00030	<0.00030	<0.00030
<b>Dissolved Metals</b>	Dissolved Mercury Filtration Location		FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location		FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)		0.0010	0.0050	0.0049	0.0068
	Antimony (Sb)-Dissolved (mg/L)		0.00927	0.00926	0.00178	0.00103
	Arsenic (As)-Dissolved (mg/L)		0.0155	0.0117	0.00671	0.0176
	Barium (Ba)-Dissolved (mg/L)		0.0107	0.0307	0.0464	0.0479
	Beryllium (Be)-Dissolved (mg/L)		<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)		<0.010	0.027	0.013	0.024
	Cadmium (Cd)-Dissolved (mg/L)		0.000880	0.000220	0.0000224	0.0000296

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1840282-1	L1840282-2	L1840282-3	L1840282-4	L1840282-5
		Description	Water	Water	Water	Water	Water
		Sampled Date	03-OCT-16	03-OCT-16	04-OCT-16	04-OCT-16	04-OCT-16
		Sampled Time	15:15	14:30	16:45	18:30	18:10
		Client ID	WQ-VC-UMN	WQ-VC-R	WQ-VC-DBC	WQ-BC	WQ-VC-U
Grouping	Analyte						
<b>WATER</b>							
<b>Dissolved Metals</b>	Calcium (Ca)-Dissolved (mg/L)		30.0	27.5	25.6	46.2	22.7
	Chromium (Cr)-Dissolved (mg/L)		<0.00010	0.00014	<0.00010	0.00012	<0.00010
	Cobalt (Co)-Dissolved (mg/L)		<0.00010	0.00014	<0.00010	0.00018	<0.00010
	Copper (Cu)-Dissolved (mg/L)		0.00103	0.00119	0.00110	0.00138	0.00094
	Iron (Fe)-Dissolved (mg/L)		0.047	0.113	0.040	0.055	0.038
	Lead (Pb)-Dissolved (mg/L)		0.000058	0.000064	<0.000050	0.000126	<0.000050
	Lithium (Li)-Dissolved (mg/L)		<0.0010	<0.0010	<0.0010	0.0014	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)		9.17	8.50	7.74	11.0	7.11
	Manganese (Mn)-Dissolved (mg/L)		0.0654	0.0700	0.0558	0.304	0.0233
	Mercury (Hg)-Dissolved (mg/L)		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)		0.000390	0.000355	0.000422	0.000962	0.000321
	Nickel (Ni)-Dissolved (mg/L)		<0.00050	0.00058	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)		0.66	0.66	0.58	0.93	0.52
	Selenium (Se)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)		6.10	6.25	5.99	6.55	5.83
	Silver (Ag)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)		2.79	2.73	2.39	3.67	2.18
	Strontium (Sr)-Dissolved (mg/L)		0.278	0.250	0.269	0.305	0.261
	Sulfur (S)-Dissolved (mg/L)		11.9	10.4	6.94	23.1	4.89
	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	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)		0.000646	0.000568	0.000678	0.00184	0.000519
	Vanadium (V)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050	0.00051	<0.00050
	Zinc (Zn)-Dissolved (mg/L)		0.0016	0.0016	0.0012	0.0021	0.0013
	Zirconium (Zr)-Dissolved (mg/L)		<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1840282-6 Water 04-OCT-16 12:15 WQ-TP	L1840282-7 Water 05-OCT-16 09:30 WQ-PW	L1840282-8 Water 04-OCT-16 09:40 WQ-PC-U	L1840282-9 Water 04-OCT-16 09:00 WQ-PC-D	L1840282-10 Water 04-OCT-16 09:10 WQ-PC-D-R
Grouping	Analyte				
<b>WATER</b>					
<b>Dissolved Metals</b>	Calcium (Ca)-Dissolved (mg/L)	219	94.7	95.0	94.9
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00041	0.00153	0.00118	0.00115
	Copper (Cu)-Dissolved (mg/L)	0.0158	0.00114	0.00144	0.00139
	Iron (Fe)-Dissolved (mg/L)	0.018	0.065	0.038	0.037
	Lead (Pb)-Dissolved (mg/L)	0.000478	0.000260	0.000229	0.000240
	Lithium (Li)-Dissolved (mg/L)	0.0101	0.0019	0.0019	0.0018
	Magnesium (Mg)-Dissolved (mg/L)	40.2	22.8	23.2	23.3
	Manganese (Mn)-Dissolved (mg/L)	0.120	1.33	1.29	1.26
	Mercury (Hg)-Dissolved (mg/L)	0.0000061	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.00120	0.000474	0.000501	0.000492
	Nickel (Ni)-Dissolved (mg/L)	0.00067	0.00091	0.00076	0.00076
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	14.9	1.28	1.39	1.35
	Selenium (Se)-Dissolved (mg/L)	0.000051	0.000066	0.000072	0.000069
	Silicon (Si)-Dissolved (mg/L)	3.28	6.46	6.58	6.51
	Silver (Ag)-Dissolved (mg/L)	0.000045	0.000012	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	13.8	6.29	6.46	6.54
	Strontium (Sr)-Dissolved (mg/L)	0.600	0.523	0.531	0.533
	Sulfur (S)-Dissolved (mg/L)	237	79.5	80.4	80.0
	Thallium (Tl)-Dissolved (mg/L)	0.000131	0.000019	0.000012	0.000012
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000957	0.00212	0.00222	0.00226
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	0.00051	0.00051
	Zinc (Zn)-Dissolved (mg/L)	0.0383	0.0366	0.0287	0.0259
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030

