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EDI Project No: 15Y0146

Assessment and Abandoned Mines Branch (AAM) K-149
Department of Energy, Mines and Resources, Yukon Government
Room 2C Royal Center, 4114-4th Avenue
PO 2703, Whitehorse, YT, Y1A 2C6

Attention: Erik Pit, Type II Project Manager

RE: Mount Nansen Water Resources Investigations – Monthly Report: October 2015 & Seasonal Analysis

Trip dates:	October 13-15, 2015
EDI field staff:	Scott Dilling, Brodie Smith and Danny Skookum
Weather during trip:	Conditions for the three days included air temperatures from -5 to 3°C, with clear to partly cloudy skies, and calm to light winds.

The following monthly report includes a summary of site conditions and data collected during EDI's October 2015 trip to Mount Nansen as part of the 2015/16 Water Resources Investigations. The October 2015 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, 2015 to October 15, 2015). See Table 1 for a summary of data included in this report.

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

Report Section	Description
Site Conditions	• Summary of weather and general site conditions
Meteorology	• Statement on station status and identification of any data gaps or QA/QC issues • Seasonal Meteorological Summary: summary of April – October 2015 meteorology
Hydrology	• Discussion of noteworthy hydrology observations for this month • Statement of QA/QC for the data collected this month • Seasonal Hydrologic Summary: summary of April to October 2015 hydrology
Water Quality	• Summary of noteworthy water quality observations for this month • Statement on QA/QC sample results for this month
Program Recommendations	• Program recommendations for meteorological, hydrology and water quality programs
Additional Trip Information	• Project Safety Concerns • Wildlife sightings • Budget and schedule considerations

Report Section	Description
List of Attachments	• Maps of stations and sites • Site and station photos (October Trip) • Data Tables (October Data) – hydrology and water quality • Meteorology Plots – Open-water Season • Rating Curves – Open-water Season • Hydrographs – Open-water Season • Water quality lab result reports

SITE CONDITIONS

The October 2015 site trip represents autumn conditions at the Mount Nansen site. Air temperatures were cooler than last trip, ranging from -5 to 3°C. Ice was forming along most watercourses and waterbodies (ice thickness ranged from 1-6 cm). The tailings pond was completely ice covered. Water levels were lower than during the September 2015 trip. Many seeps were dry (WQ-LW-SEEP-01, WQ-MS-S-08, WQ-ADIT-SEEP, WQ-DESS-02, and WQ-DESS-03).

Pony Creek upstream of H-PC-DSP and WQ-PC-U remains impacted by placer activity, although the placer operation appeared to be inactive during the sampling event and has likely shut down for the season. A moderate flowrate of water continues to flow over the embankment of the settling pond and downstream through the creek channel. Conditions at the Pony Creek water quality sites and hydrometric station are still not considered representative of normal flow patterns or water quality within Pony Creek.

METEOROLOGY

Meteorological data was collected at the ATM-ROAD station throughout the month of October 2015. EDI conducted a preliminary QA/QC review of the October 2015 data and all sensors appear to be functioning as expected. There was no snow on site during the October investigation, which corresponded with a snow sensor measurement of 0.64 cm, on October 13, 2015. This indicates so far that the snow sensor is overestimating snow depth. Meteorological data for the open-water season (April 1, 2015 to October 15, 2015) has been analyzed and is summarized below.

Table 1. 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[1]	Difference (cm)
October 13, 2015 1:00 pm	0.00	0.64	181 (Good)	0.64

Note:

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

Seasonal Meteorological Summary: April 1, 2015 – October 15, 2015

Telemetry system and snow sensor maintenance was conducted on the meteorological station by Northern AvCom on July 9, 2015. The maintenance did not result in any data gaps and it did include the installation of a flat concrete surface for the snow sensor target. An additional snow sensor data quality metric called 'Snow_Depth_Qual" was added in the daily data record; the data quality metric reflects the quality of the measurement (see Note 1, Table 1).

Seasonally typical air temperatures were recorded between April 1 and October 15, 2015; mean daily air temperatures began to rise above 0°C starting on April 19, 2015 and were consistently above 0°C starting on May 5, 2015. In the fall, mean daily temperatures fell below 0°C on September 29, 2015. July had the highest mean monthly temperature at 11.0°C, and April had the lowest mean monthly temperature at -1.1°C. The maximum hourly temperature recorded during the reporting period was 23.5°C on July 6, 2015, while the lowest recorded temperature was -10.6°C on April 13, 2015. Temperature ranges and means for all months in the open-water season can be found in Table 2. Daily air temperature fluctuations throughout the open water season can be seen in more detail in Attachment 4A: Figure 1.

The ground surface temperature record followed similar seasonal patterns as air temperature. The daily average ground surface temperature was above 0°C starting on May 5, 2015, and began dropping below 0°C on September 23, 2015. The maximum ground temperature was 27.1°C on June 19, 2015, and the minimum ground temperature was recorded on April 13, 2015 at -6.4°C. For more detail, see Attachment 4A: Figure 1.

Seasonal rainfall patterns were characteristic of the region for the April 1 to October 15, 2015 period, where summer storms in July and August represented the most intense and highest monthly rainfall totals. Total monthly rainfall in the month of August was the highest of the season (97.9 mm) and included nine precipitation events. August also had the highest total daily rainfall (26.7 mm) and the highest hourly rainfall intensity (5.0 mm/hr) on August 11, 2015 at 17:00; the total duration of this storm was 32 hours and it produced a total of 29.0 mm of rain (see Table 2). The large precipitation event that occurred on August 27 for a duration of 21 hours produced a total of 29.7 mm of rain; this event was significant because it produced a pronounced hydrologic response recorded at all hydrometric stations. For more detail on rainfall throughout the season, see Attachment 4A, Figure 2. In total, 30 rain storms occurred during the season; more information on these events can be found in Attachment 4A: Table 2.

Table 2. Mount Nansen air temperature and rainfall statistics by month (April 1 to October 15, 2015).

Month	Air Temperature			Rainfall		
	Max (°C)	Min (°C)	Mean (°C)	Max Intensity (mm/hr)	Max Daily Total (mm)	Total Monthly (mm)
April	6.9	-10.6	-1.1	3.8	5.1	6.1
May	22.8	-2.3	9.8	1.5	2.9	8.3
June	20.2	1.4	10.1	2.2	7.4	25.2
July	23.5	1.2	11.0	4.8	12.4	57.2
August	21.0	-2.2	8.1	5.0	26.7	97.9
September	12.1	-5.6	3.0	3.7	9.2	26.3
October	5.8	-8.5	-0.5	1.4	5.2	11.6

The depth of the snowpack at the end the 2014/15 winter period was 51.6 cm on April 1, 2015. Snow was present on the ground at the meteorological station until the first week of May 2015. The snow sensor recorded erroneous data (e.g., -200 cm) on May 9, 2015 (03:00, 04:00) and May 10, 2015 (10:00, 11:00); this data was removed from the final dataset for reporting but remains in the raw data files. At the onset of the 2015/16 winter there were four minor snowfall events; two on September 26, one on each of October 1 and October 12. Snowfall from each event except the one on October 12 subsequently melted and did not accumulate. For more detail, see Attachment 4A: Table 1 and Figure 3.

The dominant wind directions during the season were northerly to north-easterly (see Attachment 4a: Figure 4). The maximum mean hourly wind speed recorded during this period was 10.8 m/s (38.8 km/hr) on September 30, 2015. The month with the highest mean wind speed was April at 3.2 m/s (11.52 km/hr), while August had the lowest mean monthly wind speed at 1.9 m/s (6.84 km/hr) (see Attachment 4A: Figure 5).

Net radiation during the open-water season ranged from a minimum of -91.2 W/m^2 on September 30, 2015 to a maximum recorded net radiation of 645.6 W/m^2 on June 6, 2015. June had the highest mean monthly net radiation at 121.7 W/m^2, while October had the lowest monthly mean net radiation at 1.3 W/m^2. For more detail, see Attachment 4A: Figure 6.

Mean daily relative humidity ranged from 42.6% (April) to 75.4% (October). The maximum recorded relative humidity occurred 99.1% on both May 27 and October 10, 2015. The minimum recorded relative humidity was 15.0% on May 17, 2015. For more detail, see Attachment 4A: Figure 7.

HYDROLOGY

Discharge measurements were collected at all stations with suitable conditions during the October 2015 trip. Water levels decreased throughout the Mount Nansen Site watershed since the September 2015 trip.

Continuous water level records are available for nine stations for the period up to October 15, 2015: H-DC-B, H-DC-M WP, H-DC-R, H-BC, H-VC-U, H-VC-DBC, H-VC-UMN and H-VC-R. Several continuous water level loggers were removed for the winter period because the channels typically freeze to bed. The loggers were removed from H-DC-B, H-DC-R, and H-BC (Note: instantaneous discharge measurements will still be collected as conditions allow through the winter).

See attached data tables for a summary of surface water conditions and hydrometric monitoring tasks completed at each station for October 2015 (Attachment 3). Quality control and quality assurance was conducted for all hydrometric data. Noteworthy observations are included below. Hydrometric data for the period April 1, 2015 to October 15, 2015 has been analyzed and summarized in the Seasonal Hydrometric Summary section.

Noteworthy Observations - October

- Discharge measurements were collected with an ADV at H-VC-U, H-VC-DBC, H-VC-UMN, H-VC-R and H-VC-R+290 with discharge values ranging from 0.192 to 0.464 m^3/s. These values were lower than the flows observed in September 2015 which ranged from 0.856 to 1.315 m^3/s.
    - The discharge patterns along Victoria Creek in October 2015 show a normal progression with discharge increasing at each subsequent downstream station (similar to the August 2015 and September 2015 discharge pattern); with one exception being the H-VC-R and H-VC-R+290 stations. The discharge value was lower at the downstream station, H-VC-R+290 (0.398 m^3/s) than at H-VC-R (0.464 m^3/s); additional concurrent measurements will be obtained in the future to verify this hydrologic relationship
- Back Creek was flowing during this trip. Discharge was measured with a salt tracer and was 0.009 m^3/s, which was lower than the September 2015 value (0.099 m^3/s). There was ice within the channel during the discharge measurement, which adds uncertainty to the discharge value.
- The Pony Creek watershed continues to be influenced by placer activity upstream, as flow is controlled by overflow from the settling pond, thus discharge values may be attenuated and not representative of typical conditions in Pony Creek. The discharge value collected at H-PC-DSP in October 2015 was 0.003 m^3/s.
- Discharge measurements within Dome Creek were conducted using salt tracer tests and volumetric methods. The discharge values measured using salt tracers at H-DC-B and H-DC-R, were 0.009 and 0.024 m^3/s, respectively. Volumetric measurements were collected at H-DC-DX+105, H-DC-D1b and H-DC-M WP, and were 0.002, 0.006 and 0.011 m^3/s, respectively.
- Fine sediment deposition in the weir pond at H-DC-M WP was cleared out during the October 2015 trip; sediment deposited in the stilling well was also flushed out. Additional excavation may be required in the spring of 2016. All water is flowing though the weir. Instantaneous discharge measurements were obtained at this station without issue; however, there is still some concern

that the sedimentation is producing channel instability, rating curve shifts and continuous stage data errors for this station in the open-water season. See the Seasonal Hydrologic Summary section below on whether a rating curve could be developed for this station.

Seasonal Hydrologic Summary: April 1, 2015 to October 15, 2015

Stage-discharge rating curves were developed for all hydrometric stations with continuous water level loggers at the Mount Nansen Site. These include H-DC-B, H-DC-M WP, H-VC-U, H-VC-DBC, H-VC-UMN and H-VC-R. This list excluded two stations with continuous water level loggers; H-PC-DSP and the new station, H-VC-R+290. The H-PC-DSP logger functions as a record of stage and hydrologic response only because the channel cross-section is non-ideal for stage discharge rating curve development. The new station on Victoria Creek (H-VC-R+290; 290 m downstream of H-VC-R) was installed in September 2015 to avoid winter ice accumulations and therefore there were insufficient open-water rating measurements to develop a rating curve. While a rating curve was developed for H-DC-M WP, sediment sourced from the diversion channel reach has deposited upstream of the weir, shifting the channel geometry and theoretically, the stage-discharge relationship. While some rating curve shifts may have occurred, they were not readily detectible in the data and therefore a curve was developed.

The continuous records of stage (water level) were converted to discharge using the rating curve equations, and hydrographs were produced. The rating equations for each station and the hydrographs are compiled in Attachment 4B. Hydrographs for hydrometric stations where only instantaneous discharge measurements were collected, including the flows out of the seepage pond recorded by Denison Environmental Services (DES) are also compiled in Attachment 4B.

The upper Dome Creek watershed hydrographs (Attachment 4B, Figure 4B.1) showed that flows at the downstream station, H-DC-D1b were typically 0.002 m^3/s higher than those at H-DC-DX+105 except during the September trip that occurred after a number of larger storm events in the weeks and months prior. The freshet flow at H-DC-M WP and H-DC-R were not captured by the continuous water level loggers; however, the logger at H-DC-B was in place during the snowmelt peak and was estimated to be 0.11 m^3/s on May 9, 2015 compared to the rain storm event related flow of 0.51 m^3/s on August 27, 2015.

Pony Creek Downstream of the Pit (H-PC-DSP) was influenced throughout the open water season by placer mining activity immediately upstream of the hydrometric station. Mining activity was first observed on the June 15, 2015 site visit. The flow regime in Pony Creek appeared to be substantially altered when mining operations were active. For example, stage fluctuated mid-day corresponding with pumping and water management operations in August; and, site visits in June and July corresponded with zero flow at the station (stage recorded below 0.13 m, local datum, correspond with standing water at the stilling well).

Flow in Back Creek was at or near 0.000 m^3/s at every visit except those that occurred in August and September. Extensive ice conditions in April, May and June forced flow into multiple channels outside the main channel and into Victoria Creek upstream of H-VC-U; as a result, the snowmelt peak could not be

measured. This extent and thickness of ice formation at the end of the 2014/15 winter was unusual and delayed measurements until later in the season. Back Creek flows increased in response to the August rain storm events, particularly to the event that began on August 27 where flows are estimated to have increased to a peak of 0.67 m^3/s.

Two snowmelt peaks were recorded in the Victoria Creek watershed and occurred on May 10, and May 15, 2015 respectively; the second peak was lower than the first (Attachments 4B, Figures 5 to 12). The sites visits on May 4 to 5 and May 12 to 14, 2015 appear to have occurred several days before and after the peak flows events were recorded in the Victoria Creek watershed. The continuous loggers in place at H-VC-DBC, H-VC-UMN, and H-VC-R captured the timing and magnitude of the snowmelt related peak flows; the following list summarizes the peak discharges recorded at the Victoria Creek stations:

- H-VC-U: May 13 = 2.3 m^3/s; August 28 = 4.3 m^3/s
- H-VC-DBC: May 10 = 2.7 m^3/s; May 13 = 2.7 m^3/s; August 28 = 5.1 m^3/s
- H-VC-UMN: May 10 = Discharge estimate not available due to backwater from ice near the Victoria Road culvert; August 28 = 5.5 m^3/s.
- H-VC-R: May 9 = 4.08 m^3/s; May10 = 4.8 m^3/s; August 28 = 6.4 m^3/s

Prohibitive ice conditions typically inhibit the reinstallation of data loggers and measurement of the peak flows in the Dome Creek watershed; however a logger was in place at H-DC-B during this spring period and snowmelt peaks were recorded (Attachment 4B, Figure 2).

Following the snowmelt peak, flows declined substantially and remained low until the beginning of August. The month of August was characterized by nine substantial rainfall events that increased flow in all watercourses in a step-like fashion. A rainstorm that began on August 27 produced high flows on August 28 at all the hydrometric stations these flows were in many cases twice as high as the snowmelt peaks (Attachment 4B, Figures 13 and 14). It is theorized that by the end of August the watershed were saturated and the hydrologic response in the creeks were rapid after this event.

All hydrographs, rating curve equations and the rating measurements are compiled in Attachment 4B.

WATER QUALITY

Water quality samples and data were collected at the regularly scheduled sites during the October 2015 trip. Additional samples were also collected within the Upper Dome Creek and mill area as part of an extra investigation, taking place during the August, September and October 2015 site visits. A total of 18 normally scheduled sites were sampled and 6 additional sites were sampled during the October 2015 trip. As noted above in the 'Site Conditions' section, the WQ-LW-SEEP, WQ-MS-S-08 and WQ-ADIT-SEEP were all dry during this trip (consistent with previous trips) and the WQ-DESS-02 and WQ-DESS-03 sites were also dry. The regular monthly drinking water sample was collected from the pumphouse well (WQ-PW).

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

Noteworthy Observations - October

- Placer mining activity was ongoing on **Pony Creek** upstream of the two water quality sites, although pumps were not running at the time of sample collection, with water flowing freely over an earth dam, thus samples are not considered representative of typical results for the creek.
    - Both sites had moderate turbidity, 15.9 NTU at WQ-PC-U and 24.4 NTU at WQ-PC-D.
    - The WQ-PC-U samples exceeded the CCME-AL guidelines and/or the Mount Nansen EQS for total aluminum, arsenic, iron, lead. The dissolved iron concentration also exceeded the CCME-AL guideline. This is an improvement over the previous sampling results from August 2015 when there was higher turbidity and TSS resulting in additional metals parameters with concentrations above guidelines values (such as copper). Samples from this site in the past do not typically exceed any guidelines or standard criteria, as the site is located upstream of Mount Nansen Site activities, which suggests that the results from August to October 2015 are a result of placer activities upstream.
    - The WQ-PC-D samples exceeded the CCME-AL guidelines and Mount Nansen EQS for total aluminum, arsenic, cadmium, copper, iron, zinc, as well as dissolved aluminum, cadmium, iron and zinc. These are similar results to the previous results from August and September 2015. Samples from this site commonly have high concentrations of these metals, which are associated with an old waste rock pile that the creek runs through directly upstream of the sample site. The placer activity upstream is also contributing to some of the higher metals concentrations at this site, based on water quality upstream at WQ-PC-U.
- **Back Creek** was flowing during the sampling event. The creek was less turbid than during the previous sampling event, with a turbidity of 11.9 NTU compared to 32.1 NTU (September 2015 trip) and 267 NTU (August 2015 trip). Several parameters exceeded the guideline and/or standard criteria for total aluminum, iron, and manganese. Concentrations of most metals were still lower than during the September 2015 trip where the CCME-AL guidelines were exceeded for aluminum, arsenic, cadmium, copper and iron.

- The **Victoria Creek** samples did not exceed any guidelines or standard criteria during the October 2015 trip.
- The **Victoria Creek** sites downstream of Back Creek (WQ-VC-DBC) and Dome Creek (WQ-VC-UMN and WQ-VC-R), had samples that exceeded guidelines and/or standards for aluminum, copper (only WQ-VC-R) and iron. These results are likely related to contributions from Back Creek.
- The total zinc concentration in the October 2015 **WQ-SEEP** sample was above the CCME-AL guideline with a concentration of 0.0679 mg/L (an increase from 0.0436 mg/L in September 2015 and 0.0196 mg/L in August 2015). This site also commonly exceeded guidelines and/or standards for ammonia, arsenic, cadmium, iron, and manganese.
- The following observations are a summary of results from the **extra water quality investigations along Upper Dome Creek and the mill site area**:
    - The WQ-DC-14 site (upstream of WQ-DC-DX+105 and WQ-DC-15) was frozen/dry during the October 2015 trip. This site had been flowing during the September 2015 trip.
    - WQ-DC-15 was sampled during the October 2015 trip, as there was flow at this site (which is downstream from WQ-DC-14, which was dry). Similar to the September 2015 trip, there was also a noticeable change in the in-situ water quality with an increase in specific conductivity and a decrease in dissolved oxygen compared to WQ-DC-DX upstream, likely related to groundwater influence. The WQ-DC-15 sample had similar water quality to WQ-DC-DX+105 site, with higher total dissolved solids compared to the upstream WQ-DC-DX site, and higher concentrations of ions and metals. The WQ-DC-15 samples exceeded the guidelines and/or standards for fluoride, arsenic, cadmium, iron, manganese, and zinc. Note the WQ-DC-DX site exceeded the guidelines for aluminum and iron only.
    - Downstream of WQ-DC-DX+105, samples were collected at WQ-DC-11, which had similar water quality to the WQ-DC-DX+105 site.
    - The WQ-MS-S-03 sample was also sampled as part of the extra investigation, and had the highest total and dissolved zinc concentration of any samples collected during the extra investigation (total zinc 0.881 mg/L and dissolved zinc 0.835 mg/L). The WQ-MS-S-03 also exceeded the guideline for total suspended solids (TSS), fluoride, aluminum, arsenic, cadmium, copper, iron, lead, manganese, mercury and silver.
    - The samples collected from WQ-DC-10 exceeded similar guidelines and standard criteria to sites upstream (WQ-MS-S-03, WQ-DC-11, and WQ-DC-DX+105).
    - The WQ-DC-8 samples exceeded the guidelines and/or standards for TSS, aluminum, arsenic, cadmium, iron, lead, manganese, silver and zinc (similar to previous results).
    - The WQ-MS-S-A was sampled during the October 2015 sampling event. The samples exceeded the guidelines and/or standards for TSS, fluoride, aluminum, arsenic, cadmium, copper, iron, lead, manganese, silver and zinc (similar to the September 2015

results). The total and dissolved zinc concentrations were lower than other samples collected during the extra investigation (0.223 mg/L and 0.203 mg/L for total and dissolved zinc, respectively).

QA/QC Samples

Travel Blank Sample – all parameters were below detection limits.

Field Blank Sample – all parameters were below detection limits.

Replicate Sample(s) – the average RPD of the replicate sample set for WQ-VC-UMN-r, WQ-DC-DX+105-01-r, and WQ-DC-B-r was 6%, 2% and 4%, respectively. The average RPD for total metals in the three replicate samples was 7%, 3% and 7%, respectively. The average RPD for dissolved metals was 7%, 1% and 3% in the three replicate sets. Individual RPDs of all parameters were <20% different for the WQ-DC-DX+105-r and WQ-DC-B-r replicate sets, indicating that sample analysis was adequately precise. For WQ-VC-UMN-r set there were two parameters with RDP>50% (total chromium and dissolved zinc). RPD >%50 indicate problems or errors in the laboratory analysis that affect precision of the analytical results. The WQ-VC-UMN replicate sample results appear to be within the range of variability for the site, and are well below any guideline or standard criteria. A review of the total chromium and dissolved zinc concentrations for all other samples was conducted to detect if there were any suspect data or potential errors in the other lab results. All total chromium and dissolved zinc concentrations for other samples appeared to be within the range of variability based on previous data for each site. If potential errors had been detected in other sample data, re-analysis of the samples in question would be requested from the lab; however, this is not necessary for this instance.

PROGRAM RECOMMENDATIONS

- During each winter trip, collect photographs and snow depths adjacent to the meteorological station compound to confirm snow sensor data.
- Discharge measurements should continue to be collected at the H-VC-R and H-VC-R+290 stations using the mid-section ADV method to compare hydrometric conditions at the two stations during the November and December 2015 site visit where possible.
- EDI will be testing new sensors and instrumentation (Sommer Flow Tracer) for salt tracer discharge measurements during the November 2015 trip. This instrument will allow for real-time data review and discharge computations which enhances field based quality control. The Sommer Flow Tracer is anticipated to increase the efficiency and cost effectiveness of post-field data processing.
- Where feasible, EDI will collect concurrent discharge measurements wherever salt tracer tests are completed during the 2015/16 winter season using a secondary method (such as volumetric). The secondary measurement is used to validate the salt tracer measurements if poor hydraulic conditions are present due to complex ice formations.

- Monitor sediment deposition in the H-DC-M WP station weir pond and recommend excavation as required.
- Monitor the WQ-LW-SEEP-01, WQ-MS-S-08 and WQ-ADIT-SEEP during the November 2015 trip, in order to collect opportunistic samples if flowing (these sites were dry during the May, June, July, August, September and October 2015 trips, except for WQ-MS-S-08 in May 2015). The November trip is likely the last opportunity to collect water at these sites before winter.