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



## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1840282-11 Water 03-OCT-16 16:40 WQ-DC-R	L1840282-12 Water 05-OCT-16 08:50 FIELD BLANK	L1840282-13 Water 05-OCT-16 TRAVEL BLANK	L1840282-15 Water 04-OCT-16 11:30 WQ-SEEP	L1840282-16 Water 04-OCT-16 11:40 WQ-SEEP-R	
Grouping	Analyte					
<b>WATER</b>						
<b>Dissolved Metals</b>	Calcium (Ca)-Dissolved (mg/L)	145	<0.050	<0.050	234	226
	Chromium (Cr)-Dissolved (mg/L)	0.00030	<0.00010	<0.00010	0.00051	0.00041
	Cobalt (Co)-Dissolved (mg/L)	0.00111	<0.00010	<0.00010	0.00783	0.00732
	Copper (Cu)-Dissolved (mg/L)	0.00087	<0.00020	<0.00020	0.00258	0.00235
	Iron (Fe)-Dissolved (mg/L)	0.748	<0.010	<0.010	7.90	7.44
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0018	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)	52.6	<0.10	<0.10	57.9	53.4
	Manganese (Mn)-Dissolved (mg/L)	0.898	<0.00010	<0.00010	5.46	5.17
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	0.0000054	0.0000055
	Molybdenum (Mo)-Dissolved (mg/L)	0.000370	<0.000050	<0.000050	0.000921	0.000887
	Nickel (Ni)-Dissolved (mg/L)	0.00094	<0.00050	<0.00050	0.00333	0.00309
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	2.76	<0.10	<0.10	6.39	6.01
	Selenium (Se)-Dissolved (mg/L)	0.000079	<0.000050	<0.000050	0.000286	0.000236
	Silicon (Si)-Dissolved (mg/L)	5.87	<0.050	<0.050	8.00	7.71
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	11.3	<0.050	<0.050	39.0	36.0
	Strontium (Sr)-Dissolved (mg/L)	0.468	<0.00020	<0.00020	0.715	0.697
	Sulfur (S)-Dissolved (mg/L)	144	<0.50	<0.50	235	223
	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)	0.00043	<0.00030	<0.00030	0.00101	0.00074
	Uranium (U)-Dissolved (mg/L)	0.00153	<0.000010	<0.000010	0.00213	0.00212
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	0.00192	0.00177
	Zinc (Zn)-Dissolved (mg/L)	0.0065	<0.0010	<0.0010	0.0398	0.0345
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	0.00064	0.00063

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1840282-17	L1840282-18	L1840282-19	L1840282-20
		Description	Water	Water	Water	Water
		Sampled Date	03-OCT-16	03-OCT-16	04-OCT-16	04-OCT-16
		Sampled Time	18:25	19:25	12:40	10:55
		Client ID	WQ-DC-DX+105	WQ-DC-D16	WQ-DC-B	WQ-DC-U
Grouping	Analyte					
<b>WATER</b>						
<b>Dissolved Metals</b>	Calcium (Ca)-Dissolved (mg/L)		162	207	186	191
	Chromium (Cr)-Dissolved (mg/L)		<0.00010	<0.00010	0.00011	0.00014
	Cobalt (Co)-Dissolved (mg/L)		0.00069	0.00034	0.00045	0.00228
	Copper (Cu)-Dissolved (mg/L)		<0.00020	0.00055	0.00036	0.00084
	Iron (Fe)-Dissolved (mg/L)		0.111	0.434	2.86	1.12
	Lead (Pb)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)		0.0082	0.0073	0.0032	0.0023
	Magnesium (Mg)-Dissolved (mg/L)		51.9	89.9	81.8	59.8
	Manganese (Mn)-Dissolved (mg/L)		0.960	0.802	0.693	2.19
	Mercury (Hg)-Dissolved (mg/L)		<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)		0.000292	0.000242	0.000299	0.000479
	Nickel (Ni)-Dissolved (mg/L)		0.00151	0.00078	0.00067	0.00138
	Phosphorus (P)-Dissolved (mg/L)		<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)		3.41	4.58	3.21	3.82
	Selenium (Se)-Dissolved (mg/L)		<0.000050	<0.000050	0.000064	0.000131
	Silicon (Si)-Dissolved (mg/L)		6.49	6.04	5.83	6.33
	Silver (Ag)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)		4.71	6.98	9.14	16.8
	Strontium (Sr)-Dissolved (mg/L)		0.392	0.530	0.625	0.614
	Sulfur (S)-Dissolved (mg/L)		136	221	214	191
	Thallium (Tl)-Dissolved (mg/L)		0.000094	0.000023	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)		<0.00030	<0.00030	<0.00030	0.00036
	Uranium (U)-Dissolved (mg/L)		0.00399	0.00318	0.00231	0.00179
	Vanadium (V)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)		0.753	0.270	0.0177	0.0090
	Zirconium (Zr)-Dissolved (mg/L)		<0.00030	<0.00030	<0.00030	<0.00030

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

## Reference Information

## Qualifiers for Individual Samples Listed:

Sample Number	Client Sample ID	Qualifier	Description
L1840282-13	TRAVEL BLANK	WSMD	Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.
		LPMB	Lab-Preserved for Total Metals. Sample received with pH > 2 and preserved at the lab. Total Metals results may be biased low.
L1840282-7	WQ-PW	LPMB	Lab-Preserved for Total Metals. Sample received with pH > 2 and preserved at the lab. Total Metals results may be biased low.