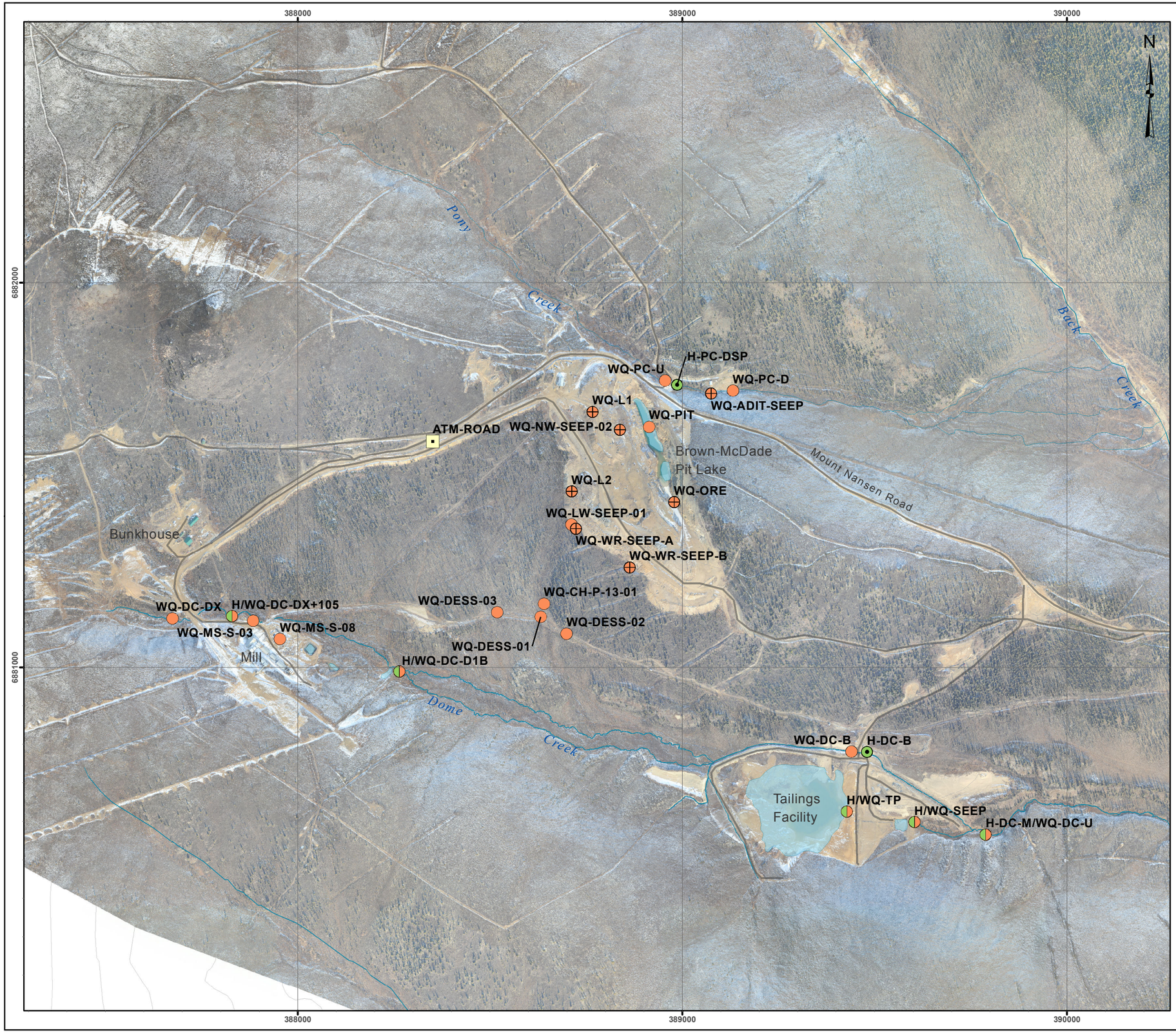
ADDITIONAL TRIP INFORMATION

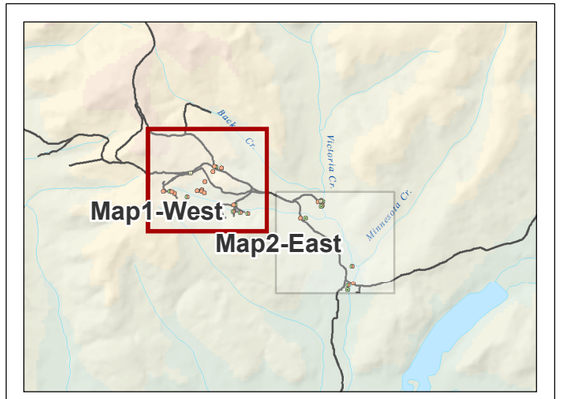
Any changes to project scope (i.e. additional sites sampled):	The next trip is scheduled for November 16-18, 2015 and will represent the first sampling event of the winter season. The October 2015 trip included additional sampling and extra water quality investigations into the Upper Dome Creek/mill site area, where 6 additional samples were collected. These will be covered by the contingency fund in the budget (see below). No sampling of the extra investigations of Upper Dome Creek and the mill area is planned for the November 2015 trip, as the investigation was intended to take place only during the August, September and October 2015 trips.
Any alterations to sample schedule/budget:	The extra water quality investigation on Upper Dome Creek and the mill site area, as discussed with AAM, will come out of the contingency fund for the project. Based on additional lab fees, external markup 5%, consumables, additional field and reporting time, the estimated total for this additional work is **$2,365.40.**
Additional Comments:	**Pony Creek** still impacted by upstream placer operation (although currently not active), water is flowing over the embankment of the settling pond to areas downstream. The water quality and hydrometric results may not be representative of typical water quality and quantity conditions in Pony Creek. Excavation and maintenance of the **H-DC-M WP** station weir pond was conducted during the October 2015 trip.
Wildlife Sightings:	None.
Site concerns (safety):	None.

LIST OF ATTACHMENTS

The following information is attached to this monthly report:

1. Maps of Hydrometric Stations and Water Quality Sites
2. Site and Station Photos from the trip
3. Data Tables (October 2015 trip)
    A. Hydrology – Site Conditions and Tasks Completed & Summary Table of Discharge Measurements.
    B. Water Quality – Site Conditions and Samples Collected & Summary Table of In Situ Parameters and Lab Results
4. Seasonal Data Summary: April 1, 2015 – October 15, 2015
    A. Meteorology – rainfall and snowfall summary data tables, data plots
    B. Hydrology – rating measurements, rating curve equations, hydrographs
5. Copies of Lab Certificate of Analysis (COA) & Yukon Environmental Health Services Bacteriological Results (October 2015)





Legend

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

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

Notes:

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

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

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

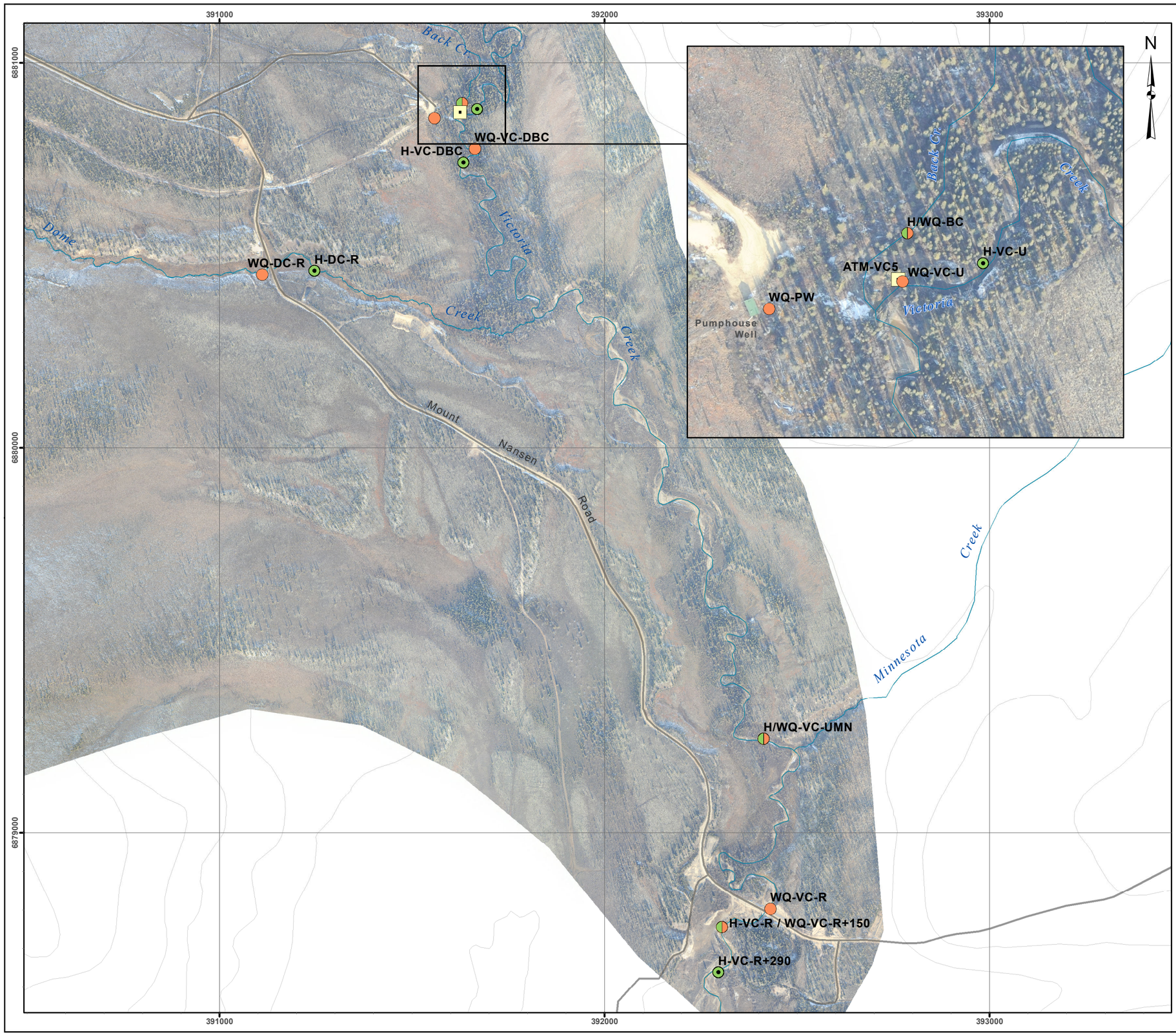
Project data displayed is site specific. Data collected by EDI Environmental Dynamics Inc. (2015) was obtained using Garmin GPS technology.

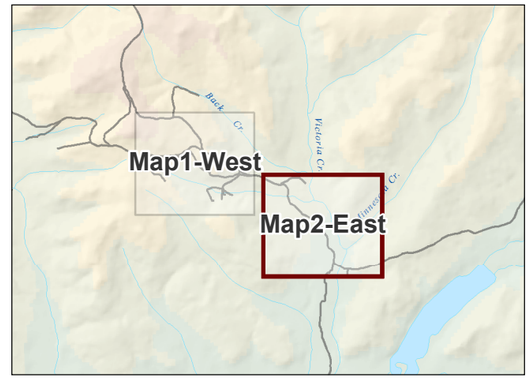
0 50 100 200 300 400 500
metres

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

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

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





Legend

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

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

Notes:

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

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

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

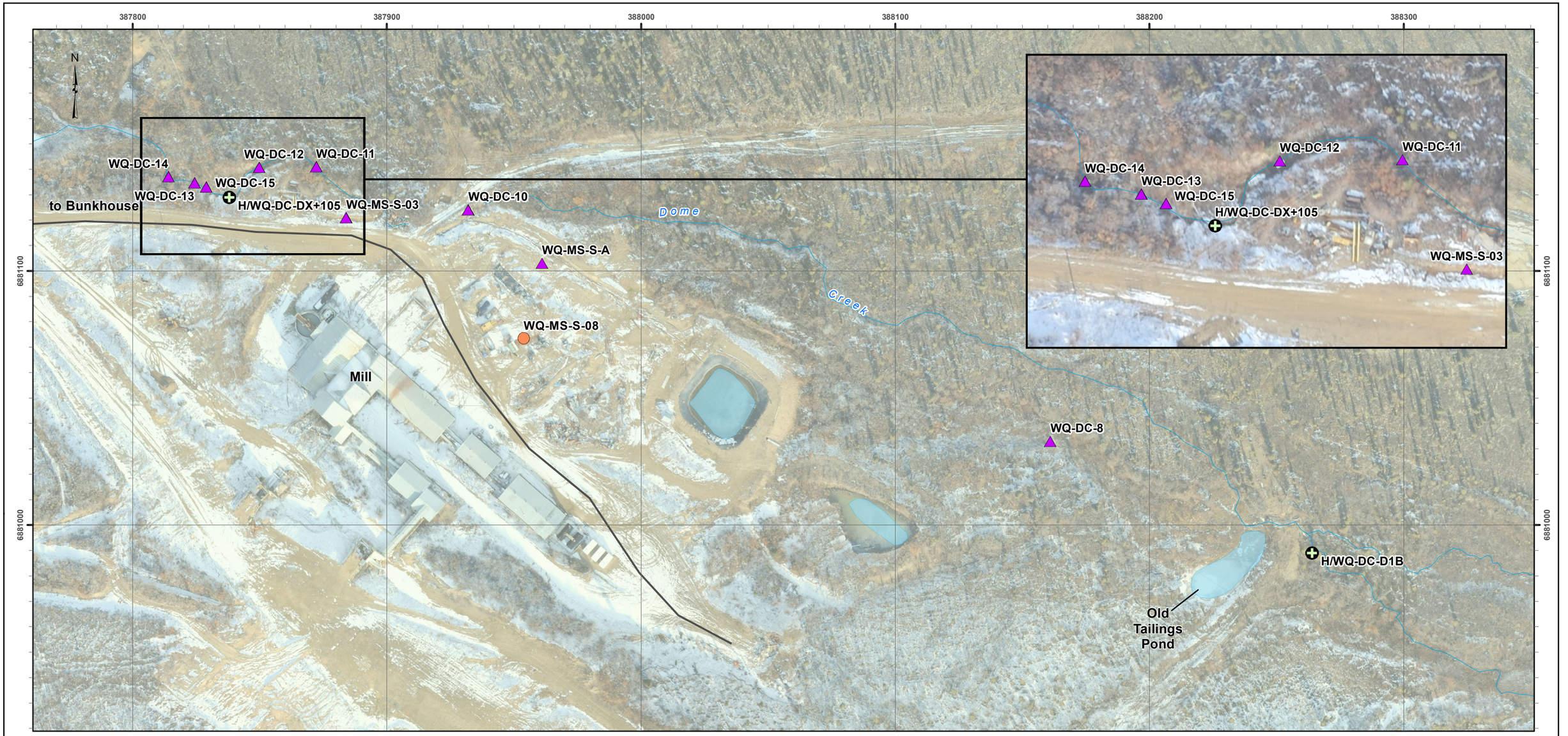
Project data displayed is site specific. Data collected by EDI Environmental Dynamics Inc. (2015) was obtained using Garmin GPS technology.

0 50 100 200 300 400 500
metres

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

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

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



Dome Creek Investigation Sites

Legend

- Investigation Site
- Hydrometric Station and Water Quality Site
- Water Quality Site (label e.g. WQ-PC-U)
- Unpaved Road/Access

1 centimetre = 15 metres

Map Projection: North American Datum 1983 UTM Zone 8N

0 20 40 60 80 100

Metres

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.

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

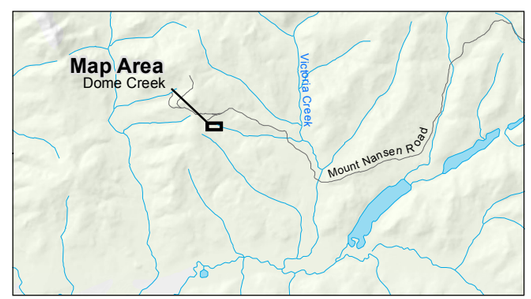
Watercourse, drainage areas and Mount Nansen Road layers digitized / modified by EDI (2011) using orthophotos provided by Yukon Government, Energy, Mines and Resources (2011).

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.

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

Drawn:	Checked:	MAP 3	Date: 23/09/2015
MP	MM/SD		



Path: J:\Yukon\Projects\2015\15Y0146_AAM_Mount_Nansen\Mapping\FinalMaps\Map3_DomeInvestigationSites_21Sept2015.mxd

Photo 1. WQ-DC-DX – looking upstream.

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

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

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

Photo 5. WQ-DC-B – looking upstream.

Photo 6. H-DC-B – looking downstream.

Photo 7. H-DC-M WP – looking upstream showing accumulated sediment.

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

Photo 9. WQ-DC-R – looking upstream.

No Photo

Photo 10. H-DC-R – NO PHOTO AVAILABLE.

Photo 11. WQ-DESS-01 – looking upstream.

Photo 12. WQ-DESS-02 – looking upstream (site dry – insufficient flow for sample).

Photo 13. WQ-DESS-03 – overview of dry conditions at sampling site.

Photo 14. WQ-CH-P-13-01 – looking upstream.

Photo 15. WQ-LW-SEEP-01 – site dry.

Photo 16. H/WQ-SEEP – overview of sampling site.

Photo 17. H -TP – overview of staff gauges.

Photo 18. WQ-TP – overview of sample site.

Photo 19. WQ-PC-U – view of pond and sedimentation at sample site.

No Photo

Photo 20. H-PC-DSP – NO PHOTO AVAILABLE.

Photo 21. WQ-PC-D – looking downstream.

Photo 22. WQ-ADIT-SEEP – dry conditions at seep location.

Photo 23. Placer mine along Pony Creek.

Photo 24. H/WQ-BC – looking upstream.

Photo 25. H-VC-U – upstream view.

Photo 26. WQ-VC-U – looking downstream showing confluence with Back Creek.

Photo 27. WQ-VC-DBC – looking downstream.

Photo 28. H-VC-DBC – looking upstream.

Photo 29. H/WQ-VC-UMN – looking downstream.

Photo 30. WQ-VC-R – looking upstream.

Photo 31. H-VC-R – looking upstream.

Photo 32. H-VC-R+290 – looking upstream.

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

Photo 34. WQ-MS-S-03 – extra sample site – overview (photo very dark).

Photo 35. WQ-MS-S-A – extra sample site – looking downstream, site frozen to substrate.

Photo 36. WQ-DC-15 – extra sample site – downstream view.

Photo 37. WQ-DC-14 – extra sample site – upstream view, site frozen to substrate.

Photo 38. WQ-DC-11 – extra sample site – downstream view.

Photo 39. WQ-DC-10 – extra sample site – upstream view.

Photo 40. WQ-DC-8 – extra sample site – upstream view.

Photo 41. Meteorological station overview.

Photo 42. H/WQ-PW – overview.

Measurement ID	Hydrometric Identifier (HID)	Measurement Date	Measurement Time	Discharge Measurement Method	Discharge (m^3/s)	Discharge Data Flag	Surveyed Water Elevation (m)	Survey Data Flag	Comments
374	ATM-VC5	14/10/2015		N					Ice lens inside storage tube; however, no ice is covering sensor.
371	H-DC-DX+105	13/10/2015	18:30	V	0.002				Volumetric discharge estimate completed. Minor algae growth along channel. Some ice on banks of channel. Ice cleared away in vicinity of measurement location. Minimal amount of water not captured in volumetric measurement due to channel conditions.
377	H-DC-D1b	14/10/2015	17:42	V	0.006				Volumetric discharge measurement completed.
367	H-DC-B	14/10/2015	15:00	SS	0.009		1.991		Ice in channel with a few open water leads. Ice thickness up to 0.1 m. Ice along banks of entire measurement reach. Channel in vicinity of logger is partially ice covered. Stilling well, staff gauge, logger and benchmarks removed from site.
380	H-TP	14/10/2015	14:00	N					Staff gauges remain dry, but water level higher than during previous visit. Entire tailings pond covered in ice; ice approximately 0.05 m thick near shore.
379	H-SEEP	14/10/2015	13:47	V	0.003				No ice formation at pipe outlet. Flow rate at pump - 162.747 L/min (0.003 m3/s).
375	H-DC-M WP	14/10/2015	13:20	V	0.011		2.253		Volumetric discharge measurement made at downstream end of weir. Minimal ice along banks upstream and downstream of weir pond. All flow through weir pond is contained in a single channel. One hour spent excavating sediment from weir pond. Sediment frozen beyond limits of active channel and could not be excavated. Sediment flushed from stilling well.
368	H-DC-R	13/10/2015	15:00	SS	0.024		0.498		Channel covered with sheet of ice approximately 0.05 m thick. Ice broken up and cleared from measurement reach prior to conducting discharge measurement. Stilling well, staff gauge and logger removed from site.
378	H-PC-DSP	13/10/2015	18:35	V	0.003			N	Ice at culvert outlet and in channel downstream. Ice up to 0.1 m thick. Ice broken up and removed prior to discharge measurement.
366	H-BC	14/10/2015	11:35	SS	0.009	B	1.733	S	Main channel free of ice. Banks covered with ice 5 - 10 cm thick. Some pieces of ice were trapped in channel during the discharge estimate which adds uncertainty to the value.
376	H-VC-U	14/10/2015	10:10	ADV-MID	0.192		2.041		Added two horizontal support arms to well. Stilling well now vertical and rigid. Staff gauging reading of 0.246 m prior to repairing well. Installed direct read cable on logger. Benchmark 2 is slighly loose.
372	H-PW	15/10/2015	10:20	V	0.003				Short hose from pumphouse building now connected.
369	H-VC-DBC	14/10/2015	8:20	ADV-MID	0.216		1.768		ADV completed for discharge estimate. Fine sediment purged from stilling well.
373	H-VC-UMN	13/10/2015	16:50	ADV-MID	0.336		1.641		No ice present in channel.
381	H-VC-R	13/10/2015	13:40	ADV-MID	0.464			N	Fine sediment purged from stilling well.
370	H-VC-R+290	13/10/2015	13:35	ADV-MID	0.398		2.436		Direct read cable installed on logger. Logger re-winterized. Well is stable and vertical with existing supports. Fine sediment purged from inside stilling well.

Discharge Measurement Method Legend

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

Hydrometric Stations

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

Discharge Data Flag Legend

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

Survey Data Flag Legend

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

Water Quality Site	Sample Collected? (Y/N)	Measurement Date	Comments
WQ-ADIT-SEEP	N	13-Oct-15	Site is dry.
WQ-BC	Y	14-Oct-15	Centre of channel free of ice. Banks covered with layer of ice approximately 5 to 10 cm thick.
WQ-CH-P-13-01	Y	14-Oct-15	Water appears clear, but with large particulates in wate . Ice upstream and downstream of sampling location up to 5cm thick.
WQ-DC-B	Y	14-Oct-15	Low flow with light turbidity. Most of channel covered in ice.
WQ-DC-D1b	Y	14-Oct-15	Part of stream covered in ice of variable thickness, averaging 5 cm. Moderate flow with light turbidity.
WQ-DC-DX	Y	15-Oct-15	Water level very low with clear water. Channel is covered with ice.
WQ-DC-DX+105	Y	15-Oct-15	Minimal ice along banks. Minimal algae growth in channel.
WQ-DC-R	Y	13-Oct-15	Moderate flow in channel with light turbidity. Variable ice thickness. Thick ice, approximately 5cm thick, upstream of sampling location. Open water at sampling location.
WQ-DC-U	Y	14-Oct-15	Low flow. Some ice forming along stream bank. Some overflow ice present in marsh on LDB.
WQ-DESS-01	Y	14-Oct-15	Low flow rate. Broke away ice to obtain sample. Very fine sediment stirred up inadvertently during sampling.
WQ-DESS-02	N	14-Oct-15	Insufficient water to collect sample. Soil is wet, but no flowing water.
WQ-DESS-03	N	14-Oct-15	Site is dry.
WQ-LW-SEEP-01	N	14-Oct-15	Site is dry.
WQ-MS-S-08	N	14-Oct-15	No surface flow.
WQ-PC-D	Y	13-Oct-15	Ice covering entire creek with few small open areas. Low flow with moderate turbidity.
WQ-PC-U	Y	13-Oct-15	Some ice forming along creek edges. Second channel on LDB is dry. Low flow with light turbidity.
WQ-PW	Y	14-Oct-15	Ice forming around outflow from pipe.
WQ-SEEP	Y	14-Oct-15	Moderate flow rate from pipe. No ice forming at site.
WQ-TP	Y	14-Oct-15	Very low water level in pond, although slightly higher than last trip (September 2015). Light turbidity. Entire pond covered with ice, approximately 5 cm thick.
WQ-VC-DBC	Y	14-Oct-15	Low flow with clear water. Some ice at few places along banks and on woody debris.