## QC Samples with Qualifiers &amp; Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Sodium (Na)-Dissolved	MB-LOR	L1840282-13
Method Blank	Zinc (Zn)-Dissolved	MB-LOR	L1840282-13
Method Blank	Magnesium (Mg)-Total	MB-LOR	L1840282-7
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1840282-1, -10, -11, -12, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1840282-13
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1840282-1, -10, -11, -12, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1840282-13
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1840282-1, -10, -11, -12, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1840282-13
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L1840282-13
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1840282-1, -10, -11, -12, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1840282-1, -10, -11, -12, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1840282-13
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1840282-1, -10, -11, -12, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1840282-13
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1840282-13
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1840282-1, -10, -11, -12, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -8, -9
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1840282-13
Matrix Spike	Aluminum (Al)-Total	MS-B	L1840282-10, -11, -12, -15, -16, -17, -18, -19, -20, -8, -9
Matrix Spike	Barium (Ba)-Total	MS-B	L1840282-1, -2, -3, -4, -5, -6
Matrix Spike	Barium (Ba)-Total	MS-B	L1840282-10, -11, -12, -15, -16, -17, -18, -19, -20, -8, -9
Matrix Spike	Boron (B)-Total	MS-B	L1840282-7
Matrix Spike	Calcium (Ca)-Total	MS-B	L1840282-7
Matrix Spike	Calcium (Ca)-Total	MS-B	L1840282-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Total	MS-B	L1840282-10, -11, -12, -15, -16, -17, -18, -19, -20, -8, -9
Matrix Spike	Copper (Cu)-Total	MS-B	L1840282-7
Matrix Spike	Iron (Fe)-Total	MS-B	L1840282-10, -11, -12, -15, -16, -17, -18, -19, -20, -8, -9
Matrix Spike	Magnesium (Mg)-Total	MS-B	L1840282-7
Matrix Spike	Magnesium (Mg)-Total	MS-B	L1840282-1, -2, -3, -4, -5, -6
Matrix Spike	Magnesium (Mg)-Total	MS-B	L1840282-10, -11, -12, -15, -16, -17, -18, -19, -20, -8, -9
Matrix Spike	Manganese (Mn)-Total	MS-B	L1840282-7
Matrix Spike	Manganese (Mn)-Total	MS-B	L1840282-10, -11, -12, -15, -16, -17, -18, -19, -20, -8, -9
Matrix Spike	Potassium (K)-Total	MS-B	L1840282-7
Matrix Spike	Sodium (Na)-Total	MS-B	L1840282-7
Matrix Spike	Sodium (Na)-Total	MS-B	L1840282-1, -2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Total	MS-B	L1840282-10, -11, -12, -15, -16, -17, -18, -19, -20, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L1840282-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Total	MS-B	L1840282-10, -11, -12, -15, -16, -17, -18, -19, -20, -8, -9
Matrix Spike	Sulfur (S)-Total	MS-B	L1840282-10, -11, -12, -15, -16, -17, -18, -19, -20, -8, -9

## Qualifiers for Individual Parameters Listed:

## Reference Information

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

### Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
<b>ALK-COL-VA</b>	Water	Alkalinity by Colourimetric (Automated)	EPA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
<b>ALK-TITR-VA</b>	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.			
<b>BE-D-L-CCMS-VA</b>	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.			
<b>BE-T-L-CCMS-VA</b>	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
<b>BR-L-IC-N-VA</b>	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
<b>CL-IC-N-VA</b>	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
<b>CN-CNO-WT</b>	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			
<b>CN-SCN-VA</b>	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.			
<b>CN-T-CFA-VA</b>	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.			
<b>CN-WAD-CFA-VA</b>	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.			
<b>COLOUR-TRUE-VA</b>	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.			
<b>EC-PCT-VA</b>	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.			
<b>ECOLI-COLI-HLTH-VA</b>	Water	E.coli by Collert	APHA METHOD 9223
This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture hydrolyzable substrates and then sealed in a multi-well packet. The packet is incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the positive responses to a probability table.			