Water Quality Site	Sample Collected? (Y/N)	Measurement Date	Comments
WQ-VC-R	Y	13-Oct-15	Ice forming along stream banks. Approximately 1 to 3 cm thickness. Water level moderate with clear water.
WQ-VC-R+150	N	-	This is the winter/early spring sampling location - samples are collected from WQ-VC-R until ice thickness becomes prohibitive for sampling with overflow ice conditions.
WQ-VC-U	Y	14-Oct-15	Low flow with clear water. Some ice along banks and on woody debris.
WQ-VC-UMN	Y	13-Oct-15	Minor ice along bank upstream of sampling location. Moderate flow with clear water.
QA/QC Samples			
Replicate 1	Y	15-Oct-15	Replicate sample collected from WQ-DC-DX+105 (sample ID WQ-DC-DX+105-r).
Replicate 2	Y	14-Oct-15	Replicate sample collected from WQ-DC-B (sample ID WQ-DC-B-r).
Replicate 3	Y	13-Oct-15	Replicate sample collected from WQ-VC-UMN (sample ID WQ-VC-UMN-r).
Field Blank	Y	14-Oct-15	Sample bottles filled with deionized water supplied by ALS; samples were filtered and preserved as instructed. Collected Field Blank at WQ-DC-B.
Travel Blank	Y	15-Oct-15	Samples provided by lab and were transported to and from site.
Extra WQ Investigations (Upper Dome Creek and Mill Site Investigation)			
WQ-MS-S-03	Y	15-Oct-15	Ice along banks of channel 0.02m thick in some locations, most locations free of ice. Moderate flow with light turbidity.
WQ-MS-S-A	Y	13-Oct-15	Low flow with moderate turbidity, orange colour deposits on substrate. Channel mostly covered with ice.
WQ-DC-8	Y	14-Oct-15	Ice coverage surrounding sampling location. Ice cleared prior to collecting sample. Moderate flow with light turbidity.
WQ-DC-10	Y	15-Oct-15	Icicles formed at bottom of pipe upstream of sample site. Broke away prior to collecting sample. Surface mostly open downstream, with few banks with ice 0.02 m thick. Moderate flow with light turbidity. Orange deposits on substrate.
WQ-DC-11	Y	15-Oct-15	Minimal ice along banks of channel. Moderate flows with clear water.
WQ-DC-14	N	15-Oct-15	Frozen to bed. Thin layer of ice at site.
WQ-DC-15	Y	15-Oct-15	No ice in channel or along banks. Moderate flows with clear water. Some ice forming along stream edges.

NOTES

WQ-PIT-1, 2, 3 were removed from scope

Summary of Water Quality Results for the October 13-15, 2015 Trip.

Analyte	Units	CCME-WATER-F-AL	Mount Nansen Effluent Discharge Standards	Sample ID/Site ID Date Sampled Detection Limit	WQ-PC-U 10/13/2015 6:35:00 PM	WQ-PC-D 10/13/2015 6:20:00 PM	WQ-BC 10/14/2015 10:50:00 AM	WQ-VC-U 10/14/2015 9:07:00 AM	WQ-VC-DBC 10/14/2015 8:50:00 AM
Temperature (in-situ)	°C	-	-	-	0.5	0.4	0.0	0.1	0
Specific Conductivity (in-situ)	µS/cm	-	-	-	456.6	453.3	327.1	189	197.3
pH (in-situ)	pH	6.5 - 9.0	6.0 - 8.5	-	7.63	7.61	7.89	7.27	7.08
Dissolved Oxygen (in-situ)	mg/L	-	-	-	13.84	13.84	2.76	13.58	14.09
Turbidity (In-situ)	NTU	-	-	-	15.94	24.40	11.94	0.23	0.6
Colour, True	CU	15	-	5	-	-	-	-	-
Conductivity	µS/cm	-	-	2	444	435	387	187	192
Hardness (as CaCO3)	mg/L	-	-	0.5	225	230	211	95.5	97.7
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	7.83	7.73	8.04	7.83	7.81
Total Suspended Solids	mg/L	-	50	3	7.8	19.6	4.1	<3.0	<3.0
Total Dissolved Solids	mg/L	-	-	1	283	284	243	104	106
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	81.6	81	125	82.4	81.8
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	81.6	81	125	82.4	81.8
Ammonia, Total (as N)	mg/L	0.75	-	0.005	0.537	0.46	0.0056	<0.0050	<0.0050
Chloride (Cl)	mg/L	120	-	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.12	-	0.02	0.054	0.053	0.091	0.046	0.05
Nitrate (as N)	mg/L	13	-	0.005	0.113	0.14	0.0766	0.135	0.137
Nitrite (as N)	mg/L	0.06	-	0.001	0.0014	0.0016	<0.0010	<0.0010	<0.0010
Sulfate (SO4)	mg/L	-	-	0.3	147	146	87.4	17.6	19.1
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	-	0.3	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanate	mg/L	-	-	0.2	0.32	0.29	<0.20	<0.20	<0.20
Thiocyanate (SCN)	mg/L	-	-	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Aluminum (Al)-Total	mg/L	0.1	-	0.003	***0.22***	***0.399***	***0.209***	0.0225	0.0246
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	0.00106	0.00206	0.00028	0.0001	<0.00010
Arsenic (As)-Total	mg/L	0.005	-	0.0001	***0.00627***	***0.00906***	0.00239	0.00032	0.00033
Barium (Ba)-Total	mg/L	-	1.0	0.00005	0.0762	0.069	0.0704	0.0638	0.0633
Beryllium (Be)-Total	mg/L	-	-	0.00002	<0.000020	0.000027	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Total	mg/L	-	-	0.00005	<0.000050	0.000079	<0.000050	<0.000050	<0.000050
Boron (B)-Total	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total *(Lab Result)*	mg/L	0.00009	0.02	0.000005	0.0000544	***0.000622***	0.000231	0.0000141	0.0000214
Cadmium (Cd)-Total (Hardness Adjusted Guideline)	*mg/L*	-	-	-	*0.000311*	*0.000316*	*0.000295*	*0.000153*	*0.000155*
Calcium (Ca)-Total	mg/L	-	-	0.05	63.6	64.3	56.9	24	24.8
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.0001	0.00043	0.00056	0.00037	0.00015	0.00015
Cobalt (Co)-Total	mg/L	-	-	0.0001	0.00069	0.00061	0.00034	<0.00010	<0.00010
Copper (Cu)-Total *(Lab Result)*	mg/L	0.002	0.2	0.0005	0.00155	***0.00536***	0.002	0.00133	0.00125
Copper (Cu)-Total (Hardness Adjusted Guideline)	*mg/L*	-	-	-	*0.00400*	*0.00400*	*0.00400*	*0.00227*	*0.00232*
Iron (Fe)-Total	mg/L	0.3	1.0	0.01	***1.45***	***1.47***	***0.34***	0.056	0.065
Lead (Pb)-Total *(Lab Result)*	mg/L	0.001	0.1	0.00005	0.00162	0.0066	0.00104	<0.000050	<0.000050
Lead (Pb)-Total (Hardness Adjusted Guideline)	*mg/L*	-	-	-	*0.00700*	*0.00700*	*0.00700*	*0.00300*	*0.00309*
Lithium (Li)-Total	mg/L	-	-	0.001	<0.0010	0.001	0.0022	<0.0010	<0.0010
Magnesium (Mg)-Total	mg/L	-	-	0.1	14.6	14.4	14.5	7.97	8.21
Manganese (Mn)-Total	mg/L	-	0.5	0.0001	0.417	0.322	***0.618***	0.0451	0.0581
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.000005	<0.0000050	<0.0000050	0.0000051	<0.0000050	<0.0000050
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	0.000183	0.000213	0.000924	0.0004	0.000403
Nickel (Ni)-Total *(Lab Result)*	mg/L	0.025	0.3	0.0005	0.00078	0.00089	0.00072	<0.00050	<0.00050
Nickel (Ni)-Total (Hardness Adjusted Guideline)	*mg/L*	-	-	-	*0.15000*	*0.15000*	*0.15000*	*0.09229*	*0.09390*
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total	mg/L	-	-	0.1	0.79	0.85	0.98	0.55	0.57
Selenium (Se)-Total	mg/L	0.001	-	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Total	mg/L	-	-	0.05	6.96	7.05	7.34	6.06	6.06
Silver (Ag)-Total	mg/L	0.0001	0.1	0.00001	0.000022	0.000063	0.000019	<0.000010	<0.000010
Sodium (Na)-Total	mg/L	-	-	0.05	4.44	4.36	4.25	2.43	2.43
Strontium (Sr)-Total	mg/L	-	-	0.0002	0.414	0.402	0.421	0.263	0.265
Sulfur (S)-Total	mg/L	-	-	0.5	48.3	48	29	5.88	6.46
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	<0.000010	0.000018	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.0003	0.00917	0.0131	0.00632	0.00036	0.00044
Uranium (U)-Total	mg/L	0.015	-	0.00001	0.0013	0.00121	0.00209	0.000507	0.000537
Vanadium (V)-Total	mg/L	-	-	0.0005	0.00127	0.00155	0.0007	<0.00050	<0.00050
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	0.0067	***0.0597***	0.0073	0.0034	<0.0030
Aluminum (Al)-Dissolved	mg/L	0.1	-	0.001	0.0085	0.0115	0.012	0.0142	0.0136
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	0.00096	0.0016	0.00019	<0.00010	<0.00010
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	0.00431	0.00385	0.00142	0.00028	0.00033
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	0.0722	0.0637	0.0692	0.0638	0.064
Beryllium (Be)-Dissolved	mg/L	-	-	0.00002	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Dissolved	mg/L	-	-	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved *(Lab Result)*	mg/L	0.00009	-	0.000005	0.000029	***0.000548***	0.000222	0.0000181	0.000025
Cadmium (Cd)-Diss. (Hardness Adjusted Guideline)	*mg/L*	-	-	-	*0.000311*	*0.000316*	*0.000295*	*0.000153*	*0.000155*
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	65.4	67.2	59.3	24.7	25.5
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	<0.00010	<0.00010	0.0001	<0.00010	<0.00010
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	0.00056	0.00039	0.00026	<0.00010	<0.00010
Copper (Cu)-Dissolved *(Lab Result)*	mg/L	0.002	-	0.0002	0.00077	0.0033	0.00147	0.00118	0.00117
Copper (Cu)-Diss. (Hardness Adjusted Guideline)	*mg/L*	-	-	-	*0.00400*	*0.00400*	*0.00400*	*0.00227*	*0.00232*
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	***0.661***	***0.315***	0.051	0.039	0.038
Lead (Pb)-Dissolved *(Lab Result)*	mg/L	0.001	-	0.00005	0.00013	0.000377	0.00005	<0.000050	<0.000050
Lead (Pb)-Diss. (Hardness Adjusted Guideline)	*mg/L*	-	-	-	*0.00700*	*0.00700*	*0.00700*	*0.00300*	*0.00309*
Lithium (Li)-Dissolved	mg/L	-	-	0.001	<0.0010	<0.0010	0.0019	<0.0010	<0.0010
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	14.9	15.1	15.1	8.2	8.26
Manganese (Mn)-Dissolved	mg/L	-	-	0.0001	0.407	0.299	0.607	0.0431	0.0567
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.000005	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved	mg/L	0.0073	-	0.00005	0.000182	0.00017	0.000927	0.000377	0.000376
Nickel (Ni)-Dissolved *(Lab Result)*	mg/L	0.025	-	0.0005	0.00054	0.00056	0.00064	<0.00050	<0.00050
Nickel (Ni)-Diss. (Hardness Adjusted Guideline)	*mg/L*	-	-	-	*0.15000*	*0.15000*	*0.15000*	*0.09229*	*0.09390*
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	-	-	0.1	0.79	0.8	0.97	0.56	0.55
Selenium (Se)-Dissolved	mg/L	0.001	-	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Dissolved	mg/L	-	-	0.05	6.68	6.7	7.19	6.14	6.11
Silver (Ag)-Dissolved	mg/L	0.0001	-	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved	mg/L	-	-	0.05	4.45	4.37	4.23	2.4	2.47
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	0.41	0.406	0.422	0.258	0.262
Sulfur (S)-Dissolved	mg/L	-	-	0.5	48.5	48.5	29.2	5.93	6.43
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	mg/L	-	-	0.0003	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	0.00127	0.0012	0.00208	0.000488	0.00053
Vanadium (V)-Dissolved	mg/L	-	-	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.001	0.0031	***0.051***	0.0045	0.0019	0.0012

Analyte	WQ-VC-UMN 10/13/2015 5:00:00 PM	WQ-VC-UMN-r 10/13/2015 5:05:00 PM	QA/QC WQ-VC-UMN-r Replicate Analysis	WQ-VC-R 10/13/2015 3:56:00 PM	WQ-DC-DX 10/14/2015 6:40:00 PM	WQ-DC-DX+105 10/15/2015 8:35:00 AM	WQ-DC-DX+105-r 10/15/2015 8:45:00 AM	QA/QC WQ-DC-DX+105-r Replicate Analysis	WQ-DC-D1b 10/14/2015 5:55:00 PM	WQ-CH-P-13-01 10/14/2015 4:45:00 PM
Temperature (in-situ)	1.8	-	-	1.5	0.0	0.6	-	-	0.2	0.0
Specific Conductivity (in-situ)	250.2	-	-	237.0	576.1	1242	-	-	1613.0	1467.0
pH (in-situ)	7.87	-	-	7.91	7.66	6.91	-	-	7.81	***6.49***
Dissolved Oxygen (in-situ)	14.19	-	-	14.62	12.85	1.79	-	-	13.72	13.1
Turbidity (In-situ)	1.50	-	-	2.95	1.05	2.36	-	-	12.07	57.5
Colour, True	-	-	-	-	-	-	-	-	-	-
Conductivity	244	243	0%	234	549	1140	1140	0%	1460	1310
Hardness (as CaCO3)	127	125	2%	118	296	730	724	1%	998	888
pH (lab)	7.99	7.97	0%	7.98	7.76	7.30	7.28	0%	8.10	6.52
Total Suspended Solids	<3.0	<3.0	<DL	<3.0	13.3	<3.0	<3.0	<DL	5.4	13.6
Total Dissolved Solids	143	142	1%	134	367	863	867	0%	1230	1120
Alkalinity, Bicarbonate (as CaCO3)	87	86.5	1%	81.4	112	281	288	2%	307	8.6
Alkalinity, Carbonate (as CaCO3)	<1.0	<1.0	<DL	<1.0	<1.0	<1.0	<1.0	<DL	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	<1.0	<1.0	<DL	<1.0	<1.0	<1.0	<1.0	<DL	<1.0	<1.0
Alkalinity, Total (as CaCO3)	87	86.5	1%	81.4	112	281	288	2%	307	8.6
Ammonia, Total (as N)	0.0062	0.0063	<2xDL	0.0076	0.0196	0.0231	0.0224	<2xDL	0.135	0.0074
Chloride (Cl)	<0.50	<0.50	<DL	<0.50	<0.50	<1.0	<1.0	<DL	<2.5	<1.0
Fluoride (F)	0.048	0.051	<2xDL	0.055	0.056	***0.168***	***0.171***	2%	***0.13***	0.041
Nitrate (as N)	0.137	0.136	1%	0.129	0.0613	0.025	0.026	4%	0.1	0.193
Nitrite (as N)	<0.0010	<0.0010	<DL	0.001	<0.0010	<0.0020	<0.0020	<DL	<0.0050	<0.0020
Sulfate (SO4)	42.4	42.5	0%	39.9	186	432	433	0%	696	798
Cyanide, Weak Acid Diss	<0.0050	<0.0050	<DL	<0.0050	<0.0050	<0.0050	<0.0050	<DL	<0.0050	<0.0050
Cyanide, Total	<0.0050	<0.0050	<DL	<0.0050	<0.0050	<0.0050	<0.0050	<DL	<0.0050	<0.0050
Cyanate	<0.20	<0.20	<DL	<0.20	<0.20	<0.20	<0.20	<DL	<0.20	<0.20
Thiocyanate (SCN)	<0.50	<0.50	<DL	<0.50	<0.50	<0.50	<0.50	<DL	<0.50	<0.50
Aluminum (Al)-Total	0.0505	0.0448	12%	0.0757	***0.139***	0.0074	0.0057	<2xDL	***0.481***	***0.173***
Antimony (Sb)-Total	0.0002	0.00021	<2xDL	0.00021	0.00142	0.0115	0.0112	3%	0.0124	0.00012
Arsenic (As)-Total	0.00098	0.00096	2%	0.00119	0.00472	***0.0349***	***0.0333***	5%	***0.0444***	0.00053
Barium (Ba)-Total	0.06	0.0618	3%	0.0602	0.043	0.0117	0.0116	1%	0.0318	0.0099
Beryllium (Be)-Total	<0.000020	<0.000020	<DL	<0.000020	<0.000020	<0.000020	0.000021	<DL	<0.000020	0.000035
Bismuth (Bi)-Total	<0.000050	<0.000050	<DL	<0.000050	<0.000050	<0.000050	<0.000050	<DL	<0.000050	<0.000050
Boron (B)-Total	<0.010	<0.010	<DL	<0.010	<0.010	<0.010	<0.010	<DL	0.039	<0.010
Cadmium (Cd)-Total *(Lab Result)*	0.0000316	0.0000316	0%	0.000032	0.0000308	***0.00235***	***0.0024***	2%	***0.0014***	***0.00784***
Cadmium (Cd)-Total (Hardness Adjusted Guideline)	*0.000193*	*0.000191*	-	*0.000182*	*0.000370*	*0.000370*	*0.000370*	-	*0.000370*	*0.000370*
Calcium (Ca)-Total	31.7	32.1	1%	30.5	77	188	186	1%	211	210
Chromium (Cr)-Total	0.00039	0.00017	79%	0.00023	0.00031	<0.00010	<0.00010	<DL	0.00079	0.00019
Cobalt (Co)-Total	0.00011	0.00011	<2xDL	0.00017	0.00032	0.00087	0.00086	1%	0.00061	<0.00010
Copper (Cu)-Total *(Lab Result)*	0.00138	0.00136	<2xDL	0.00151	0.00159	<0.00050	<0.00050	<DL	0.00264	0.00105
Copper (Cu)-Total (Hardness Adjusted Guideline)	*0.00290*	*0.00286*	-	*0.00272*	*0.00400*	*0.00400*	*0.00400*	-	*0.00400*	*0.00400*
Iron (Fe)-Total	0.107	0.105	2%	0.263	***0.569***	***0.303***	0.289	5%	***2.37***	0.063
Lead (Pb)-Total *(Lab Result)*	0.000205	0.000195	<2xDL	0.000287	0.000259	0.000076	0.000082	<2xDL	***0.00995***	<0.000050
Lead (Pb)-Total (Hardness Adjusted Guideline)	*0.00431*	*0.00423*	-	*0.00393*	*0.00700*	*0.00700*	*0.00700*	-	*0.00700*	*0.00700*
Lithium (Li)-Total	<0.0010	<0.0010	<DL	<0.0010	<0.0010	0.0104	0.0101	3%	0.0079	0.0023
Magnesium (Mg)-Total	10.2	10.4	2%	9.7	21.5	62.9	61.8	2%	97.6	70.9
Manganese (Mn)-Total	0.067	0.0667	0%	0.0753	0.0991	***1.26***	***1.23***	2%	***0.842***	0.202
Mercury (Hg)-Total	<0.0000050	<0.0000050	<DL	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<DL	0.0000061	0.0000061
Molybdenum (Mo)-Total	0.000408	0.000426	4%	0.000382	0.000069	0.000314	0.000363	14%	0.000226	<0.000050
Nickel (Ni)-Total *(Lab Result)*	<0.00050	<0.00050	<DL	0.00051	<0.00050	0.00187	0.00181	<2xDL	0.00124	0.00672
Nickel (Ni)-Total (Hardness Adjusted Guideline)	*0.11462*	*0.11324*	-	*0.10839*	*0.15000*	*0.15000*	*0.15000*	-	*0.15000*	*0.15000*
Phosphorus (P)-Total	<0.050	<0.050	<DL	<0.050	<0.050	<0.050	<0.050	<DL	<0.050	<0.050
Potassium (K)-Total	0.67	0.69	3%	0.73	4.65	3.65	3.63	1%	4.23	0.37
Selenium (Se)-Total	<0.000050	<0.000050	<DL	0.000054	0.000082	<0.000050	0.00005	<DL	0.000083	0.000073
Silicon (Si)-Total	5.72	5.86	2%	6.08	4.76	6.4	6.37	0%	6.53	8.78
Silver (Ag)-Total	<0.000010	<0.000010	<DL	<0.000010	<0.000010	<0.000010	<0.000010	<DL	***0.000124***	<0.000010
Sodium (Na)-Total	3.05	3.05	0%	2.88	3.63	5.17	5.03	3%	6.9	5.66
Strontium (Sr)-Total	0.278	0.283	2%	0.257	0.244	0.439	0.432	2%	0.544	0.478
Sulfur (S)-Total	13.8	14.2	3%	13.1	60.4	149	147	1%	215	267
Thallium (Tl)-Total	<0.000010	<0.000010	<DL	<0.000010	0.00001	0.000101	0.000105	4%	0.000048	<0.000010
Tin (Sn)-Total	<0.00010	<0.00010	<DL	<0.00010	<0.00010	<0.00010	<0.00010	<DL	<0.00010	<0.00010
Titanium (Ti)-Total	0.00127	0.00111	<2xDL	0.0019	0.00808	<0.00030	<0.00030	<DL	0.0327	<0.0012
Uranium (U)-Total	0.00064	0.000649	1%	0.000614	0.000383	0.00456	0.00444	3%	0.00326	<0.000010
Vanadium (V)-Total	<0.00050	<0.00050	<DL	<0.00050	0.00083	<0.00050	<0.00050	<DL	0.0022	<0.00050
Zinc (Zn)-Total	<0.0030	<0.0030	<DL	<0.0030	<0.0030	***0.801***	***0.786***	2%	***0.343***	***2.88***
Aluminum (Al)-Dissolved	0.0134	0.0137	2%	0.02	0.0083	<0.0010	<0.0010	<DL	0.0028	***0.139***
Antimony (Sb)-Dissolved	0.00019	0.0002	<2xDL	0.00018	0.00142	0.0113	0.0114	1%	0.0111	<0.00010
Arsenic (As)-Dissolved	0.00078	0.00079	1%	0.00085	0.00347	***0.0144***	***0.0145***	1%	***0.0136***	0.00042
Barium (Ba)-Dissolved	0.0613	0.061	0%	0.0609	0.0421	0.0113	0.0114	1%	0.0254	0.00982
Beryllium (Be)-Dissolved	<0.000020	<0.000020	<DL	<0.000020	<0.000020	<0.000020	<0.000020	<DL	<0.000020	0.000031
Bismuth (Bi)-Dissolved	<0.000050	<0.000050	<DL	<0.000050	<0.000050	<0.000050	<0.000050	<DL	<0.000050	<0.000050
Boron (B)-Dissolved	<0.010	<0.010	<DL	<0.010	<0.010	<0.010	<0.010	<DL	0.035	<0.010
Cadmium (Cd)-Dissolved *(Lab Result)*	0.0000246	0.0000242	<2xDL	0.000031	0.0000269	***0.00144***	***0.00138***	4%	0.000245	***0.00745***
Cadmium (Cd)-Diss. (Hardness Adjusted Guideline)	*0.000193*	*0.000191*	-	*0.000182*	*0.000370*	*0.000370*	*0.000370*	-	*0.000370*	*0.000370*
Calcium (Ca)-Dissolved	33.4	32.9	2%	31.1	81.6	190	187	2%	230	235
Chromium (Cr)-Dissolved	<0.00010	0.00011	<DL	0.00014	<0.00010	<0.00010	<0.00010	<DL	<0.00010	0.0001
Cobalt (Co)-Dissolved	<0.00010	0.0001	<DL	0.00013	0.00027	0.00083	0.00085	2%	0.00023	<0.00010
Copper (Cu)-Dissolved *(Lab Result)*	0.00114	0.00119	4%	0.00125	0.00109	0.00023	0.00022	<2xDL	0.00074	0.00091
Copper (Cu)-Diss. (Hardness Adjusted Guideline)	*0.00290*	*0.00286*	-	*0.00272*	*0.00400*	*0.00400*	*0.00400*	-	*0.00400*	*0.00400*
Iron (Fe)-Dissolved	0.034	0.041	<2xDL	0.093	***0.356***	0.128	0.124	3%	***0.481***	0.032
Lead (Pb)-Dissolved *(Lab Result)*	<0.000050	<0.000050	<DL	<0.000050	<0.000050	<0.000050	<0.000050	<DL	<0.000050	<0.000050
Lead (Pb)-Diss. (Hardness Adjusted Guideline)	*0.00431*	*0.00423*	-	*0.00393*	*0.00700*	*0.00700*	*0.00700*	-	*0.00700*	*0.00700*
Lithium (Li)-Dissolved	<0.0010	<0.0010	<DL	<0.0010	<0.0010	0.0099	0.0099	0%	0.0077	0.0022
Magnesium (Mg)-Dissolved	10.5	10.4	1%	9.86	22.5	62.2	62.6	1%	103	73.5
Manganese (Mn)-Dissolved	0.0626	0.0627	0%	0.0696	0.098	1.21	1.23	2%	0.749	0.168
Mercury (Hg)-Dissolved	<0.0000050	<0.0000050	<DL	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<DL	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved	0.000402	0.000405	1%	0.000374	0.000055	0.000307	0.000311	1%	0.000213	<0.000050
Nickel (Ni)-Dissolved *(Lab Result)*	<0.00050	<0.00050	<DL	<0.00050	<0.00050	0.00176	0.0018	<2xDL	0.00079	0.00648
Nickel (Ni)-Diss. (Hardness Adjusted Guideline)	*0.11462*	*0.11324*	-	*0.10839*	*0.15000*	*0.15000*	*0.15000*	-	*0.15000*	*0.15000*
Phosphorus (P)-Dissolved	<0.050	<0.050	<DL	<0.050	<0.050	<0.050	<0.050	<DL	<0.050	<0.050
Potassium (K)-Dissolved	0.69	0.7	1%	0.7	4.94	3.74	3.66	2%	4.52	0.42
Selenium (Se)-Dissolved	<0.000050	0.000053	<DL	<0.000050	0.000113	<0.000050	<0.000050	<DL	0.000065	0.000079
Silicon (Si)-Dissolved	5.95	5.91	1%	6.09	4.78	6.38	6.26	2%	6.1	8.98
Silver (Ag)-Dissolved	<0.000010	<0.000010	<DL	<0.000010	<0.000010	<0.000010	<0.000010	<DL	<0.000010	<0.000010
Sodium (Na)-Dissolved	3.01	3.05	1%	2.88	3.69	4.98	4.97	0%	7.22	5.94
Strontium (Sr)-Dissolved	0.276	0.277	0%	0.257	0.247	0.426	0.428	0%	0.56	0.493
Sulfur (S)-Dissolved	14	13.9	1%	13.2	62	141	142	1%	219	274
Thallium (Tl)-Dissolved	<0.000010	<0.000010	<DL	<0.000010	<0.000010	0.000093	0.000096	3%	0.00003	<0.000010
Tin (Sn)-Dissolved	<0.00010	<0.00010	<DL	<0.00010	<0.00010	<0.00010	<0.00010	<DL	<0.00010	<0.00010
Titanium (Ti)-Dissolved	<0.00030	<0.00030	<DL	<0.00030	<0.00030	<0.00030	<0.00030	<DL	<0.00030	<0.00030
Uranium (U)-Dissolved	0.000627	0.000623	1%	0.00059	0.000371	0.00438	0.0044	0%	0.00332	<0.000010
Vanadium (V)-Dissolved	<0.00050	<0.00050	<DL	<0.00050	<0.00050	<0.00050	<0.00050	<DL	<0.00050	<0.00050
Zinc (Zn)-Dissolved	0.0047	0.0017	94%	0.002	0.0013	***0.800***	***0.801***	0%	***0.277***	***2.94***

Analyte	WQ-DESS-01 10/14/2015 4:30:00 PM	WQ-DC-B 10/14/2015 2:50:00 PM	WQ-DC-B-r 10/14/2015 3:00:00 PM	QA/QC WQ-DC-B-r Replicate Analysis	WQ-TP 10/14/2015 2:05:00 PM	WQ-SEEP 10/14/2015 1:40:00 PM	WQ-DC-U 10/14/2015 1:05:00 PM	WQ-DC-R 10/13/2015 4:20:00 PM	WQ-PW 10/15/2015 10:20:00 AM
Temperature (in-situ)	0.0	0.0	-	-	4.6	2.7	0.2	0.5	0.4
Specific Conductivity (in-situ)	926.7	1447.0	-	-	1367	1617.0	1239.0	1206.0	370.1
pH (in-situ)	6.80	7.55	-	-	7.92	6.91	7.77	7.63	7.96
Dissolved Oxygen (in-situ)	12.9	12.6	-	-	12.49	2.58	11.88	13.26	3.03
Turbidity (In-situ)	4.6	15.9	-	-	2.82	23.20	17.84	18.05	0.38
Colour, True	-	-	-	-	-	-	-	-	<5.0
Conductivity	897	1330	1300	2%	1170	1490	1320	1140	343
Hardness (as CaCO3)	543	881	852	3%	705	893	843	687	182
pH (lab)	6.17	7.92	7.86	1%	8	7.17	7.99	7.90	8.16
Total Suspended Solids	84.2	12.3	12.3	<2xDL	3.6	27.7	9.4	3.4	-
Total Dissolved Solids	704	1070	1060	1%	968	1240	1060	869	192
Alkalinity, Bicarbonate (as CaCO3)	3.9	219	218	0%	79.8	258	220	190	-
Alkalinity, Carbonate (as CaCO3)	<1.0	<1.0	<1.0	<DL	<1.0	<1.0	<1.0	<1.0	-
Alkalinity, Hydroxide (as CaCO3)	<1.0	<1.0	<1.0	<DL	<1.0	<1.0	<1.0	<1.0	-
Alkalinity, Total (as CaCO3)	3.9	219	218	0%	79.8	258	220	190	160
Ammonia, Total (as N)	<0.0050	0.151	0.15	1%	0.059	***4.51***	***1.14***	0.59	-
Chloride (Cl)	<1.0	<1.0	<1.0	<DL	<1.0	<2.5	<1.0	<1.0	<0.50
Fluoride (F)	0.04	0.094	0.085	<2xDL	0.243	0.082	0.096	0.091	0.095
Nitrate (as N)	0.069	0.175	0.174	1%	0.113	1.01	0.382	0.465	0.131
Nitrite (as N)	<0.0020	<0.0020	0.0023	<DL	0.0023	0.023	0.0064	0.0092	<0.0010
Sulfate (SO4)	506	628	627	0%	636	694	614	501	28.4
Cyanide, Weak Acid Diss	<0.0050	<0.0050	<0.0050	<DL	<0.0050	0.0107	<0.0050	<0.0050	-
Cyanide, Total	<0.0050	<0.0050	<0.0050	<DL	<0.0050	0.0243	<0.0050	<0.0050	-
Cyanate	<0.20	<0.20	<0.20	<DL	<0.20	2.01	0.75	0.37	-
Thiocyanate (SCN)	<0.50	<0.50	<0.50	<DL	<0.50	4.1	<0.50	<0.50	-
Aluminum (Al)-Total	***1.72***	***0.123***	***0.14***	13%	0.0379	0.0189	0.0842	0.0317	<0.010
Antimony (Sb)-Total	0.00069	0.00257	0.00272	6%	0.0333	0.00054	0.00172	0.00168	<0.00050
Arsenic (As)-Total	***0.0115***	***0.00933***	***0.0101***	8%	***0.117***	***0.046***	***0.0164***	***0.0132***	0.00043
Barium (Ba)-Total	0.0493	0.0421	0.0441	5%	0.0107	0.0652	0.0466	0.0455	0.08
Beryllium (Be)-Total	0.000079	<0.000020	<0.000020	<DL	<0.000020	<0.000020	<0.000020	<0.000020	-
Bismuth (Bi)-Total	<0.000050	<0.000050	<0.000050	<DL	0.000167	<0.000050	<0.000050	<0.000050	-
Boron (B)-Total	<0.010	0.018	0.02	<2xDL	0.07	0.059	0.027	0.023	<0.10
Cadmium (Cd)-Total *(Lab Result)*	***0.00368***	0.0000877	0.000107	20%	***0.000769***	***0.000561***	0.000114	0.0000558	<0.00020
Cadmium (Cd)-Total (Hardness Adjusted Guideline)	*0.000370*	*0.000370*	*0.000370*	-	*0.000370*	*0.000370*	*0.000370*	*0.000370*	*0.000261*
Calcium (Ca)-Total	137	187	192	3%	205	254	199	169	42.2
Chromium (Cr)-Total	0.00238	0.00043	0.00037	<2xDL	0.00018	0.00056	0.00031	0.00029	<0.0020
Cobalt (Co)-Total	0.00067	0.00039	0.00042	<2xDL	0.0005	0.00863	0.00199	0.00139	-
Copper (Cu)-Total *(Lab Result)*	***0.00491***	0.00101	0.00124	<2xDL	***0.0251***	0.00387	0.00159	0.00115	<0.0010
Copper (Cu)-Total (Hardness Adjusted Guideline)	*0.00400*	*0.00400*	*0.00400*	-	*0.00400*	*0.00400*	*0.00400*	*0.00400*	*0.00400*
Iron (Fe)-Total	***2.68***	***2.96***	***3.05***	3%	***0.34***	***11.2***	***2.64***	***2.34***	<0.030
Lead (Pb)-Total *(Lab Result)*	0.00318	0.00017	0.000188	<2xDL	0.0169	0.000063	0.000112	0.00014	0.00058
Lead (Pb)-Total (Hardness Adjusted Guideline)	*0.00700*	*0.00700*	*0.00700*	-	*0.00700*	*0.00700*	*0.00700*	*0.00700*	*0.00700*
Lithium (Li)-Total	0.0012	0.0037	0.0041	<2xDL	0.0063	0.0012	0.0033	0.0026	-
Magnesium (Mg)-Total	41.9	84.4	87.6	4%	38.8	54.7	74.3	63.9	18.5
Manganese (Mn)-Total	0.116	***0.665***	***0.706***	6%	0.183	***5.96***	***1.96***	***1.34***	<0.0020
Mercury (Hg)-Total	0.0000127	<0.0000050	<0.0000050	<DL	0.0000103	0.0000126	<0.0000050	<0.0000050	<0.00020
Molybdenum (Mo)-Total	0.000171	0.000314	0.000337	7%	0.00122	0.00089	0.000428	0.000374	-
Nickel (Ni)-Total *(Lab Result)*	0.00563	0.00091	0.00093	<2xDL	0.00083	0.00379	0.00134	0.00106	-
Nickel (Ni)-Total (Hardness Adjusted Guideline)	*0.15000*	*0.15000*	*0.15000*	-	*0.15000*	*0.15000*	*0.15000*	*0.15000*	*0.15000*
Phosphorus (P)-Total	0.112	<0.050	<0.050	<DL	<0.050	<0.050	<0.050	<0.050	-
Potassium (K)-Total	0.58	3.06	3.15	3%	13	6.33	3.65	3.18	0.84
Selenium (Se)-Total	0.000157	0.000074	0.000086	<2xDL	<0.000050	0.00031	0.00011	0.000087	<0.0010
Silicon (Si)-Total	10.7	6.04	6.23	3%	2.25	7.19	6.11	6.01	-
Silver (Ag)-Total	***0.000104***	<0.000010	<0.000010	<DL	0.000272	0.00003	<0.000010	<0.000010	-
Sodium (Na)-Total	4.15	8.25	8.95	8%	13.7	34.5	14.5	12.1	4.8
Strontium (Sr)-Total	0.321	0.585	0.625	7%	0.523	0.738	0.622	0.521	-
Sulfur (S)-Total	162	199	208	4%	203	232	203	168	-
Thallium (Tl)-Total	0.000045	<0.000010	<0.000010	<DL	0.000138	<0.000010	<0.000010	<0.000010	-
Tin (Sn)-Total	<0.00010	<0.00010	<0.00010	<DL	<0.00010	<0.00010	<0.00010	<0.00010	-
Titanium (Ti)-Total	0.0498	0.00645	0.00708	9%	0.00035	<0.0015	0.00432	0.00116	-
Uranium (U)-Total	0.000126	0.00266	0.00282	6%	0.0009	0.00225	0.00236	0.00192	0.00157
Vanadium (V)-Total	0.00586	0.00083	0.0009	<2xDL	<0.00050	0.00199	0.00077	0.00065	-
Zinc (Zn)-Total	***1.52***	0.0275	***0.0303***	10%	***0.066***	***0.0679***	0.0229	0.0096	<0.050
Aluminum (Al)-Dissolved	0.0864	0.0047	0.0045	<2xDL	0.0071	0.0117	0.0058	0.0099	-
Antimony (Sb)-Dissolved	0.0002	0.00272	0.00272	0%	0.0323	0.00052	0.00175	0.00166	-
Arsenic (As)-Dissolved	0.00057	0.00476	0.00475	0%	***0.082***	***0.0379***	***0.0126***	***0.00637***	-
Barium (Ba)-Dissolved	0.0193	0.04	0.0398	1%	0.0102	0.0645	0.0442	0.0432	-
Beryllium (Be)-Dissolved	<0.000020	<0.000020	<0.000020	<DL	<0.000020	<0.000020	<0.000020	<0.000020	-
Bismuth (Bi)-Dissolved	<0.000050	<0.000050	<0.000050	<DL	<0.000050	<0.000050	<0.000050	<0.000050	-
Boron (B)-Dissolved	<0.010	0.015	0.016	<2xDL	0.063	0.054	0.023	0.019	-
Cadmium (Cd)-Dissolved *(Lab Result)*	***0.00321***	0.0000338	0.0000408	19%	***0.000639***	***0.000407***	0.0000718	0.0000354	-
Cadmium (Cd)-Diss. (Hardness Adjusted Guideline)	*0.000370*	*0.000370*	*0.000370*	-	*0.000370*	*0.000370*	*0.000370*	*0.000370*	-
Calcium (Ca)-Dissolved	145	203	195	4%	216	264	209	169	-
Chromium (Cr)-Dissolved	0.00012	<0.00010	<0.00010	<DL	<0.00010	0.00041	0.00013	0.00017	-
Cobalt (Co)-Dissolved	<0.00010	0.00035	0.00035	<2xDL	0.00043	0.00867	0.002	0.00135	-
Copper (Cu)-Dissolved *(Lab Result)*	0.00143	0.00046	0.00054	<2xDL	0.0188	0.00206	0.00102	0.00087	-
Copper (Cu)-Diss. (Hardness Adjusted Guideline)	*0.00400*	*0.00400*	*0.00400*	-	*0.00400*	*0.00400*	*0.00400*	*0.00400*	-
Iron (Fe)-Dissolved	0.053	***1.64***	***1.58***	4%	0.024	***9.83***	***0.792***	***0.635***	-
Lead (Pb)-Dissolved *(Lab Result)*	<0.000050	<0.000050	<0.000050	<DL	0.00115	0.000277	<0.000050	<0.000050	-
Lead (Pb)-Diss. (Hardness Adjusted Guideline)	*0.00700*	*0.00700*	*0.00700*	-	*0.00700*	*0.00700*	*0.00700*	*0.00700*	-
Lithium (Li)-Dissolved	<0.0010	0.0037	0.0038	<2xDL	0.0066	0.0011	0.0032	0.0025	-
Magnesium (Mg)-Dissolved	43.8	91	88.5	3%	40	56.9	78	64.5	-
Manganese (Mn)-Dissolved	0.0312	0.689	0.684	1%	0.153	6.06	2.01	1.31	-
Mercury (Hg)-Dissolved	<0.0000050	<0.0000050	<0.0000050	<DL	<0.0000050	<0.0000050	<0.0000050	<0.0000050	-
Molybdenum (Mo)-Dissolved	<0.000050	0.000301	0.000299	1%	0.00119	0.000869	0.000435	0.000347	-
Nickel (Ni)-Dissolved *(Lab Result)*	0.00436	0.00073	0.00076	<2xDL	0.00075	0.00379	0.00125	0.00101	-
Nickel (Ni)-Diss. (Hardness Adjusted Guideline)	*0.15000*	*0.15000*	*0.15000*	-	*0.15000*	*0.15000*	*0.15000*	*0.15000*	-
Phosphorus (P)-Dissolved	<0.050	<0.050	<0.050	<DL	<0.050	<0.050	<0.050	<0.050	-
Potassium (K)-Dissolved	0.37	3.22	3.14	3%	13.7	6.69	3.97	3.21	-
Selenium (Se)-Dissolved	0.000063	0.000075	0.000066	<2xDL	0.00005	0.000336	0.000107	0.000085	-
Silicon (Si)-Dissolved	8.97	6.07	5.93	2%	2.27	7.26	6.05	5.76	-
Silver (Ag)-Dissolved	<0.000010	<0.000010	<0.000010	<DL	0.000028	<0.000010	<0.000010	<0.000010	-
Sodium (Na)-Dissolved	4.14	8.59	8.8	2%	13.6	34.9	14.9	12	-
Strontium (Sr)-Dissolved	0.322	0.616	0.616	0%	0.525	0.739	0.647	0.514	-
Sulfur (S)-Dissolved	167	209	202	3%	205	232	205	166	-
Thallium (Tl)-Dissolved	<0.000010	<0.000010	<0.000010	<DL	0.000136	<0.000010	<0.000010	<0.000010	-
Tin (Sn)-Dissolved	<0.00010	<0.00010	<0.00010	<DL	<0.00010	<0.00010	<0.00010	<0.00010	-
Titanium (Ti)-Dissolved	0.00031	<0.00030	<0.00030	<DL	<0.00030	<0.0012	<0.00030	<0.00030	-
Uranium (U)-Dissolved	<0.000010	0.0028	0.00274	2%	0.000889	0.00226	0.00243	0.00187	-
Vanadium (V)-Dissolved	<0.00050	<0.00050	<0.00050	<DL	<0.00050	0.0017	<0.00050	<0.00050	-
Zinc (Zn)-Dissolved	***1.57***	0.0229	0.0234	2%	***0.0503***	***0.0678***	0.0158	0.0097	-

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

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

<u>**Notes:**</u>
** WQ-PW is a drinking water sample and the analysis package has different detection limits than all other samples. The results are also compared to the Guidelines for Canadian Drinking Water Quality (Health Canada, October 2014) versus the CCME or MN Effluent Quality Standards.
*** These samples were collected as part of an additional investigation of the Upper Dome Creek and mill site area.
QA/QC Travel/Field Blank Analysis - The travel blank and field blank had all parameters below detection limit. No contamination from transport, storage or field sampling methodology is suspected.
QA/QC Replicate Analysis - The average RPD of the replicate sample set for WQ-VC-UMN-r, WQ-DC-DX+105-01-r, and WQ-DC-B-r was 6%, 2% and 4%, respectively, indicating that sample analysis was adequately precise. The average RPD for total metals in the two replicate samples was 15% and 5%, respectively. The average RPD for total metals in the three replicate samples was 7%, 3% and 7%, respectively. The average RPD for dissolved metals was 7%, 1% and 3% in the three replicate sets.
Individual RPDs of all parameters were <20% different for the WQ-DC-DX+105 -r and WQ-DC-B-r replicate sets, indicating that sample analysis was adequately precise. For WQ-VC-UMN-r set there were two parameters with RDP>20% (total chromium and dissolved zinc, both >50%). RPD >%50 indicate problems or errors that affect precision of the analytical result. See Monthly Report for additional details.

Summary of Water Quality Results for the October 13-15, 2015 Trip.