## Reference Information

<b>F-IC-N-VA</b>	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
<b>HARDNESS-CALC-VA</b>	Water	Hardness	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO <sub>3</sub> equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
<b>HG-D-CVAA-VA</b>	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.			
<b>HG-T-CVAA-VA</b>	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.			
<b>HG-TOT-CVAFS-VA</b>	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).			
<b>IONBALANCE-VA</b>	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]			
<b>MET-D-CCMS-VA</b>	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.			
<b>MET-T-CCMS-VA</b>	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.			
<b>NH3-F-VA</b>	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.			
<b>NH3-F-VA</b>	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.			
<b>NO2-L-IC-N-VA</b>	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.			
<b>NO3-L-IC-N-VA</b>	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.			
<b>PH-PCT-VA</b>	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.			
<b>PH-PCT-VA</b>	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.			

## Reference Information

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

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

**TCOLI-COLI-HLTH-VA**              Water              Total coliform by Colilert    APHA METHOD 9223

This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture hydrolyzable substrates and then sealed in a multi-well packet. The packet is incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is quantified by a statistical estimation of bacteria density (most probable number).

**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". The Total Dissolved Solids result is calculated from measured concentrations of anions and cations in the sample.

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

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

**TSS-VA**                      Water              Total Suspended Solids by Gravimetric    APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.

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

### Chain of Custody Numbers:

#### 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: Shane Ramos  
Suite 100-8081 Lougheed Hwy.  
Burnaby, BC  
V5A 1W9

Report Date: October 21, 2016  
Work Order: 161079

## 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 LC50 toxicity test.

Sample ID	Collection Date and Time	96-h LC50 (%v/v) [95% CL]
L1840282-14 WQ-SEEP-LC50	October 4, 2016 @ N/A	73.5 [67.8 - 79.7]

N/A = Not Available, CL = Confidence Limits.

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

Start Date/Time: Oct 7 116 @ 1605 h

Work Order No.: 161079

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: L184028214 WQ-SEEP-LC50  
Sample Date: Oct 4 116  
Date Received: Oct 7 116  
Sample Volume: 2 x 20 L  
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 CaCO<sub>3</sub>): 10  
Alkalinity (mg/L CaCO<sub>3</sub>): 11

Test Organism Information:

Batch No.: 091416  
Source: Miracle Springs  
No. Fish/Volume (L): 10/12L  
Loading Density (g/L): 0.33  
Mean Length ± SD (mm): 30 ± 1  
Mean Weight ± SD (g): 0.40 ± 0.08

Range: 28 - 31  
Range: 0.29 - 0.53

Zinc Reference Toxicant Results:

Reference Toxicant ID: RTZn50  
Stock Solution ID: 16Zn02  
Date Initiated: Sept 28/16  
96-h LC50 (95% CL): 70.7 (52.0-96.3) mg/L Zn

Reference Toxicant Mean and Historical Range: 63.9 (25.2 - 162.1) mg/L Zn  
Reference Toxicant CV (%): 59%

Test Results: The 96h LC50 is estimated to be 73.5 % (v/v) with 95% confidence limits between 67.8 to 79.7 % (v/v).

Reviewed by: [Signature]

Date reviewed: Oct 21, 2016



### 96-Hour Rainbow Trout Toxicity Test Data Sheet

Client/Project#: ALS  
 Sample I.D.: L1840282-14 WQ-SEEP-LCSO  
 W.O. #: 161079  
 RBT Batch #: 091416  
 Date Collected/Time: October 4/16 @ N/A  
 Date Setup/Time: October 7/16 @ 1605h  
 Sample Setup By: EE YNL  
YNL

Number Fish/Volume: 10/12L  
 7-d % Mortality: 1.3  
 Total Pre-aeration Time (mins): 30  
 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	14.0	/	14.0
pH	7.0	/	7.1
D.O. (mg/L)	9.4	/	9.8
Cond. (µS/cm)	1520	/	1518
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
Control				10	10	10	10	15.0	15.0	15.0	15.0	15.0	9.9	9.8	9.9	9.8	9.8	7.1	6.9	7.0	7.0	7.0	33	42
6.25				10	10	10	10	15.0	15.0	15.0	15.0	15.0	9.8	9.8	9.7	9.7	9.9	7.1	7.1	7.2	7.2	7.2	198	211
12.5				10	10	10	10	15.0	15.0	15.0	15.0	15.0	9.8	9.9	9.8	9.7	9.8	7.1	7.3	7.5	7.5	7.5	359	369
25				10	10	10	10	14.5	15.0	15.0	15.0	15.0	9.8	9.8	9.7	9.8	9.8	7.0	7.4	7.7	7.7	7.7	492	497
50				10	10	10	10	14.5	15.0	15.0	15.0	15.0	9.7	9.9	9.7	9.9	9.9	7.1	7.8	7.9	7.9	8.0	824	840
100				10	10	4	1	14.0	15.0	15.0	15.0	15.0	9.8	9.9	9.8	9.9	9.9	7.1	7.1	7.3	8.3	8.3	1518	1517
Initials				AY	AY	EL	EL	EE	AY	AY	EL	EL	EE	AY	AY	EL	EL	EE	AY	AY	EL	EL	EE	EL

Sample Description/Comments: orange colour, turbid, no odour, no particulates

Fish Description at 96 h: surviving All fish appear normal      Number of Stressed Fish at 96 h: 0

Other Observations: \_\_\_\_\_

Reviewed by: [Signature]      Date Reviewed: Oct 21, 2016

**CETIS Analytical Report**

Report Date: 12 Oct-16 10:33 (p 1 of 2)