Analyte	Units	CCME-WATER-FAL	Mount Nansen Effluent Discharge Standards	Sample ID/Site ID Date Sampled Detection Limit	FIELD BLANK 10/14/2015 3:30:00 PM	TRAVEL BLANK	WQ-DC-15 *** 10/15/2015 8:50:00 AM	WQ-DC-11 *** 10/15/2015 8:20:00 AM	WQ-MS-5-03 *** 10/15/2015 8:00:00 AM	WQ-DC-10 *** 10/15/2015 7:50:00 AM	WQ-MS-5-A *** 10/14/2015 7:00:00 PM	WQ-DC-8 *** 10/14/2015 6:05:00 PM
Temperature (in-situ)	°C	-	-	-	-	-	0.7	0.1	0.4	0.0	0.1	0.1
Specific Conductivity (in-situ)	µS/cm	-	-	-	-	-	1249.0	1255.0	1292.0	1242.0	2093.0	1765.0
pH (in-situ)	pH	6.5 - 9.0	6.0 - 8.5	-	-	-	6.88	7.09	7.03	7.35	7.52	7.47
Dissolved Oxygen (in-situ)	mg/L	-	-	-	-	-	0.48	7.12	6.02	11.62	13.8	12.73
Turbidity (in-situ)	NTU	-	-	-	-	-	1.85	1.66	8.25	1.99	47.60	15.03
Colour, True	CU	15	-	5								
Conductivity	µS/cm	-	-	2	<2.0	<2.0	1140	1140	1170	1150	1850	1590
Hardness (as CaCO3)	mg/L	-	-	0.5	<0.50	<0.50	724	733	747	746	1360	1110
pH (lab)	pH	6.5 - 9.0	6.0 - 8.5	0.1	**6.40**	**6.40**	7.24	7.46	7.41	7.36	7.75	7.36
Total Suspended Solids	mg/L	-	50	3	<3.0	<3.0	<3.0	<3.0	27.9	12	***54.9***	***66.8***
Total Dissolved Solids	mg/L	-	-	1	<1.0	<1.0	864	869	901	886	1620	1370
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	286	285	294	288	411	306
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	1	<1.0	<1.0	286	285	294	288	411	306
Ammonia, Total (as N)	mg/L	0.75	-	0.005	<0.0050	<0.0050	0.0212	0.0181	0.0515	0.0348	0.05	0.426
Chloride (Cl)	mg/L	120	-	0.5	<0.50	<0.50	<1.0	<1.0	<1.0	<1.0	<2.5	<2.5
Fluoride (F)	mg/L	0.12	-	0.02	<0.020	<0.020	***0.167***	***0.169***	***0.173***	***0.171***	***0.17***	0.12
Nitrate (as N)	mg/L	13	-	0.005	<0.0050	<0.0050	0.025	0.021	<0.010	0.023	<0.025	0.204
Nitrite (as N)	mg/L	0.06	-	0.001	<0.0010	<0.0010	<0.0020	<0.0020	<0.0020	<0.0020	<0.0050	<0.0050
Sulfate (SO4)	mg/L	-	-	0.3	<0.30	<0.30	432	433	454	444	912	793
Cyanide, Weak Acid Diss	mg/L	-	0.1	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	-	0.3	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanate	mg/L	-	-	0.2	<0.20	<2.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Thiocyanate (SCN)	mg/L	-	-	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Aluminum (Al)-Total	mg/L	0.1	-	0.003	<0.0030	<0.0030	0.0081	0.0039	***1.44***	0.054	***0.16***	***0.553***
Antimony (Sb)-Total	mg/L	-	0.15	0.0001	<0.00010	<0.00010	0.0212	0.011	0.0245	0.0112	0.0143	0.0198
Arsenic (As)-Total	mg/L	0.005	-	0.0001	<0.00010	<0.00010	***0.0348***	***0.0239***	***0.407***	***0.0578***	***0.0974***	***0.101***
Barium (Ba)-Total	mg/L	-	1.0	0.00005	<0.00050	<0.00050	0.0114	0.0117	0.0468	0.0168	0.0185	0.0566
Beryllium (Be)-Total	mg/L	-	-	0.00002	<0.00020	<0.00020	<0.00020	<0.00020	0.000078	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Total	mg/L	-	-	0.00005	<0.00050	<0.00050	<0.00050	<0.00050	0.00423	<0.00050	<0.00050	<0.00050
Boron (B)-Total	mg/L	-	-	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.013	0.063
Cadmium (Cd)-Total (Lab Result)	mg/L	0.00009	0.02	0.000005	<0.0000050	<0.0000050	***0.00217***	***0.00206***	***0.00881***	***0.00204***	***0.00266***	***0.00275***
Cadmium (Cd)-Total (Hardness Adjusted Guideline)	mg/L				0.000170	0.000170	0.000170	0.000170	0.000170	0.000170	0.000170	0.000170
Calcium (Ca)-Total	mg/L	-	-	0.05	<0.050	<0.050	181	185	185	187	291	241
Chromium (Cr)-Total	mg/L	0.0089	0.04	0.00001	<0.00010	<0.00010	<0.00010	<0.00010	0.00189	0.00014	0.00033	0.00028
Cobalt (Co)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010	0.00085	0.00081	0.00266	0.00093	0.00129	0.00102
Copper (Cu)-Total (Lab Result)	mg/L	0.002	0.2	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	***0.0302***	***0.00407***	0.00183	***0.00417***	0.00279
Copper (Cu)-Total (Hardness Adjusted Guideline)	mg/L				0.00430	0.00430	0.00430	0.00430	0.00430	0.00430	0.00430	0.00430	0.00430
Iron (Fe)-Total	mg/L	0.3	1.0	0.01	<0.010	<0.010	***0.302***	0.18	***10.4***	***1.75***	***0.859***	***9.05***
Lead (Pb)-Total (Lab Result)	mg/L	0.001	0.1	0.00005	<0.00050	<0.00050	<0.00050	0.000051	***0.068***	0.00283	***0.0223***	***0.0109***
Lead (Pb)-Total (Hardness Adjusted Guideline)	mg/L				0.00700	0.00700	0.00700	0.00700	0.00700	0.00700	0.00700	0.00700
Lithium (Li)-Total	mg/L	-	-	0.001	<0.0010	<0.0010	0.0101	0.0105	0.0114	0.0105	0.0121	0.0056
Magnesium (Mg)-Total	mg/L	-	-	0.1	<0.10	<0.10	61.1	62.4	63	63	150	108
Manganese (Mn)-Total	mg/L	-	0.5	0.0001	<0.00010	<0.00010	***1.22***	***1.14***	***1.74***	***1.1***	***1.3***	***3.2***
Mercury (Hg)-Total	mg/L	0.000026	0.005	0.000005	<0.0000050	<0.0000050	<0.0000050	<0.0000050	***0.0000177***	<0.0000050	<0.0000050	0.0000094
Molybdenum (Mo)-Total	mg/L	0.0073	-	0.00005	<0.00050	<0.00050	0.00116	0.00112	0.00402	0.0028	0.00192	0.00216
Nickel (Ni)-Total (Lab Result)	mg/L	0.025	0.3	0.0005	<0.00050	<0.00050	0.0018	0.00178	0.00333	0.00168	0.00115	0.00175
Nickel (Ni)-Total (Hardness Adjusted Guideline)	mg/L				0.13000	0.13000	0.13000	0.13000	0.13000	0.13000	0.13000	0.13000
Phosphorus (P)-Total	mg/L	-	-	0.05	<0.050	<0.050	<0.050	<0.050	0.215	<0.050	<0.050	0.101
Potassium (K)-Total	mg/L	-	-	0.1	<0.10	<0.10	3.55	3.63	4.04	3.69	5.62	4.47
Selenium (Se)-Total	mg/L	0.001	-	0.00005	<0.00050	<0.00050	<0.00050	<0.00050	0.000082	<0.00050	0.00128	0.000107
Silicon (Si)-Total	mg/L	-	-	0.05	<0.050	<0.050	6.19	6.26	8.61	6.39	6.38	7.48
Silver (Ag)-Total	mg/L	0.00001	0.1	0.00001	<0.00010	<0.00010	<0.00010	<0.00010	***0.00126***	0.000072	***0.000369***	***0.000116***
Sodium (Na)-Total	mg/L	-	-	0.05	<0.050	<0.050	5.05	5.15	5	5.11	8.27	8.19
Strontium (Sr)-Total	mg/L	-	-	0.0002	<0.00020	<0.00020	0.428	0.429	0.438	0.441	0.691	0.624
Sulfur (S)-Total	mg/L	-	-	0.5	<0.50	<0.50	145	145	148	151	313	255
Thallium (Tl)-Total	mg/L	0.0008	-	0.00001	<0.000010	<0.000010	0.000099	0.000095	0.000197	0.000083	0.000241	0.000066
Tin (Sn)-Total	mg/L	-	-	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	mg/L	-	-	0.0003	<0.00030	<0.00030	0.00103	<0.00030	0.0862	0.00299	0.00877	0.0121
Uranium (U)-Total	mg/L	0.015	-	0.00001	<0.000010	<0.000010	0.0044	0.00416	0.00408	0.00416	0.00572	0.00213
Vanadium (V)-Total	mg/L	-	-	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	0.00698	<0.00050	0.00083	0.0022
Zinc (Zn)-Total	mg/L	0.03	0.3	0.003	<0.0030	<0.0030	***0.776***	***0.768***	***1.15***	***0.734***	***0.221***	***0.662***
Aluminum (Al)-Dissolved	mg/L	0.1	-	0.003	<0.0030	-	<0.0030	0.0015	0.005	0.001	0.0011	0.0031
Antimony (Sb)-Dissolved	mg/L	-	-	0.0001	<0.00010	-	0.0112	0.0111	0.0127	0.0105	0.00808	0.01379
Arsenic (As)-Dissolved	mg/L	0.005	0.15	0.0001	<0.00010	-	***0.0157***	***0.0092***	***0.0956***	***0.0364***	***0.0727***	***0.03***
Barium (Ba)-Dissolved	mg/L	-	-	0.00005	<0.00050	-	0.0113	0.0117	0.0154	0.015	0.0149	0.0375
Beryllium (Be)-Dissolved	mg/L	-	-	0.00002	<0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Dissolved	mg/L	-	-	0.00005	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved	mg/L	-	-	0.01	<0.010	-	<0.010	<0.010	<0.010	<0.010	<0.010	0.053
Cadmium (Cd)-Dissolved (Lab Result)	mg/L	0.00009	-	0.000005	<0.0000050	-	***0.00137***	***0.00138***	***0.00575***	***0.00194***	***0.00209***	***0.00974***
Cadmium (Cd)-Diss. (Hardness Adjusted Guideline)	mg/L				0.000170	-	0.000170	0.000170	0.000170	0.000170	0.000170	0.000170
Calcium (Ca)-Dissolved	mg/L	-	-	0.05	<0.050	-	183	190	194	193	295	255
Chromium (Cr)-Dissolved	mg/L	0.0089	-	0.0001	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Dissolved	mg/L	-	-	0.0001	<0.00010	-	0.00087	0.0008	0.0014	0.00086	0.00114	0.00047
Copper (Cu)-Dissolved (Lab Result)	mg/L	0.002	-	0.0002	<0.00020	-	<0.00020	<0.00020	0.00021	0.00023	0.00114	0.00079
Copper (Cu)-Diss. (Hardness Adjusted Guideline)	mg/L				0.00430	-	0.00430	0.00430	0.00430	0.00430	0.00430	0.00430
Iron (Fe)-Dissolved	mg/L	0.3	-	0.01	<0.010	-	0.146	0.05	***2.3***	***1.19***	***0.368***	***2.58***
Lead (Pb)-Dissolved (Lab Result)	mg/L	0.001	-	0.00005	<0.00050	-	<0.00050	<0.00050	0.000116	0.00005	0.00018	0.000056
Lead (Pb)-Diss. (Hardness Adjusted Guideline)	mg/L				0.00700	-	0.00700	0.00700	0.00700	0.00700	0.00700	0.00700
Lithium (Li)-Dissolved	mg/L	-	-	0.001	<0.0010	-	0.01	0.0103	0.0105	0.0101	0.0118	0.005
Magnesium (Mg)-Dissolved	mg/L	-	-	0.1	<0.10	-	61.9	62.6	63.5	63.9	152	114
Manganese (Mn)-Dissolved	mg/L	-	-	0.0001	<0.00010	-	1.21	1.14	1.47	1.08	1.23	2.13
Mercury (Hg)-Dissolved	mg/L	0.000026	-	0.000005	<0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved	mg/L	0.0073	-	0.00005	<0.00050	-	0.000299	0.000301	0.000274	0.000254	0.000175	0.000179
Nickel (Ni)-Dissolved (Lab Result)	mg/L	0.025	-	0.0005	<0.00050	-	0.0018	0.00178	0.00194	0.0016	0.00117	0.00113
Nickel (Ni)-Diss. (Hardness Adjusted Guideline)	mg/L				0.13000	-	0.13000	0.13000	0.13000	0.13000	0.13000	0.13000
Phosphorus (P)-Dissolved	mg/L	-	-	0.05	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	-	-	0.1	<0.10	-	3.69	3.63	3.64	3.7	5.72	4.71
Selenium (Se)-Dissolved	mg/L	0.001	-	0.00005	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	0.000135	0.00008
Silicon (Si)-Dissolved	mg/L	-	-	0.05	<0.050	-	6.34	6.31	6.17	6.29	6.05	6.55
Silver (Ag)-Dissolved	mg/L	0.0001	-	0.00001	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved	mg/L	-	-	0.05	<0.050	-	4.98	5.06	5.05	5.05	8.08	8.16
Strontium (Sr)-Dissolved	mg/L	-	-	0.0002	<0.00020	-	0.423	0.427	0.438	0.431	0.691	0.626
Sulfur (S)-Dissolved	mg/L	-	-	0.5	<0.50	-	143	141	146	146	299	255
Thallium (Tl)-Dissolved	mg/L	0.0008	-	0.00001	<0.000010	-	0.000093	0.000091	0.000083	0.000072	0.000222	0.000035
Tin (Sn)-Dissolved	mg/L	-	-	0.0001	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	mg/L	-	-	0.0003	<0.00030	-	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Dissolved	mg/L	0.015	-	0.00001	<0.000010	-	0.00432	0.00417	0.00399	0.00407	0.00563	0.00208
Vanadium (V)-Dissolved	mg/L	-	-	0.0005	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved	mg/L	0.03	-	0.003	<0.0030	-	***0.756***	***0.76***	***0.913***	***0.714***	***0.203***	***0.528***

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

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

ATTACHMENT 4A: SEASONAL METEOROLOGICAL SUMMARIES

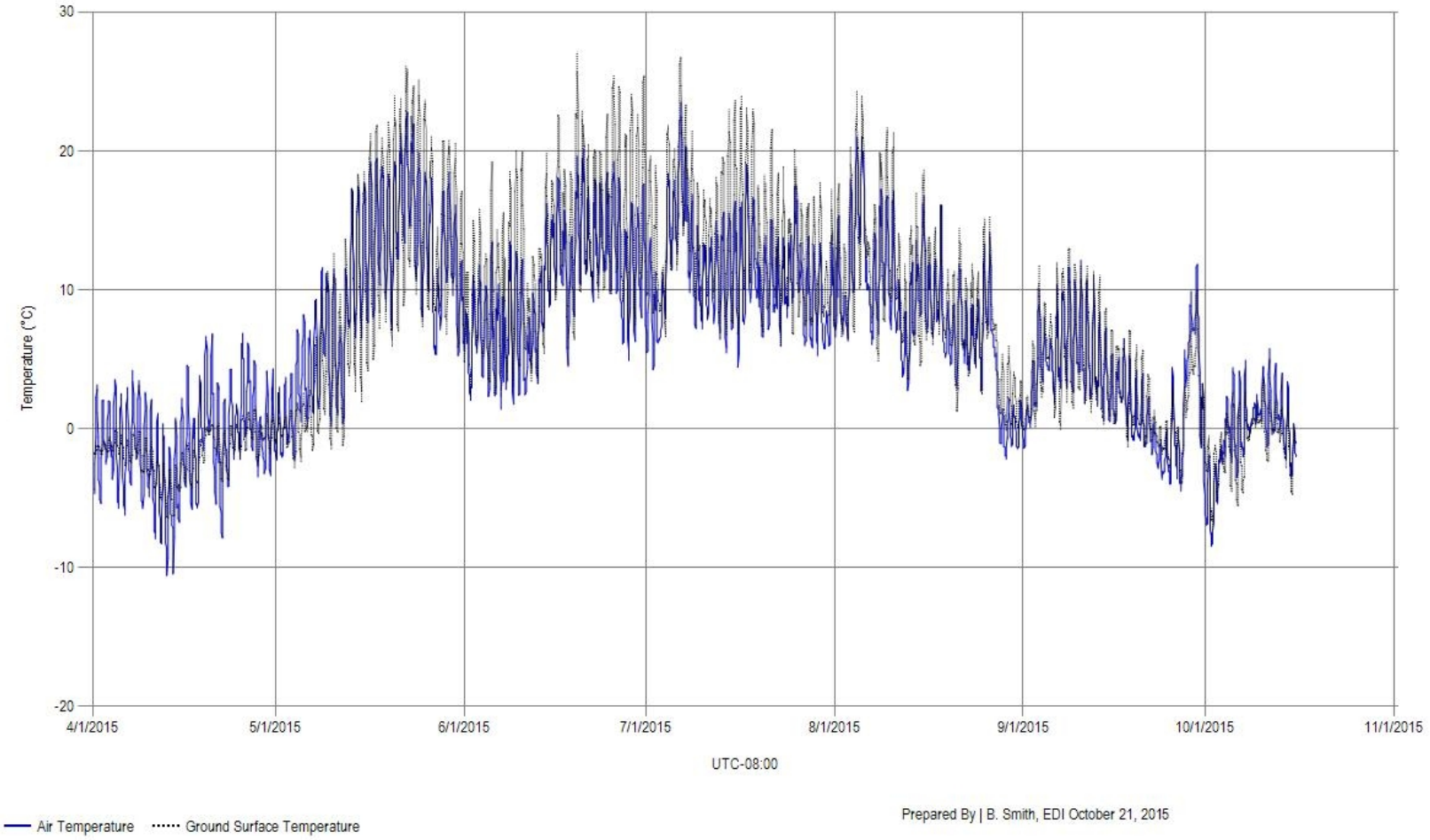


Figure 4A. 1 Mount Nansen mean hourly air and ground temperature, April 1 to October 15, 2015.

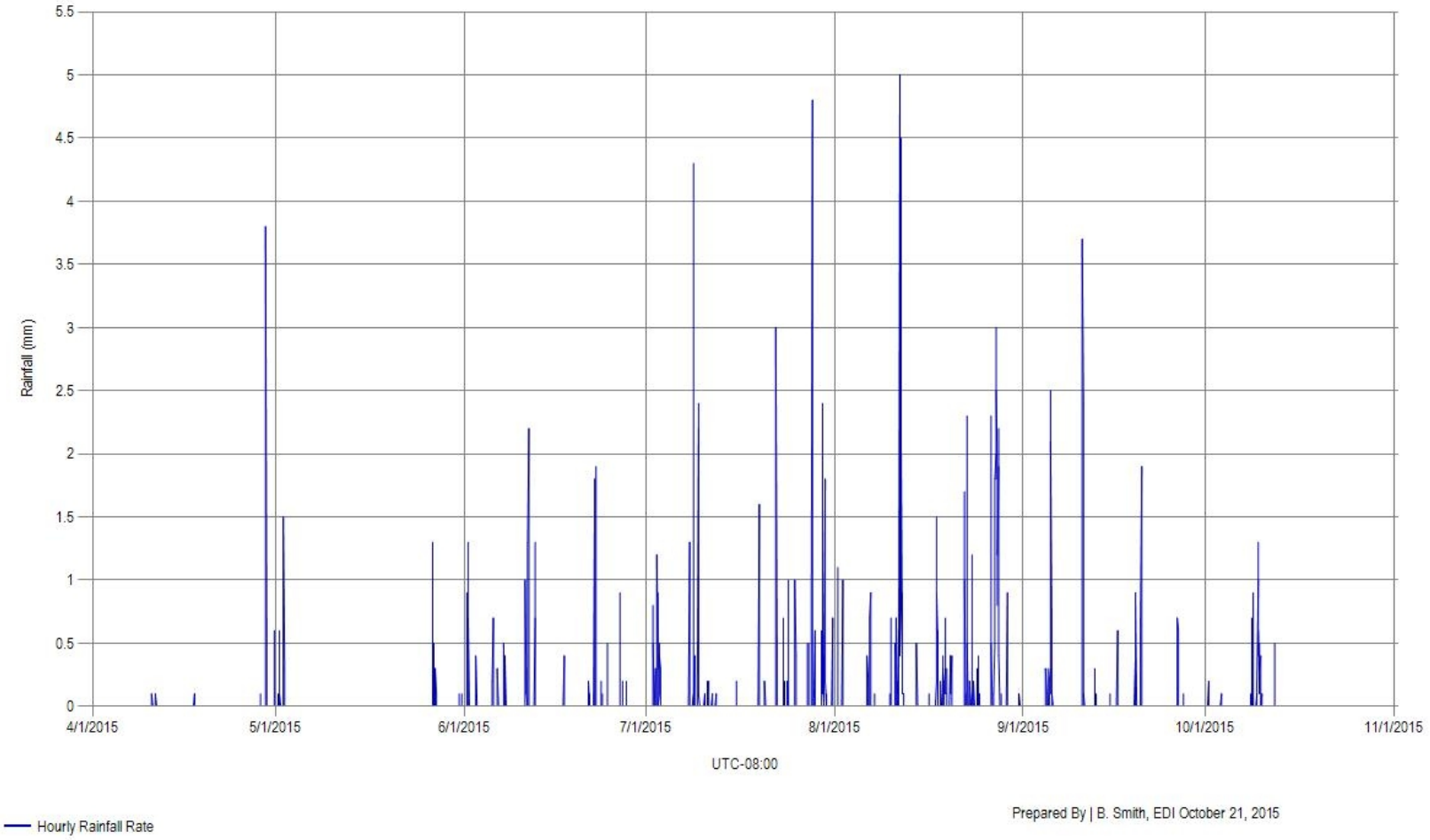


Figure 4A. 2 Mount Nansen hourly rainfall rate, April 1 to October 15, 2015.

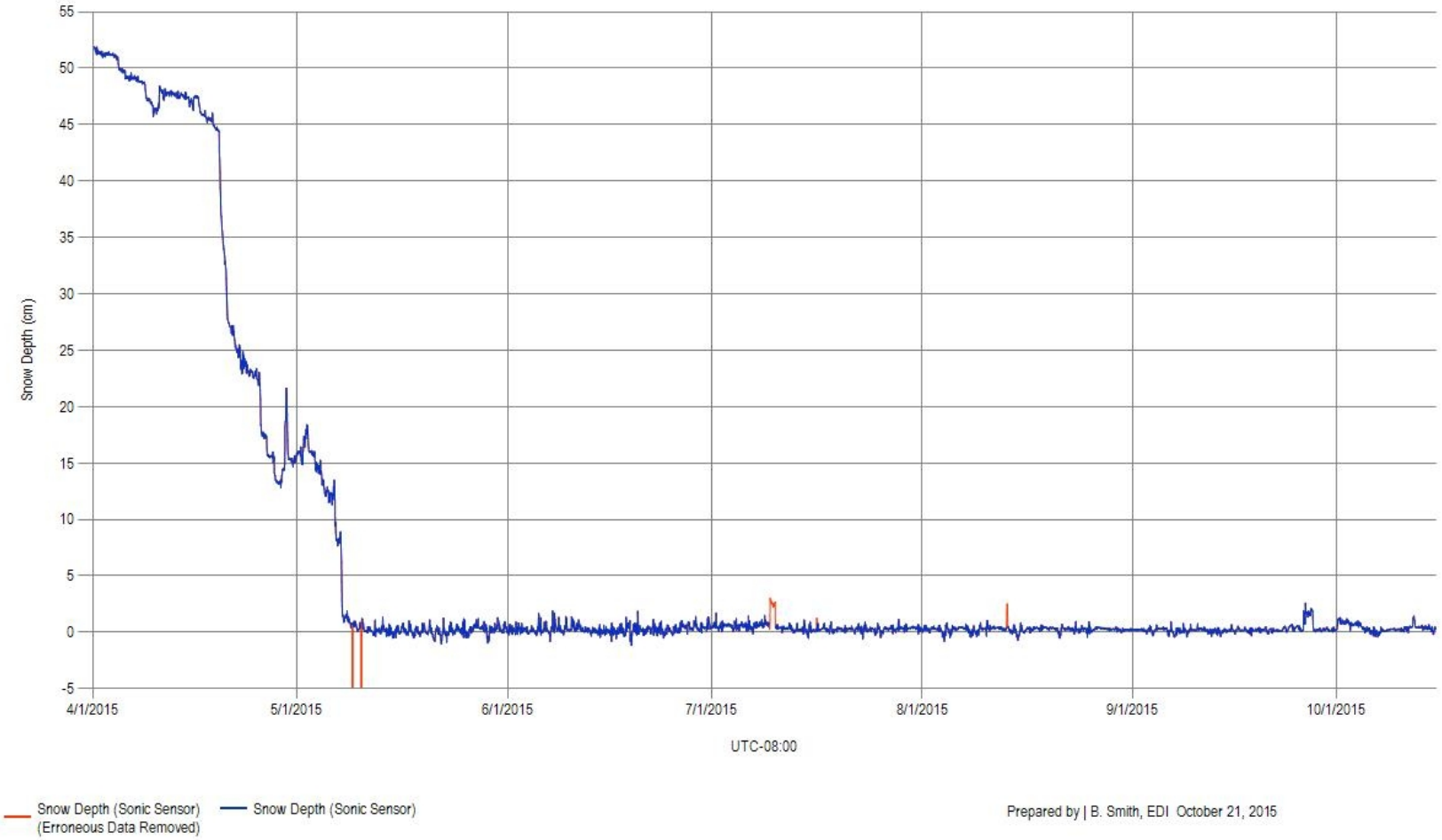


Figure 4A. 3 Mount Nansen cumulative daily snow depth, April 1 to October 15, 2015.

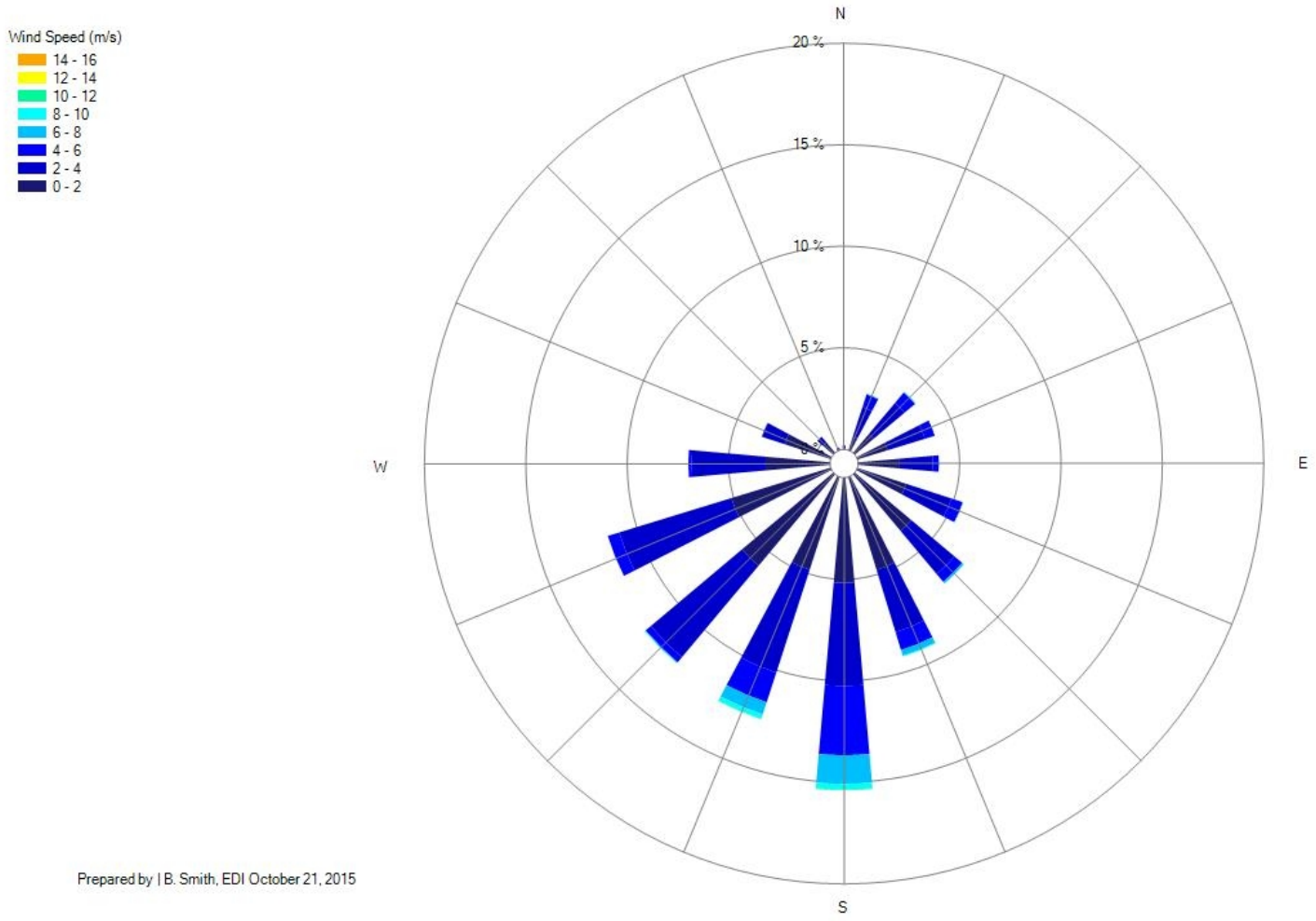


Figure 4A. 4 Mount Nansen mean hourly wind speed (m/s) and direction (wind rose diagram), April 1 to October 15, 2015.

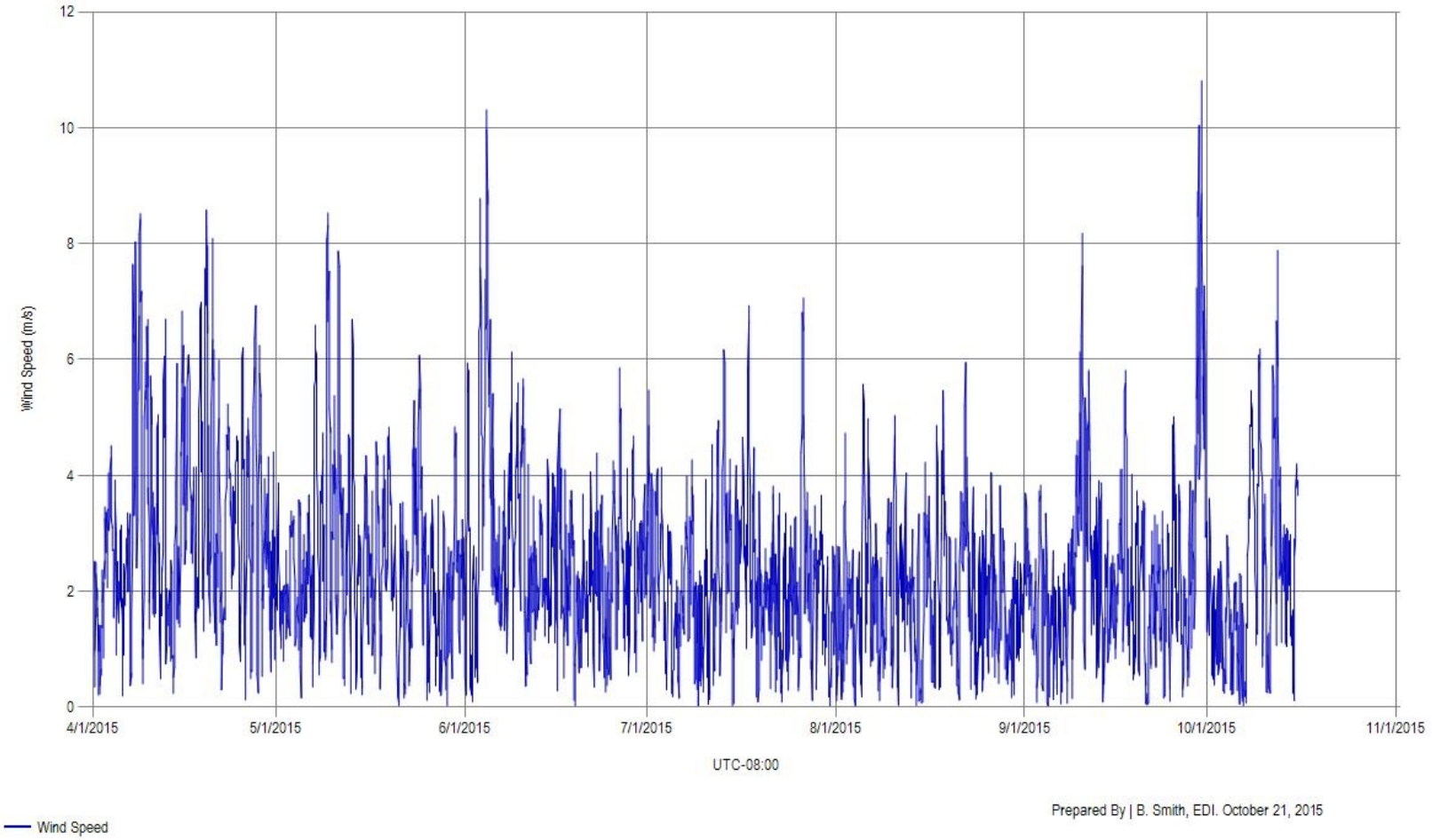


Figure 4A. 5 Mount Nansen mean hourly wind speed, April 1 to October 15, 2015.

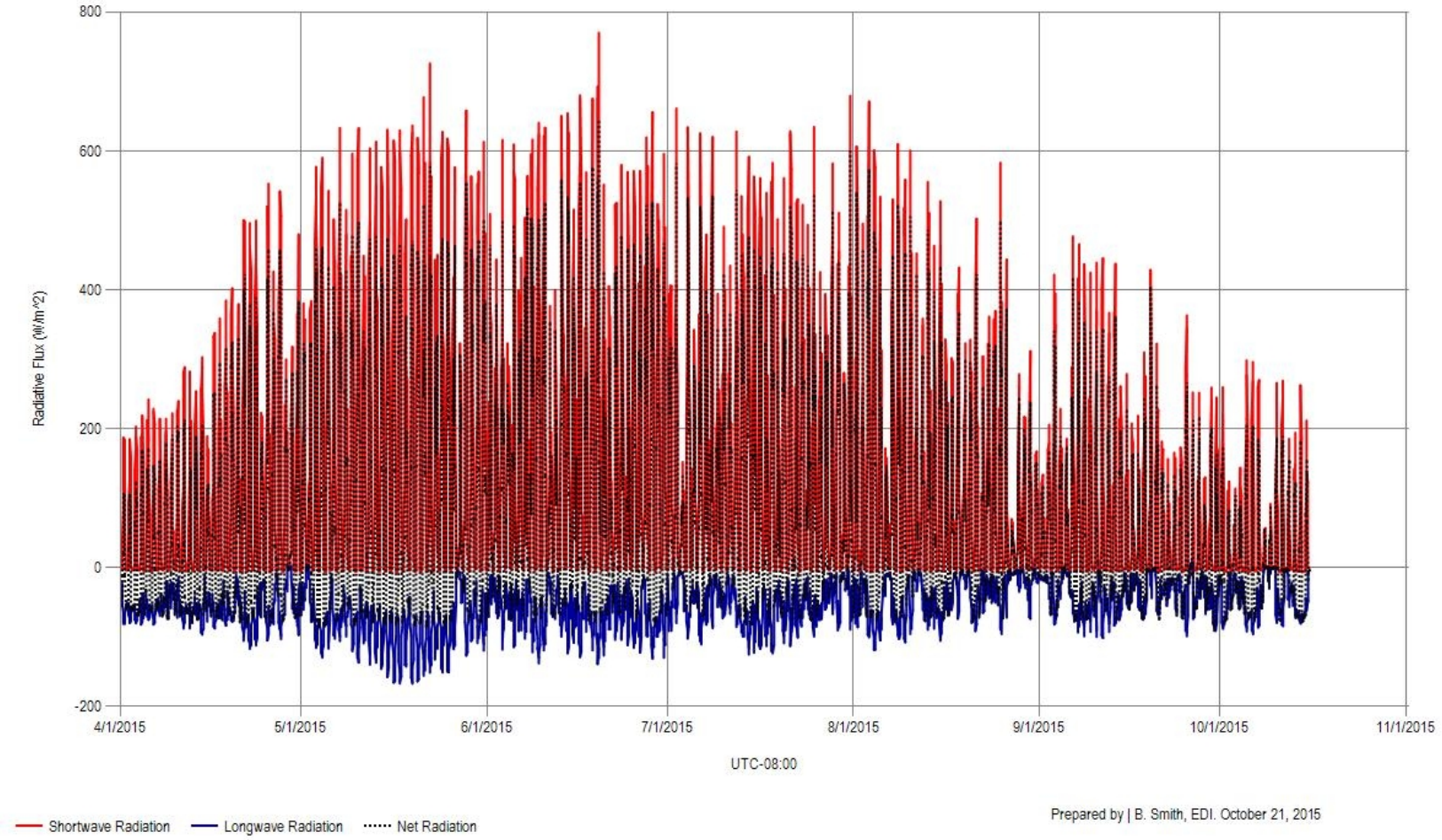


Figure 4A. 6 Mount Nansen mean hourly net shortwave, longwave and total radiation, April 1 to October 15, 2015.

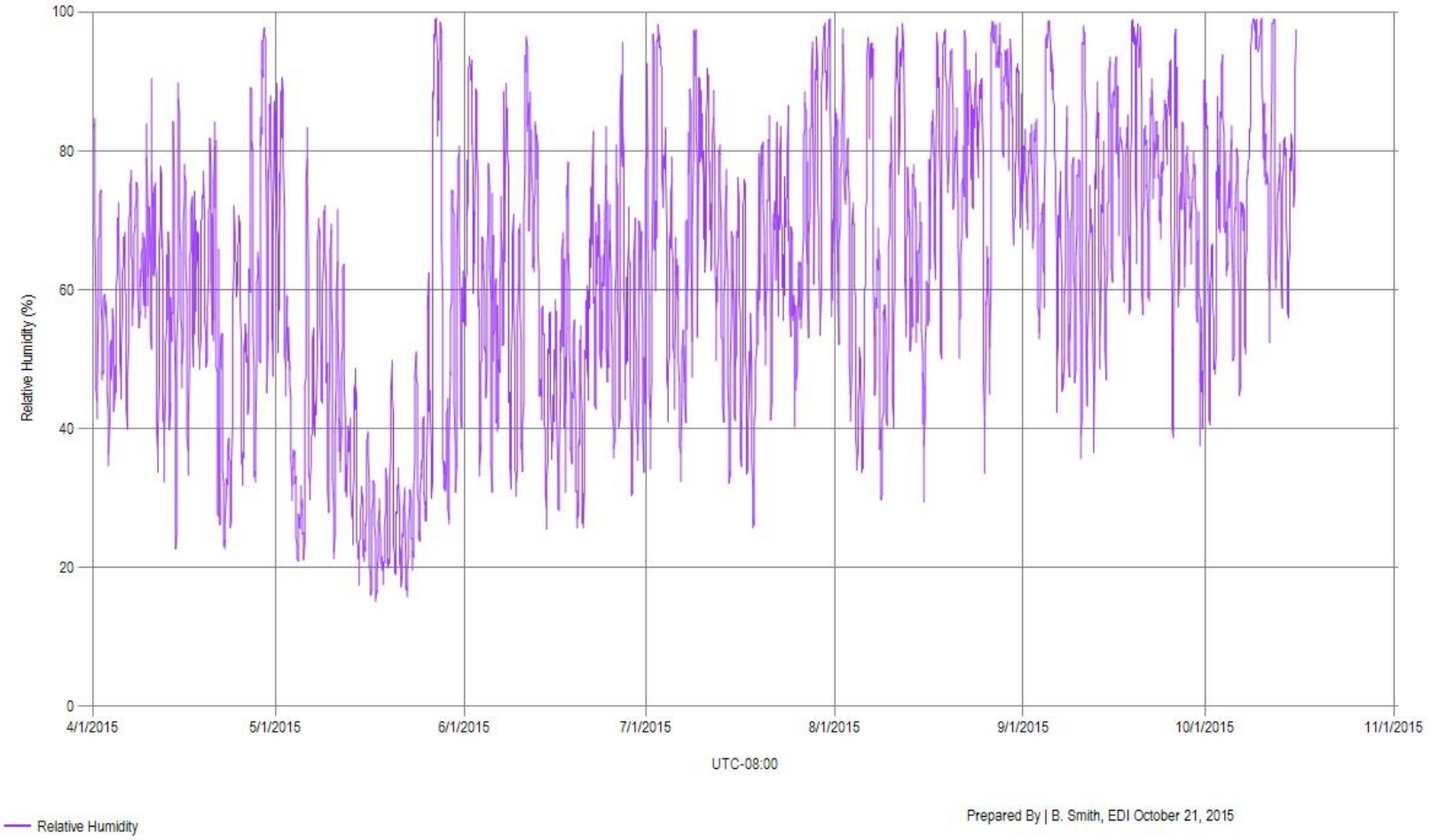


Figure 4A. 7 Mount Nansen mean hourly relative humidity, April 1 to October 15, 2015.

Table 4A 1 Mount Nansen precipitation events for the open-water season, April 1 to October 15, 2015.

Start Date	Duration (hours)	Precipitation Type	Total Accumulation (mm)
April 29, 06:00	6	Snow	67.2
April 29, 11:00	3	Rain	5.1
May 02, 03:00	9	Snow	19.9
May 02, 09:00	3	Rain	2.1
May 26, 21:00	7	Rain	4.0
May 27, 08:00	4	Rain	0.8
June 01, 19:00	2	Rain	2.0
June 11, 02:00	15	Rain	7.4
June 12, 17:00	4	Rain	3.8
July 02, 03:00	4	Rain	1.8
July 02, 20:00	13	Rain	5.8
July 08, 18:00	3	Rain	5.3
July 09, 14:00	5	Rain	5.9
July 19, 14:00	2	Rain	2.4
July 22, 11:00	4	Rain	3.9
July 28, 07:00	5	Rain	8.9
July 29, 21:00	20	Rain	13.4
August 06, 21:00	5	Rain	3.0
August 11, 01:00	32	Rain	29.0
August 17, 18:00	8	Rain	6.3
August 18, 19:00	19	Rain	3.9
August 20, 01:00	9	Rain	2.0
August 22, 10:00	3	Rain	3.9
August 22, 19:00	4	Rain	4.5
August 26, 18:00	4	Rain	5.2
August 27, 07:00	21	Rain	29.7
September 04, 18:00	28	Rain	9.6

Start Date	Duration (hours)	Precipitation Type	Total Accumulation (mm)
September 10, 20:00	4	Rain	9.2
September 20, 11:00	2	Rain	2.6
September 26, 3:00	1	Snow	17.7
September 26, 10:00	1	Snow	17.7
September 26, 12:00	4	Rain	1.7
October 01, 03:00	8	Snow	9.2
October 08, 21:00	3	Rain	2.0
October 09, 17:00	13	Rain	5.7
October 12, 05:00	5	Snow	9.7

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 4B: SEASONAL HYDROLOGIC SUMMARY

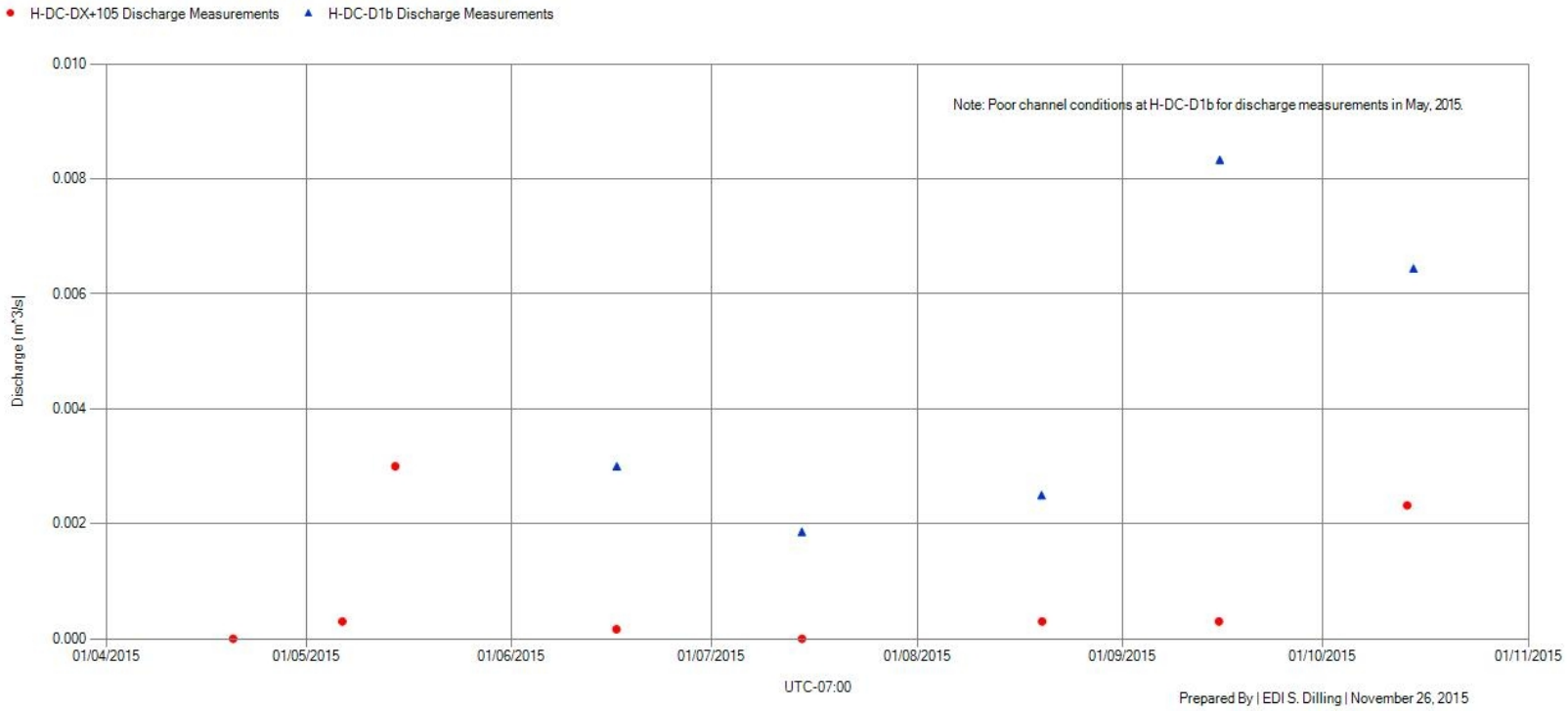


Figure 4B. 1 Hydrographs for upper Dome Creek hydrometric stations, H-DC-DX+105 and H-DC-D1B (no continuous data loggers or rating curves).

Table 4B. 1 Rating curve equation for the Diversion Channel at the Bridge (H-DC-B).

Stage (m)	Discharge (m^3/s)	Offset (m)	Slope	Equation
1.8689	0.0011	1.356	-----	-----
2.1674	0.5599	1.356	13.58778	X = 9.58088 * (Y-1.356)^13.58778

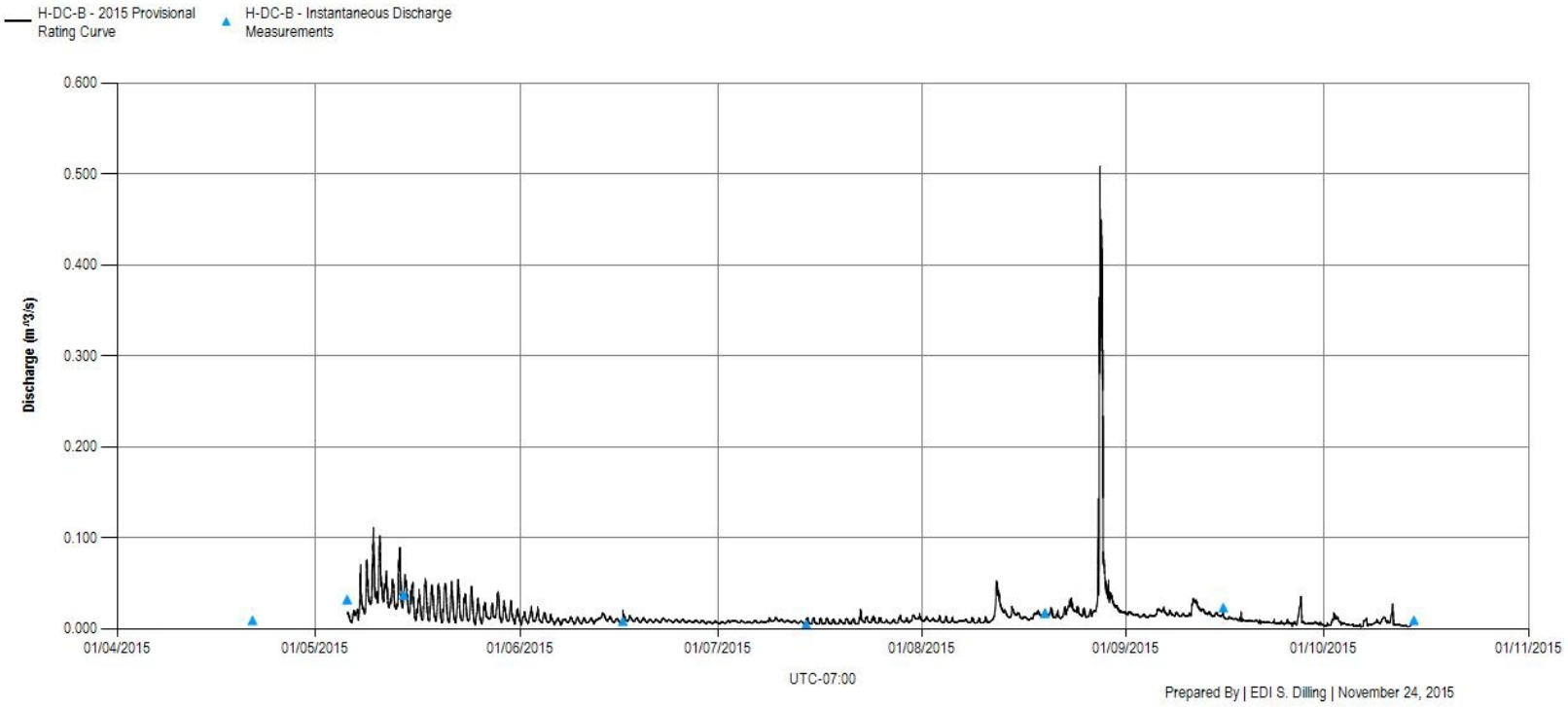


Figure 4B. 2 Hydrograph for the Diversion Channel at the Bridge (H-DC-B), April 1 to October 15, 2015.

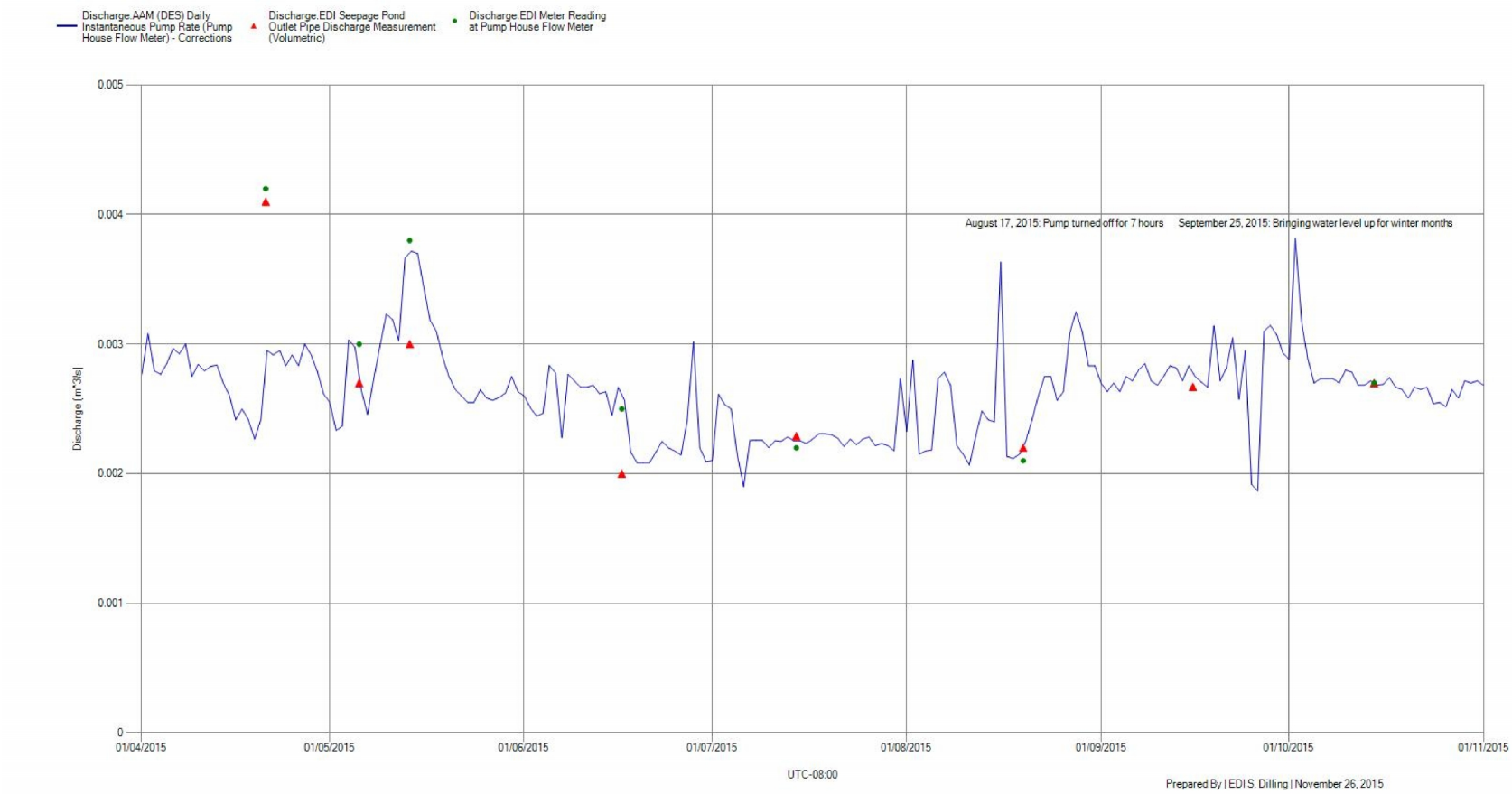


Figure 4B. 3 Hydrograph for the Seepage Pond Outlet, April 1 to October 15, 2015.