Test Code: 161079 | 04-0552-2582

Fish 96-h Acute Survival Test				Nautilus Environmental			
Analysis ID:	19-8363-1501	Endpoint:	96h Survival Rate	CETIS Version:	CETISv1.8.7		
Analyzed:	12 Oct-16 10:27	Analysis:	Trimmed Spearman-Kärber	Official Results:	Yes		
Batch ID:	20-4678-2792	Test Type:	Survival (96h)	Analyst:	Eric Cheung		
Start Date:	07 Oct-16 16:05	Protocol:	EC/EPS 1/RM/13	Diluent:	Dechlorinated Tap Water		
Ending Date:	11 Oct-16 16:05	Species:	Oncorhynchus mykiss	Brine:			
Duration:	96h	Source:	Miracle Springs	Age:			
Sample ID:	00-7200-2930	Code:	44AAD72	Client:	ALS		
Sample Date:	04 Oct-16	Material:	Water Sample	Project:			
Receive Date:	07 Oct-16 08:30	Source:	ALS				
Sample Age:	88h (8.5 °C)	Station:	L1840282-14 WQ-SEEP-LC50				

**Trimmed Spearman-Kärber Estimates**

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	10.00%	1.866	0.01763	73.49	67.76	79.7

**96h Survival Rate Summary**

C-%	Control Type	Count	Calculated Variate(A/B)								
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	1	1	1	1	0	0	0.0%	0.0%	10	10
6.25		1	1	1	1	0	0	0.0%	0.0%	10	10
12.5		1	1	1	1	0	0	0.0%	0.0%	10	10
25		1	1	1	1	0	0	0.0%	0.0%	10	10
50		1	1	1	1	0	0	0.0%	0.0%	10	10
100		1	0.1	0.1	0.1	0	0	0.0%	90.0%	1	10

**96h Survival Rate Detail**

C-%	Control Type	Rep 1
0	Negative Control	1
6.25		1
12.5		1
25		1
50		1
100		0.1

**96h Survival Rate Binomials**

C-%	Control Type	Rep 1
0	Negative Control	10/10
6.25		10/10
12.5		10/10
25		10/10
50		10/10
100		1/10

*EC*  
00-21/16

# CETIS Analytical Report

Report Date: 12 Oct-16 10:33 (p 2 of 2)  
Test Code: 161079 | 04-0552-2582

## Fish 96-h Acute Survival Test

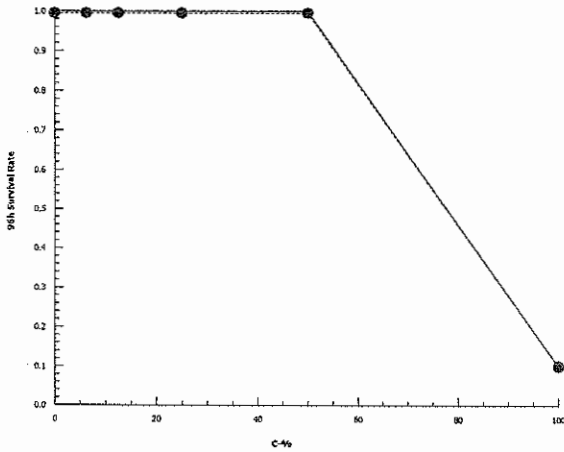
Nautilus Environmental

Analysis ID: 19-8363-1501  
Analyzed: 12 Oct-16 10:27

Endpoint: 96h Survival Rate  
Analysis: Trimmed Spearman-Kärber

CETIS Version: CETISv1.8.7  
Official Results: Yes

### Graphics



*EU*  
Oct-21/16



L1840282

VANCOUVER

Subcontract Request Form

Subcontract To:

NAUTILUS ENVIRONMENTAL

8664 COMMERCE COURT  
BURNABY, BC V5A 4N7

NOTES: Please reference on final report and invoice: PO# L1840282  
ALS requires QC data to be provided with your final results. WC # 161079  
  
RAINBOW TROUT LC50

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

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED	Priority Flag
		DUE DATE	
L1840282-14 WQ-SEEP-LC50	Trout Bioassay LC50 (96 Hour) - Nautilus (TROUT-LC50-96HR-NL 1)	10/4/2016	
		10/17/2016	

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

Please email confirmation of receipt to: **Shane.Ramos@ALSGlobal.com**

Shipped By: PAUL Date Shipped: Oct 7/2016  
 Received By: Nautilus Date Received: Oct 07/16 @ 08:30  
 Verified By: NY - Nari Yamamoto Date Verified: \_\_\_\_\_  
 Temperature: 8.5°C  
 Sample Integrity Issues: 2X 20L blue jugs

(Edi Env.)