Table 4B. 2 Rating curve equation for the Middle Dome Creek at the Weir Pond (H-DC-M WP).

Stage (m)	Discharge (m^3/s)	Offset (m)	Slope	Equation
2.1737	0.0017	1.946	-----	-----
2.4	0.08	1.946	5.581	X = 6.562 * (Y-1.946)^5.581
2.49	0.53	1.946	10.455	X = 308.027 * (Y-1.946)^10.455

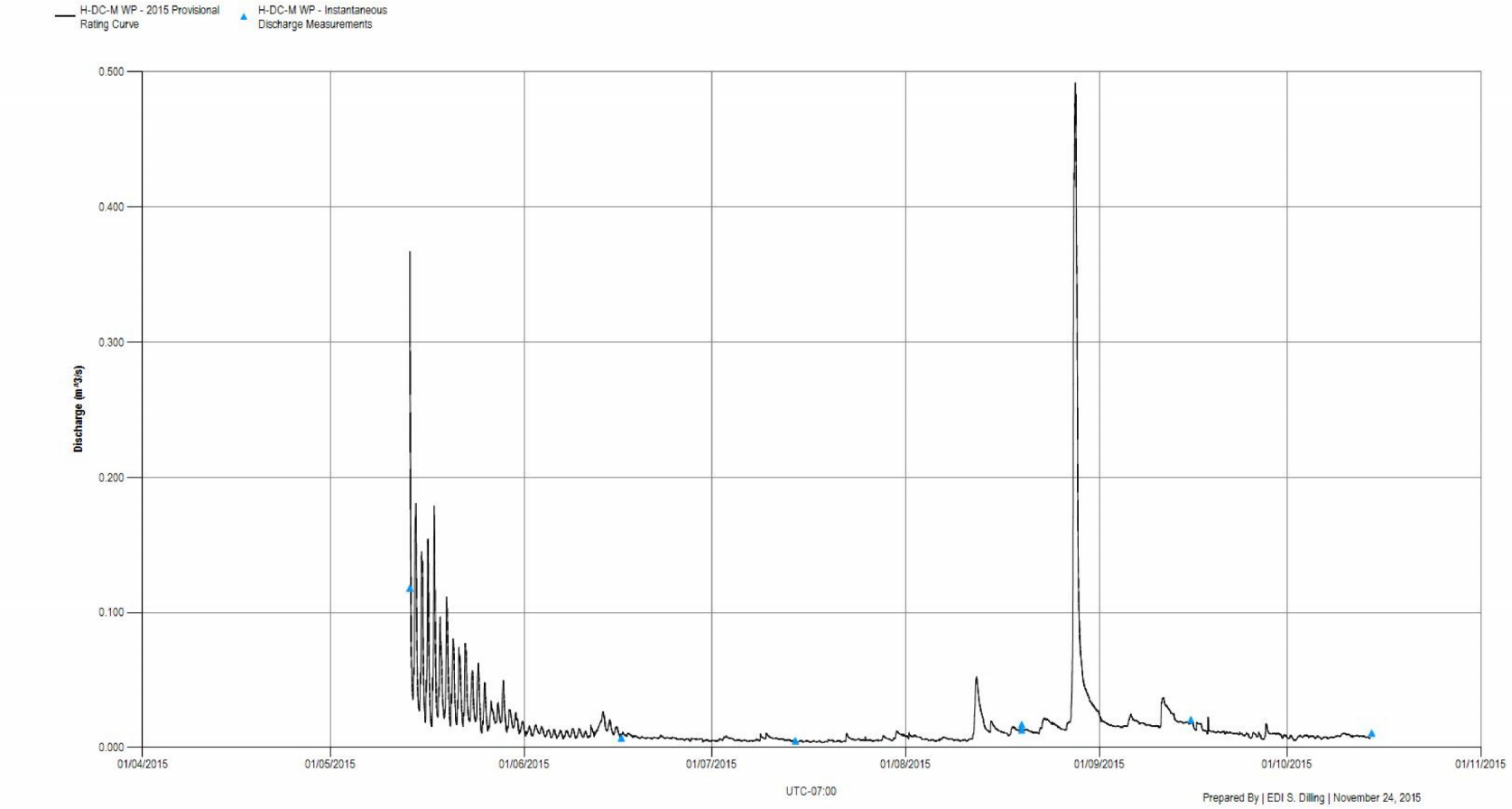


Figure 4B. 4 Hydrograph for the Middle Dome Creek at the Weir Pond (H-DC-M WP), April 1 to October 15, 2015.

Table 4B. 3 Rating curve equation for the Dome Creek at the Road (H-DC-R).

Stage (m)	Discharge (m^3/s)	Offset (m)	Slope	Equation
0.3647	0.0008	0.236	-----	-----
0.907	0.0916	0.236	2.87084	X = 0.28797 * (Y-0.236)^2.87084

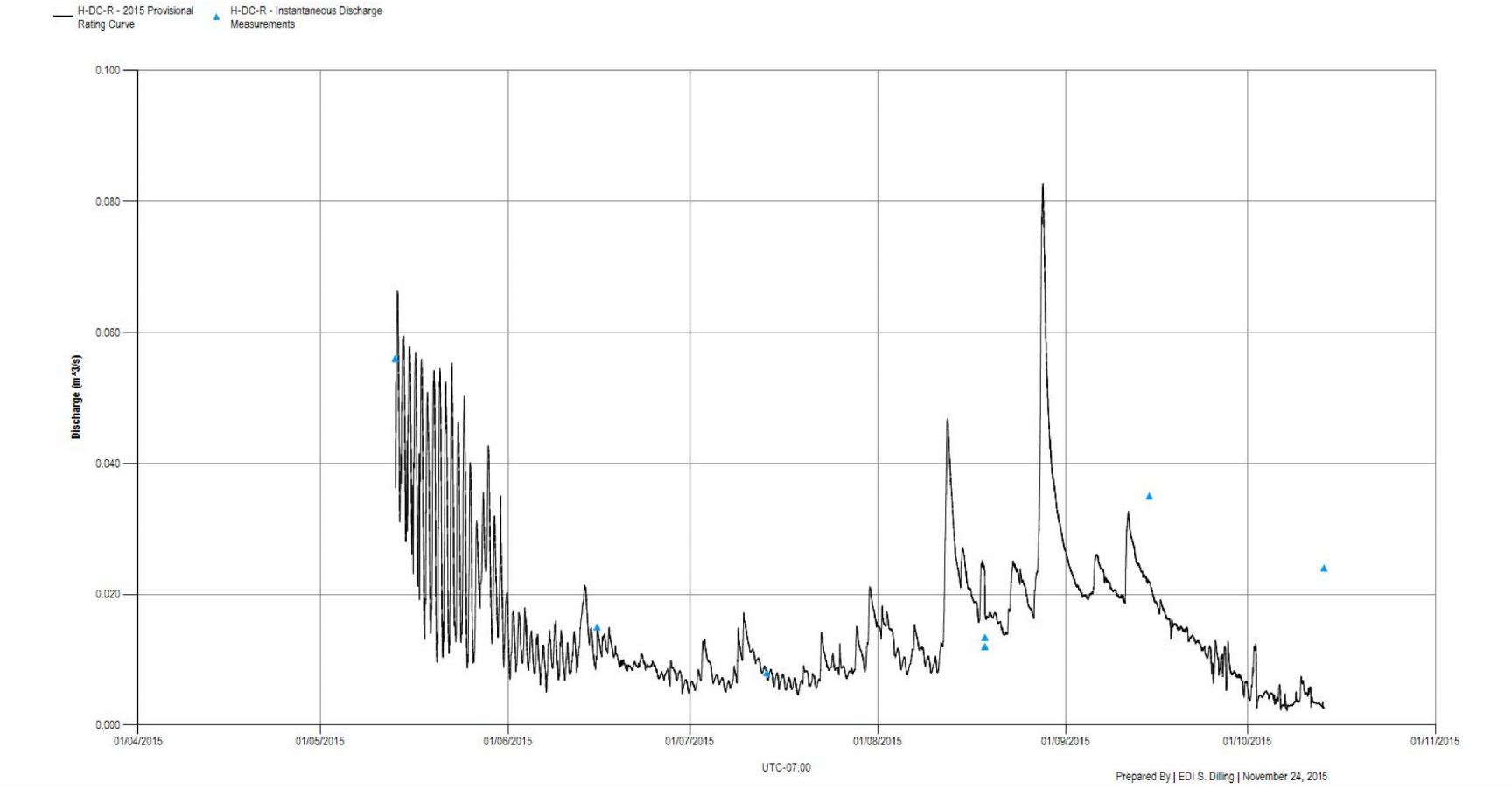


Figure 4B. 5 Hydrograph for the Dome Creek at the Road (H-DC-R), April 1 to October 15, 2015.

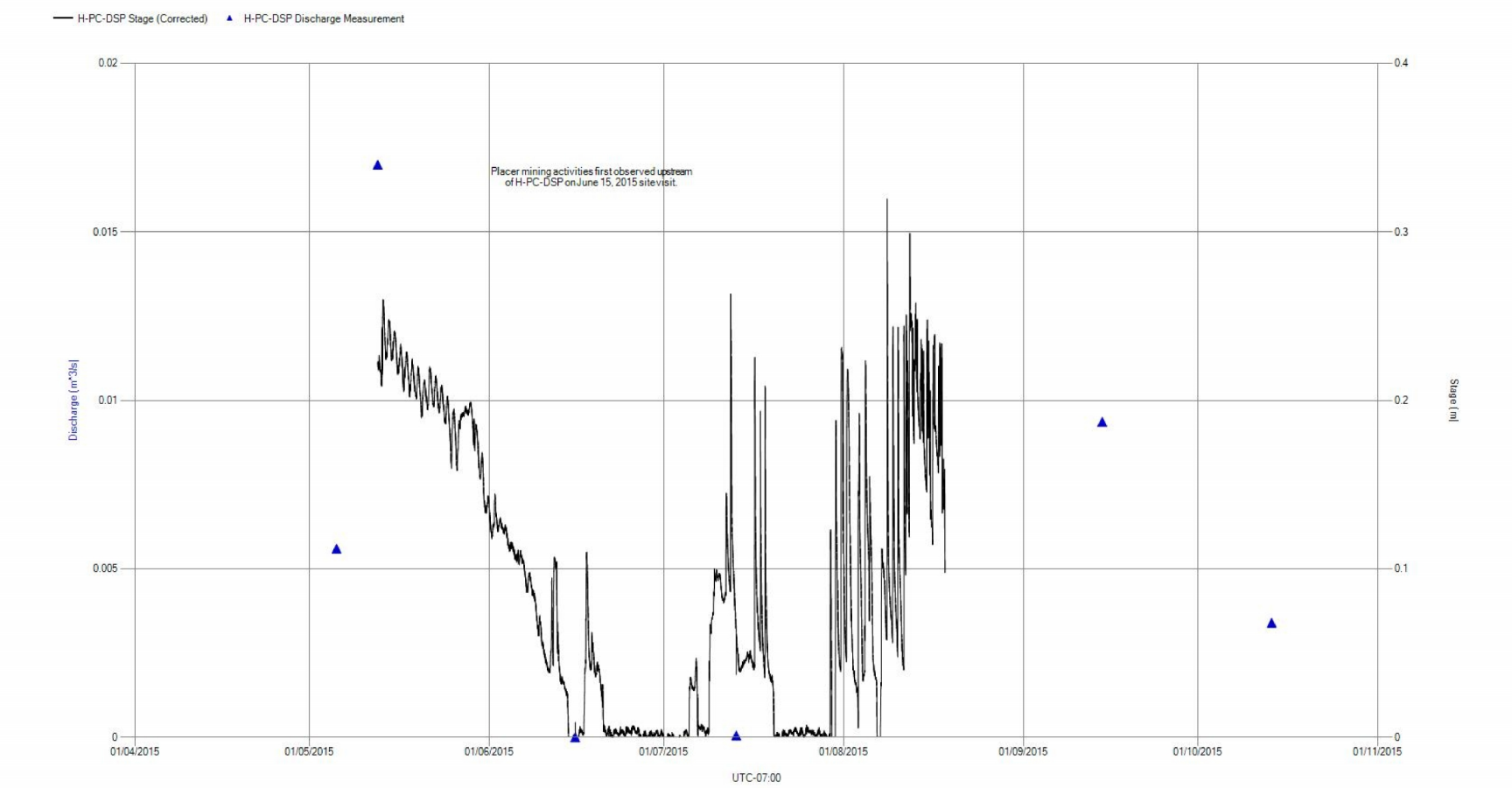


Figure 4B. 6 Hydrograph for the Pony Creek Downstream of the Pit (H-PC-DSP), April 1 to October 15, 2015 (No rating equation; Continuous stage only).

Table 4B. 4 Rating curve equation for the Back Creek at the Road (H-BC).

Stage (m)	Discharge (m^3/s)	Offset (m)	Slope	Equation
1.6838	0.001	1.649	-----	-----
2.157	0.9574	1.649	2.56045	X = 5.42269 * (Y-1.649)^2.56045

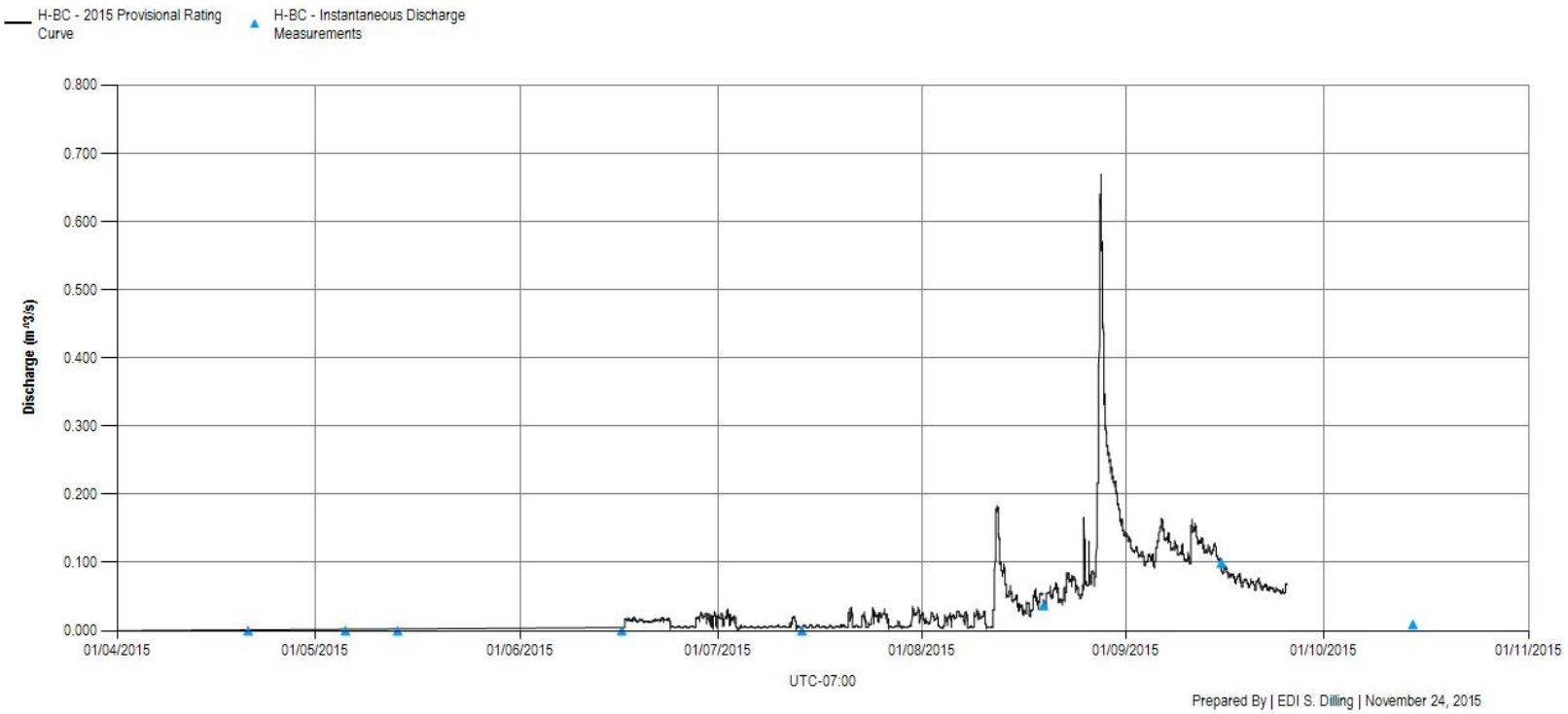


Figure 4B. 7 Hydrograph for Back Creek (H-BC), April 1 to October 15, 2015.

Table 4B. 5 Rating curve equation for the Upper Victoria Creek at the Road (H-VC-U).

Stage (m)	Discharge (m^3/s)	Offset (m)	Slope	Equation
1.9289	0.0199	1.81	-----	-----
2.5633	7.8645	1.81	3.23879	X = 19.68548 * (Y-1.81)^3.23879

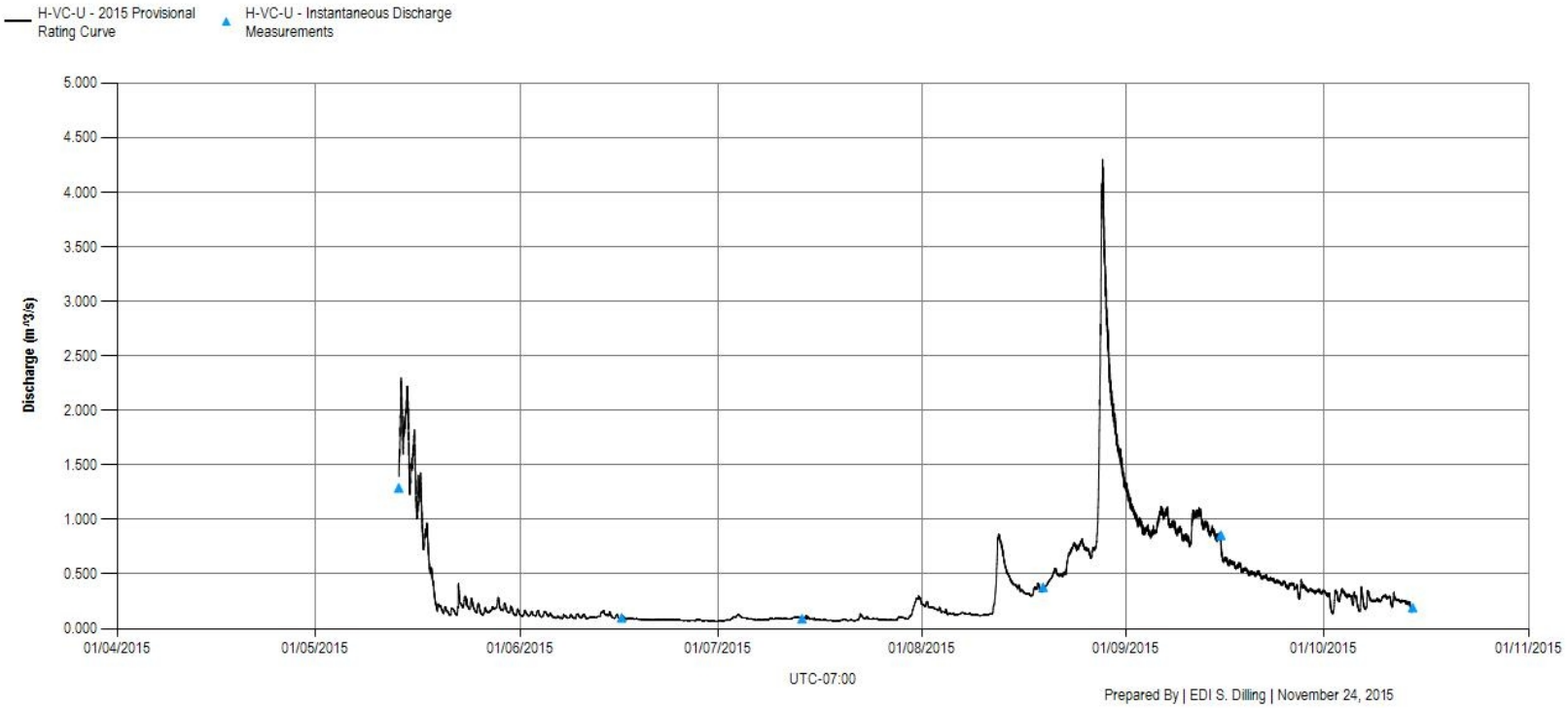


Figure 4B. 8 Hydrograph for the Upper Victoria Creek at the Road (H-VC-U), April 1 to October 15, 2015.

Table 4B. 6 Rating curve equation for the Victoria Creek downstream of Back Creek (H-VC-DBC).

Stage (m)	Discharge (m^3/s)	Offset (m)	Slope	Equation
1.6183	0.0099	1.55	-----	-----
2.3013	5.9368	1.55	2.6675	X = 12.72976 * (Y-1.550)^2.66750

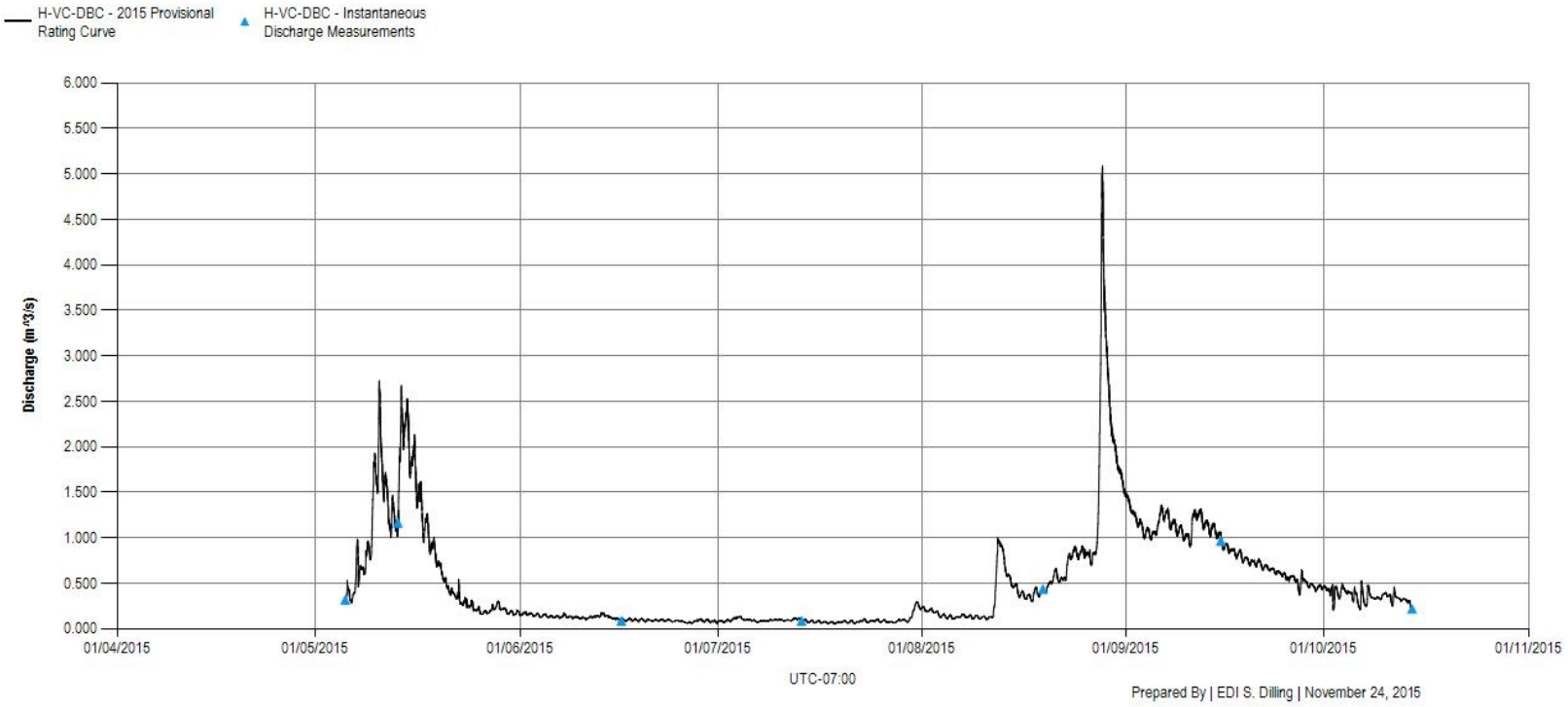


Figure 4B. 9 Hydrograph for Victoria Creek downstream of Back Creek (H-VC-DBC), April 1 to October 15, 2015.