<b>Report To</b>		<b>Report Format / Distribution</b>			<b>Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)</b>																		
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 checked="" 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 <a href="mailto:ldoetzel@edynamics.com">ldoetzel@edynamics.com</a>			Specify Date Required for E2, E or P:																		
		Email 2 <a href="mailto:Emilie.Hamm@gov.yk.ca">Emilie.Hamm@gov.yk.ca</a>																					
		Email 3 <a href="mailto:erik.pit@gov.yk.ca">erik.pit@gov.yk.ca</a>																					
<b>Invoice To</b>		<b>Invoice Distribution</b>			<b>Analysis Request</b>																		
Same as Report To <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			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																		
Copy of Invoice with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Email 1 or Fax <a href="mailto:sienner@edynamics.com">sienner@edynamics.com</a>																					
Company: EDI		Email 2 <a href="mailto:ldoetzel@edynamics.com">ldoetzel@edynamics.com</a>																					
Contact: S Jenner		Oil and Gas Required Fields (client use)																					
<b>Project Information</b>		Approver, ID:																					
ALS Quote #: Q55559		Cost Center:																					
Job #: MOUNT NANSEN 16-Y-0089		GL Account:																					
PO / AFE:		Routing Code:																					
LSD:		Activity Code:																					
		Location:																					
ALS Lab Work Order # (lab use only)		ALS Contact: Craig Flaherty			Sampler: GR M																		
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-PCT-VA	EC-PCT-VA	PH-PCT-VA	ANIONS-ALL-IC-WR	TSS-MAN-WR	CN-WAD-CFA-VA	CN-T-CFA-VA	CN-CNO-WT	CN-SCN-VA	NHG-F-VA	MET-T-BCMDG-VA	MET-D-BCMDG-VA	IONBALANC-VA	TDS-CALC-VA	Number of Containers		
	WA-VC-UMN			3 -Oct-16	15:15	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9		
	WA-VC-R			3 -Oct-16	14:30	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9		
	WQ-VC-DBC			4 -Oct-16	16:45	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9		
	WB-BC			4 -Oct-16	18:30	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9		
	WA-VC-U			4 -Oct-16	18:10	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9		
	WQ-TP			4 -Oct-16	12:15	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9		
				-Oct-16		Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R	9		
<div style="border: 2px solid black; padding: 10px; display: inline-block;"> <b>Short Holding Time</b>                  • Rush Processing             </div>																							
<b>Drinking Water (DW) Samples<sup>1</sup> (client use)</b>				<b>Special Instructions / Specify Criteria to add on report (client Use)</b>																			
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																							
Are samples for human drinking water use? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																							
<b>SHIPMENT RELEASE (client use)</b>				<b>INITIAL SHIPMENT RECEPTION (lab use only)</b>						<b>FINAL SHIPMENT RECEPTION (lab use only)</b>													
Released by: ALEX. MISCHLER		Date: 05-OCT-16		Time: 13:55		Received by: [Signature]		Date: 05-OCT-16		Time: 14:06		Received by: [Signature]		Date: 05-OCT-16		Time: 14:40							





L1840282-COFC

<b>Report To</b>		<b>Report Format / Distribution</b>			<b>Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)</b>																		
Company:	EDI	Select Report Format:	<input checked="" type="checkbox"/> PDF	<input checked="" type="checkbox"/> EXCEL	<input type="checkbox"/> EDD (DIGITAL)	<b>R</b> <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3pm - business days) <b>P</b> <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT <b>E</b> <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT <b>E2</b> <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge																	
Contact:	Lyndsay Doetzel	Quality Control (QC) Report with Report	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<b>Specify Date Required for E2,E or P:</b>																		
Address:	2195 - 2nd Avenue Whitehorse, YT Y1A 3T8	<input type="checkbox"/> Criteria on Report - provide details below if box checked																					
Phone:	867-393-4882	Select Distribution:	<input checked="" type="checkbox"/> EMAIL	<input type="checkbox"/> MAIL	<input type="checkbox"/> FAX																		
		Email 1 or Fax:	doetzel@edynamics.com																				
		Email 2:	Emilie.Hamm@gov.yk.ca																				
		Email 3:	erik.pit@gov.yk.ca																				
<b>Invoice To</b>		<b>Invoice Distribution</b>			<b>Analysis Request</b>																		
Same as Report To	<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	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																	
Copy of Invoice with Report	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Email 1 or Fax:	sjenner@edynamics.com																				
Company:	EDI	Email 2:	doetzel@edynamics.com																				
Contact:	S Jenner	<b>Oil and Gas Required Fields (client use)</b>																					
<b>Project Information</b>		Approver ID:																					
ALS Quote #:	Q55559	GL Account:																					
Job #:	MOUNT NANSEN 16-Y-0089	Routing Code:																					
PO / AFE:		Activity Code:																					
LSD:		Location:																					
<b>ALS Lab Work Order # (lab use only)</b>		ALS Contact:	Craig Flaherty		Sampler:	GR AM																	
<b>ALS Sample # (lab use only)</b>	<b>Sample Identification and/or Coordinates</b> (This description will appear on the report)			<b>Date</b> (dd-mmm-yy)	<b>Time</b> (hh:mm)	<b>Sample Type</b>	ALK-PCT-VA	ANIONS-ALL-IC-WR	CN-WAD-CFA-VA	CN-CNO-WT	CN-SCN-VA	NH3-F-VA	MET-T-BCMDG-VA	MET-D-BCMDG-VA	IONBALANC-VA	TDS-CALC-VA	Number of Containers						
	WQ-PC-U			4 -Oct-16	9:40	Water	R	R	R	R	R	R	R	R	R	R	9						
	WQ-PC-D			4 -Oct-16	9:00	Water	R	R	R	R	R	R	R	R	R	R	9						
	WQ-PC-D-R			4 -Oct-16	9:10	Water	R	R	R	R	R	R	R	R	R	R	9						
	WQ-PC-R			3 -Oct-16	16:40	Water	R	R	R	R	R	R	R	R	R	R	9						
	FIELD BLANK			5 -Oct-16	8:50	Water	R	R	R	R	R	R	R	R	R	R	9						
	TRAVEL BLANK			5 -Oct-16		Water	R	R	R	R	R	R	R	R	R	R	9						
				-Oct-16		Water	R	R	R	R	R	R	R	R	R	R	9						
<b>Short Holding Time Rush Processing</b>																							
<b>Drinking Water (DW) Samples<sup>1</sup> (client use)</b>				<b>Special Instructions / Specify Criteria to add on report (client use)</b>																			
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																							
Are samples for human drinking water use? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																							
<b>SHIPMENT RELEASE (client use)</b>				<b>INITIAL SHIPMENT RECEPTION (lab use only)</b>				<b>FINAL SHIPMENT RECEPTION (lab use only)</b>															
Released by:	ALEX. MISCHLER			Date:	05-Oct-16			Time:	13:55			Received by:	[Signature]			Date:	05 Oct 16			Time:	14:40		



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Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



L1840282-COFC

COC Number: 14 -

Page 4 of 5

<b>Report To</b> Company: EDI Contact: Lyndsay Doetzel Address: 2195 - 2nd Avenue Whitehorse, YT Y1A 3T8 Phone: 867-393-4882		<b>Report Format / Distribution</b> Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL) Quality Control (QC) Report with Report <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Criteria on Report - provide details below if box checked Select Distribution: <input type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: ldoetzel@edynamics.com Email 2: erk.pit@gov.yk.ca Email 3: Emille.Hamm@gov.yk.ca		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests) R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days) P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge Specify Date Required for E2, E or P:	
<b>Invoice To</b> Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Copy of Invoice with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Company: EDI Contact: S Jenner		<b>Invoice Distribution</b> Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: sjenner@edynamics.com Email 2: ldoetzel@edynamics.com		<b>Analysis Request</b> Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below	
<b>Project Information</b> ALS Quote #: Q55559 Job #: MOUNT NANSEN 16Y0089 PO / AFE: LSD:		<b>Oil and Gas Required Fields (client use)</b> Approver ID: Cost Center: GL Account: Routing Code: Activity Code: Location:		Rainbow Trout LC50 Number of Containers	
ALS Lab Work Order # (lab use only)		ALS Contact: Sean Stuppert CRAIG FLAHERTY		Sampler: GR AM	
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	Number of Containers
	<del>1650 (WQ-SEEP)</del> WQ-SEEP-LC50	4-Oct-16	11:30	Water	2
<b>Drinking Water (DW) Samples (client use)</b> Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Are samples for human drinking water use? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Special Instructions / Specify Criteria to add on report (client Use)		<b>SAMPLE CONDITION AS RECEIVED (lab use only)</b> Frozen <input type="checkbox"/> SIF Observations <input type="checkbox"/> Yes <input type="checkbox"/> No Ice packs Yes <input type="checkbox"/> No <input type="checkbox"/> Custody seal intact <input type="checkbox"/> Yes <input type="checkbox"/> No Cooling Initiated <input type="checkbox"/>	
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)		FINAL SHIPMENT RECEPTION (lab use only)	
Released by: ALEX. MISCHLER	Date: 05-OCT-16	Time: 13:55	Received by: [Signature]	Date: 2016 5 OCT	Time: 14:00
		Received by: [Signature]		Date: Oct 16	
				Time: 14:40	





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# Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



L1840282-COFC

COC Number: 14 -

Page 5 of 5

<b>Report To</b>		<b>Report Format / Distribution</b>			<b>Select Service Level Below (Rush Turnaround Time (TAT) Is not available for all tests)</b>											
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 checked="" 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 checked="" 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: Emilie.Hamm@gov.yk.ca														
		Email 3: erik.pit@gov.yk.ca														
<b>Invoice To</b>		<b>Invoice Distribution</b>			<b>Analysis Request</b>											
Same as Report To <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below											
Copy of Invoice with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Email 1 or Fax: sienner@edynamics.com														
Company: EDI		Email 2: ldoetzel@edynamics.com														
Contact: S Jenner		Oil and Gas Required Fields (client use)														
<b>Project Information</b>		Approver ID:														
ALS Quote #: Q55559		Cost Center:														
Job #: MOUNT NANSEN 16-Y-0089		GL Account:														
PO / AFE:		Routing Code:														
LSD:		Activity Code:														
LSD:		Location:														
ALS Lab Work Order # (lab use only)		ALS Contact: Craig Flaherty			Sampler: AM GR											
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-PCT-VA, EC-PCT-VA, PH-PCT-VA	ANIONS-ALL-IC-WR, TSS-MAN-WR	CN-WAD-CFA-VA, CN-T-CFA-VA	CN-CNO-WT	CN-SCN-VA	NH3-F-VA	MET-T-BCMDG-VA	MET-D-BCMDG-VA	IONBALANC-VA, TDS-CALC-VA	Number of Containers
	WA - SEEP			04 -Oct-16	11:30	Water	R	R	R	R	R	R	R	R	R	9
	WA - SEEP - R			04 -Oct-16	11:40	Water	R	R	R	R	R	R	R	R	R	9
	WA - DC - DX + 105			03 -Oct-16	18:25	Water	R	R	R	R	R	R	R	R	R	9
	WA - DC - D1b			3 -Oct-16	19:25	Water	R	R	R	R	R	R	R	R	R	9
	WA - DC - B			4 -Oct-16	12:40	Water	R	R	R	R	R	R	R	R	R	9
	WA - DC - U			4 -Oct-16	10:55	Water	R	R	R	R	R	R	R	R	R	9
				-Oct-16		Water	R	R	R	R	R	R	R	R	R	9
<b>Short Holding Time Rush Processing</b>																
<b>Drinking Water (DW) Samples<sup>1</sup> (client use)</b>				<b>Special Instructions / Specify Criteria to add on report (client Use)</b>												
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				Frozen: <input type="checkbox"/> SIF Observations: Yes <input type="checkbox"/> No <input type="checkbox"/>												
Are samples for human drinking water use? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				Ice packs: Yes <input type="checkbox"/> No <input type="checkbox"/> Custody seal intact: Yes <input type="checkbox"/> No <input type="checkbox"/>												
SHIPMENT RELEASE (client use)				Cooling Initiated: <input type="checkbox"/>												
Released by: ALEX MISCHLER				INITIAL SHIPMENT RECEPTION (lab use only)												
Date: 05-Oct-16 Time: 13:55				INITIAL COOLER TEMPERATURES °C: 7.5												
Received by: [Signature]				FINAL SHIPMENT RECEPTION (lab use only)												
Date: 05-Oct-16 Time: 14:06				FINAL COOLER TEMPERATURES °C: 4.10/NA												
Received by: [Signature]				Date: 05/16 Time: 14:40												

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM 02/26 v09 Form 04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



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

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

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

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

**Contact Information • Coordonnées de la personne ressource**

Contact Person **LYNDSAY DEETZEL** Phone **867-393-4882**  
Personne ressource  
Mailing address **EDI ENVIRONMENTAL DYNAMICS** Fax  
Adresse postale **2195 2ND AVENUE WHITEHORSE, YT** Téléphoneur  
**EDI ENVIRON NENTAL DYNAMICS** Postal code **Y1A 3T8**  
First Nation, Municipal or Business Name  
Nom de la Première nation, de la municipalité ou de l'entreprise  
Agent  
Agent  
Fax  
Télécopieur

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

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

**Sample Collection / Prélèvement de l'échantillon**

Sample Collected By **G.RIVEST** Date **16/10/05** Time **9:30 am**  
Échantillon prélevé par  
Sampling Site (e.g., kitchen tap) **PUMP HOUSE WELL** Previous Sample Number  
Point d'échantillonnage (ex. : robinet de cuisine)  
Is this a Resample from a Previous Test?  Yes  No  
Est-ce un deuxième échantillon d'un test antérieur?  Oui  Non Numéro de l'échantillon précédent

**Sample Supply / Source d'approvisionnement en eau**

Public Supply  Bulk Water Distributor  Business  Private Residence  
Municipal - par canalisation Municipal - par camion Privé - entreprise Privé - résidence

**Sample Source / Provenance de l'échantillon**

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

**Water Treatment / Traitement de l'eau**

Is the Water Chlorinated?  Yes  No Free Available Chlorine \_\_\_\_\_ ppm  
L'eau contient-elle du chlore? Oui Non Chlore libre disponible mg/L  
Other Treatment Systems (e.g., UV, softener, filter) \_\_\_\_\_  
Autre dispositif de traitement (ex. : désinfection aux rayons UV, adoucisseur d'eau, filtre) \_\_\_\_\_

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

Receipt of Sample **16/10/05** Time **1:45 am** By **S.**  
Réception de l'échantillon YYMM/DD - AAAAMMUU Heure Par  
Condition of Sample  Satisfactory  Unsatisfactory Details **4.8**  
État de l'échantillon Satisfaisant Non satisfaisant Précisez  
Incubation Date **161005** Time **2:45 am** By **S.** Incubator **4**  
Incubateur YYMM/DD - AAAAMMUU Heure Par Par Incubateur  
Analysis Completed **161006** Time **2:45 am** By **S.**  
Analyse terminée YYMM/DD - AAAAMMUU Heure Par Par

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

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

**Comments / Commentaires**

Report Authorized By Position **WISA** Date **161005**  
Rapport autorisé par Poste YYMM/DD - AAAAMMUU

Distribution: White - Chain of Custody Yellow - Lab Copy Pink - Client Copy  
Distribution: Blanc - Chaîne de possession Jaune - Laboratoire Rose - Client  
Sample Number : **67318**  
Numéro de l'échantillon