Table 4B. 7 Rating curve equation for the Victoria Creek upstream of Minnesota Creek (H-VC-UMN).

Stage (m)	Discharge (m^3/s)	Offset (m)	Slope	Equation
1.38	0.01	0.999	-----	-----
2.12	15.68	0.999	6.818	X = 7.197 * (Y-0.999)^6.818

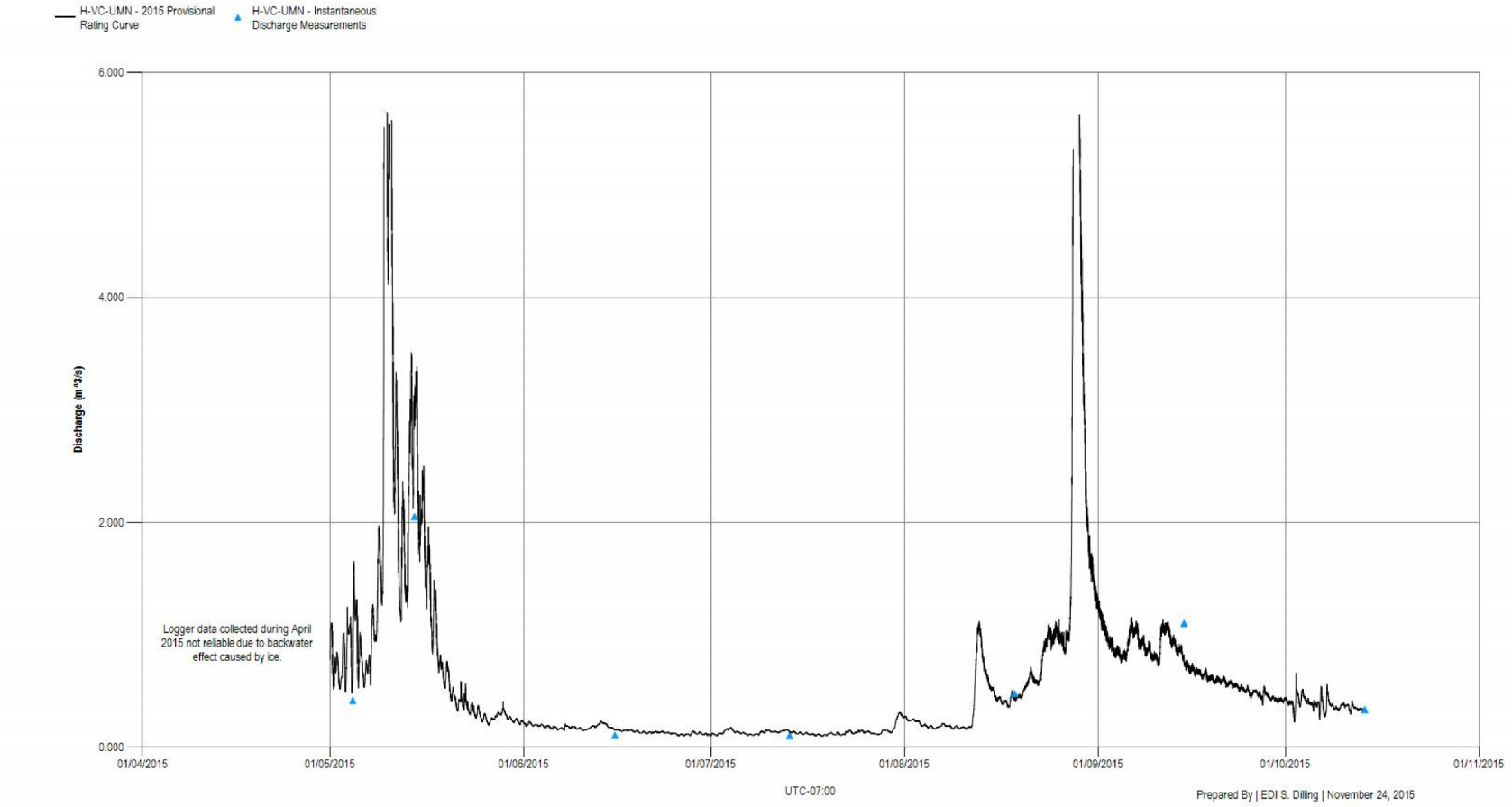


Figure 4B. 10 Hydrograph for the Victoria Creek upstream of Minnesota Creek (H-VC-UMN), April 1 to October 15, 2015.

Table 4B. 8 Rating curve equation for the Victoria Creek at the Road (H-VC-R).

Stage (m)	Discharge (m^3/s)	Offset (m)	Slope	Equation
1.9	0.02	1.58	-----	-----
2.48	9.35	1.58	5.945	X = 17.492 * (Y-1.58)^5.945

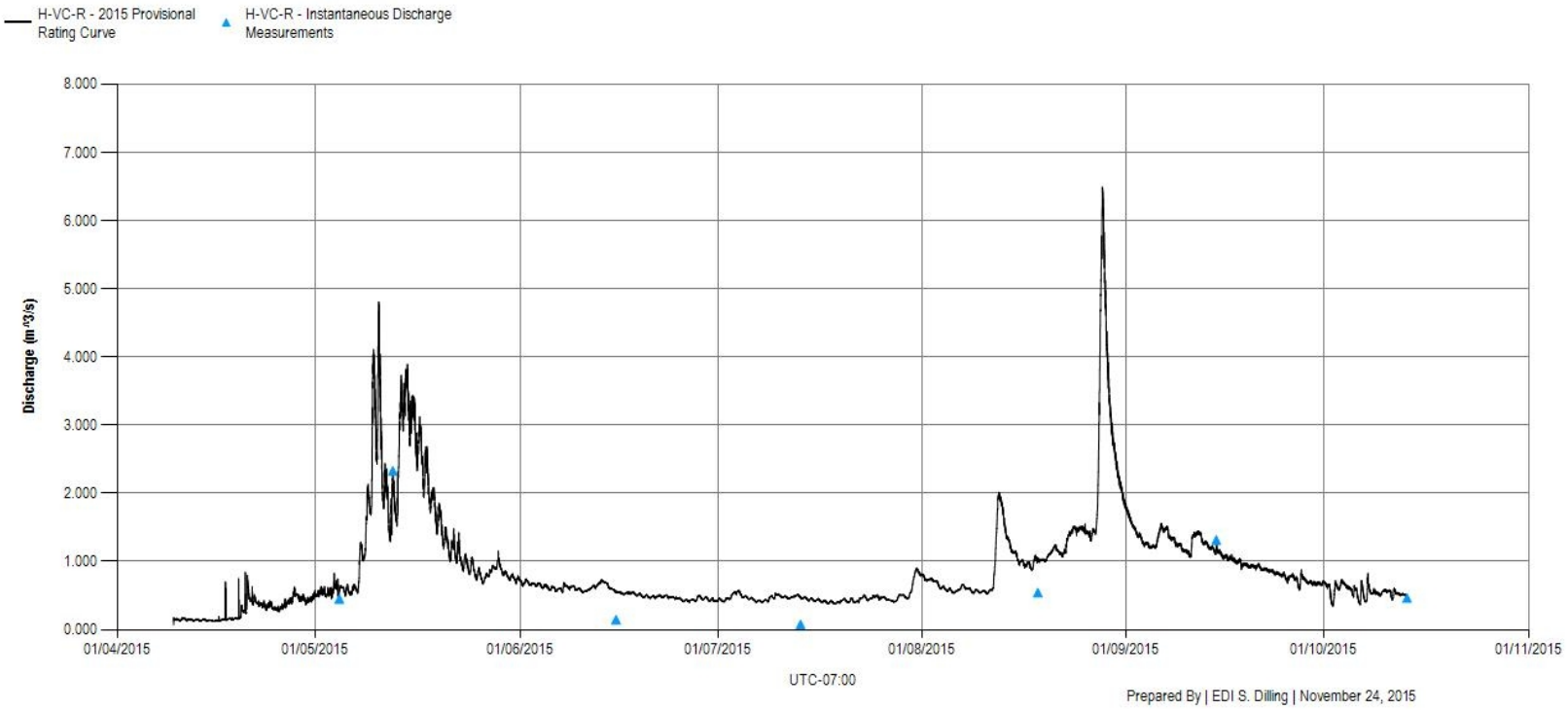


Figure 4B. 11 Hydrograph for Victoria Creek at the Road (H-VC-R), April 1 to October 15, 2015.

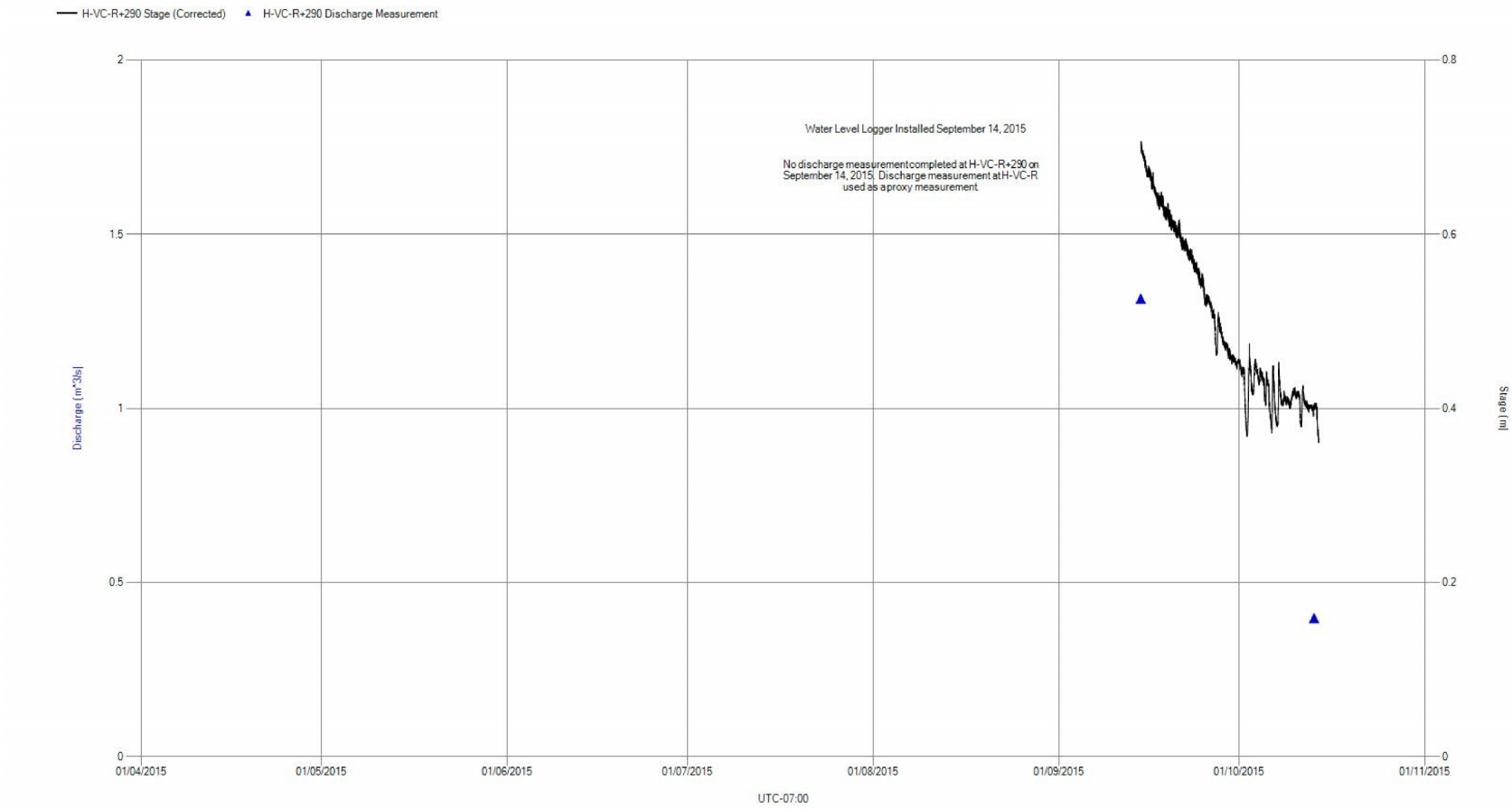


Figure 4B. 12 Hydrograph for Victoria Creek at the Road (H-VC-R+290), April 1 to October 15, 2015 (No rating equation).

Table 4B. 9 Mount Nansen Hydrometric Network Rating Measurements for the period April 1 to October 15, 2015.

HID	Date	Time	Measurement	Discharge	Accuracy	Water Surface Elevation	Staff Gauge
	(MM/DD/YYYY)	(HH:MM)	Type	(m^3/s)	(%)	(m, L.D.)	(m)
ATM-VC5	04/20/2015	17:15	N	-	-	-	-
ATM-VC5	05/05/2015	13:01	N	-	-	-	-
ATM-VC5	05/13/2015	13:17	N	-	-	-	-
ATM-VC5	06/16/2015	9:40	N	-	-	-	-
ATM-VC5	07/13/2015	18:05	N	-	-	-	-
ATM-VC5	08/18/2015	8:45	N	-	-	-	-
ATM-VC5	09/15/2015	08:10	N	-	-	-	-
ATM-VC5	10/14/2015	9:20	N	-	-	-	-
H-PC-DSP	04/20/2015	-	N	-	-	-	-
H-PC-DSP	05/05/2015	15:25	V	0.006	-	-	-
H-PC-DSP	05/12/2015	17:44	V	0.017	-	2.465	0.232
H-PC-DSP	06/15/2015	18:15	N	0.000	-	-	-
H-PC-DSP	07/13/2015	12:35	V	0.000	-	2.250	0.134
H-PC-DSP	08/18/2015	-	N	-	-	2.449	-
H-PC-DSP	09/14/2015	13:50	V	0.009	-	-	0.321
H-PC-DSP	10/13/2015	18:35	V	0.003	-	-	-
H-DC-DX+105	04/20/2015	-	N	0.000	-	-	-
H-DC-DX+105	05/06/2015	10:40	V	0.000	-	-	-
H-DC-DX+105	05/14/2015	10:06	SS	0.003	-	-	-
H-DC-DX+105	06/16/2015	17:05	V	0.000	-	-	-
H-DC-DX+105	07/14/2015	15:45	N	0.000	-	-	-
H-DC-DX+105	08/19/2015	19:12	V	0.000	-	-	-
H-DC-DX+105	09/15/2015	10:25	V	0.000	-	-	-
H-DC-DX+105	10/13/2015	18:30	V	0.002	-	-	-
H-DC-D1b	05/05/2015	-	N	-	-	-	-
H-DC-D1b	05/13/2015	14:40	N	-	-	-	-

HID	Date (MM/DD/YYYY)	Time (HH:MM)	Measurement Type	Discharge (m^3/s)	Accuracy (%)	Water Surface Elevation (m, L.D.)	Staff Gauge (m)
H-DC-D1b	06/16/2015	18:18	SS	0.003	-	-	-
H-DC-D1b	07/14/2015	15:15	V	0.002	-	-	-
H-DC-D1b	08/19/2015	17:20	V	0.003	-	-	-
H-DC-D1b	09/15/2015	13:20	V	0.008	-	-	-
H-DC-D1b	10/14/2015	17:42	V	0.006	-	-	-
H-DC-B	04/21/2015	09:45	SS	0.009	-	-	-
H-DC-B	05/05/2015	18:20	SS	0.032	-	2.004	0.182
H-DC-B	05/14/2015	08:18	SS	0.037	-	2.016	0.198
H-DC-B	06/16/2015	15:00	SS	0.008	-	1.946	0.123
H-DC-B	07/14/2015	10:00	SS	0.005	-	1.936	0.114
H-DC-B	08/19/2015	15:18	SS	0.017	-	1.974	0.143
H-DC-B	09/15/2015	16:45	SS	0.023	-	1.977	0.150
H-DC-B	10/14/2015	15:00	SS	0.009	-	1.991	0.172
H-DC-M	05/05/2015	15:50	N	-	-	-	-
H-DC-M WP	04/20/2015	18:20	N	-	-	-	-
H-DC-M WP	05/05/2015	15:50	N	-	-	-	-
H-DC-M WP	05/13/2015	17:40	SS	0.118	-	-	-
H-DC-M WP	06/16/2015	13:25	V	0.007	-	2.246	0.292
H-DC-M WP	07/14/2015	08:54	V	0.005	-	2.223	0.267
H-DC-M WP	08/19/2015	13:46	V	0.013	-	2.284	-
H-DC-M WP	08/19/2015	13:46	SS	0.017	-	2.284	-
H-DC-M WP	09/15/2015	15:10	V	0.021	-	2.302	-
H-DC-M WP	10/14/2015	13:20	V	0.011	-	2.252	0.302
H-DC-R	04/20/2015	-	N	-	-	-	-
H-DC-R	05/05/2015	-	N	-	-	-	-
H-DC-R	05/13/2015	09:22	SS	0.051	-	0.753	0.538
H-DC-R	05/13/2015	09:22	V	0.005	-	0.755	0.538

HID	Date	Time	Measurement	Discharge	Accuracy	Water Surface Elevation	Staff Gauge
	(MM/DD/YYYY)	(HH:MM)	Type	(m^3/s)	(%)	(m, L.D.)	(m)
H-DC-R	06/15/2015	16:49	SS	0.015	-	0.585	0.328
H-DC-R	07/13/2015	16:21	SS	0.008	-	0.511	0.290
H-DC-R	08/18/2015	16:43	SS	0.012	-	0.620	0.382
H-DC-R	08/18/2015	16:43	V	0.013	-	0.620	0.382
H-DC-R	09/14/2015	19:25	SS	0.035	-	0.598	0.378
H-DC-R	10/13/2015	15:00	SS	0.024	-	0.498	0.272
H-VC-U	04/20/2015	17:25	ADV-MID	0.130	3.5	-	-
H-VC-U	05/05/2015	13:15	ADV-MID	0.368	3.3	-	-
H-VC-U	05/13/2015	14:14	ADV-MID	1.290	3.5	2.251	0.448
H-VC-U	06/16/2015	10:00	ADV-MID	0.100	3.5	2.005	0.180
H-VC-U	07/13/2015	18:34	ADV-MID	0.090	3.4	2.008	0.181
H-VC-U	08/19/2015	08:41	ADV-MID	0.379	3.1	2.101	0.274
H-VC-U	09/15/2015	08:30	ADV-MID	0.856	3.3	2.184	0.352
H-VC-U	10/14/2015	10:10	ADV-MID	0.192	3.7	2.041	0.230
H-VC-DBC	04/20/2015	16:23	ADV-MID	0.192	3.1	-	-
H-VC-DBC	05/05/2015	11:32	ADV-MID	0.317	3.0	1.806	0.445
H-VC-DBC	05/13/2015	11:10	ADV-MID	1.163	3.3	1.968	0.602
H-VC-DBC	06/16/2015	08:45	ADV-MID	0.085	3.7	1.714	0.354
H-VC-DBC	07/13/2015	17:28	ADV-MID	0.085	3.4	1.712	0.352
H-VC-DBC	08/19/2015	07:50	ADV-MID	0.433	3.2	1.828	0.475
H-VC-DBC	09/15/2015	07:45	ADV-MID	0.962	3.1	1.929	0.568
H-VC-DBC	10/14/2015	08:20	ADV-MID	0.216	3.5	1.768	0.451
H-BC	04/20/2015	17:51	N	0.000	-	-	-
H-BC	05/05/2015	12:20	N	0.000	-	-	-
H-BC	05/13/2015	10:33	N	0.000	-	-	-
H-BC	06/16/2015	10:45	N	0.000	-	-	-
H-BC	07/13/2015	18:47	N	0.000	-	-	-

HID	Date	Time	Measurement	Discharge	Accuracy	Water Surface Elevation	Staff Gauge
	(MM/DD/YYYY)	(HH:MM)	Type	(m^3/s)	(%)	(m, L.D.)	(m)
H-BC	08/19/2015	10:28	SS	0.037	-	1.786	0.156
H-BC	09/15/2015	09:25	SS	0.099	-	1.863	0.202
H-BC	10/14/2015	11:35	SS	0.009	-	1.733	0.112
H-VC-UMN	04/20/2015	14:43	N	-	3.2	-	-
H-VC-UMN	05/04/2015	16:10	ADV-MID	0.418	3.3	1.779	0.772
H-VC-UMN	05/14/2015	12:39	ADV-MID	2.052	3.0	1.841	0.880
H-VC-UMN	06/15/2015	15:10	ADV-MID	0.109	3.5	1.570	0.567
H-VC-UMN	07/13/2015	14:55	ADV-MID	0.104	3.0	1.555	0.559
H-VC-UMN	08/18/2015	15:23	ADV-MID	0.480	3.2	1.660	0.668
H-VC-UMN	09/14/2015	18:20	ADV-MID	1.105	3.2	1.746	0.742
H-VC-UMN	10/13/2015	16:50	ADV-MID	0.336	5.8	1.639	0.642
H-VC-UMN	11/17/2015	12:45	ADV-MID	0.164	8.6	1.658	0.652
H-VC-R	04/20/2015	13:03	ADV-MID	0.145	3.4	-	-
H-VC-R	05/04/2015	13:57	ADV-MID	0.450	3.3	2.128	0.552
H-VC-R	05/12/2015	16:50	ADV-MID	2.328	3.2	2.258	0.678
H-VC-R	06/15/2015	13:25	ADV-MID	0.146	3.9	2.117	0.512
H-VC-R	07/13/2015	13:17	ADV-MID	0.076	3.7	2.102	0.503
H-VC-R	08/18/2015	13:30	ADV-MID	0.542	2.8	2.192	0.604
H-VC-R	09/14/2015	15:30	ADV-MID	1.315	3.0	2.215	0.600
H-VC-R	10/13/2015	13:40	ADV-MID	0.464	5.6	-	0.528
H-VC-R+290	09/14/2015	15:30	ADV-MID	1.315	3.0	2.555	0.352
H-VC-R+290	10/13/2015	13:35	ADV-MID	0.398	3.3	2.437	0.253
H-SEEP	04/20/2015	18:57	V	0.004	-	-	-
H-SEEP	05/05/2015	16:30	V	0.003	-	-	-
H-SEEP	05/13/2015	17:56	V	0.003	-	-	-
H-SEEP	06/16/2015	13:38	V	0.002	-	-	0.202
H-SEEP	07/14/2015	09:45	V	0.002	-	-	-

HID	Date	Time	Measurement	Discharge	Accuracy	Water Surface Elevation	Staff Gauge
	(MM/DD/YYYY)	(HH:MM)	Type	(m^3/s)	(%)	(m, L.D.)	(m)
H-SEEP	08/19/2015	14:10	V	0.002	-	-	0.159
H-SEEP	09/15/2015	15:50	V	0.003	-	-	-
H-SEEP	10/14/2015	13:47	V	0.003	-	-	-
H-PW	04/20/2015	17:50	V	0.003	-	-	-
H-PW	05/06/2015	14:27	V	0.003	-	-	-
H-PW	05/13/2015	12:01	V	0.003	-	-	-
H-PW	07/14/2015	11:39	V	0.003	-	-	-
H-PW	08/19/2015	10:26	V	0.003	-	-	-
H-PW	09/16/2015	08:40	V	0.002	-	-	-
H-PW	10/15/2015	10:20	V	0.003	-	-	-
H-TP	06/16/2015	13:59	N	-	-	-	1.048
H-TP	07/14/2015	09:28	N	-	-	-	-
H-TP	08/19/2015	-	N	-	-	-	-
H-TP	09/15/2015	16:30	N	-	-	-	-
H-TP	10/14/2015	14:00	N	-	-	-	-

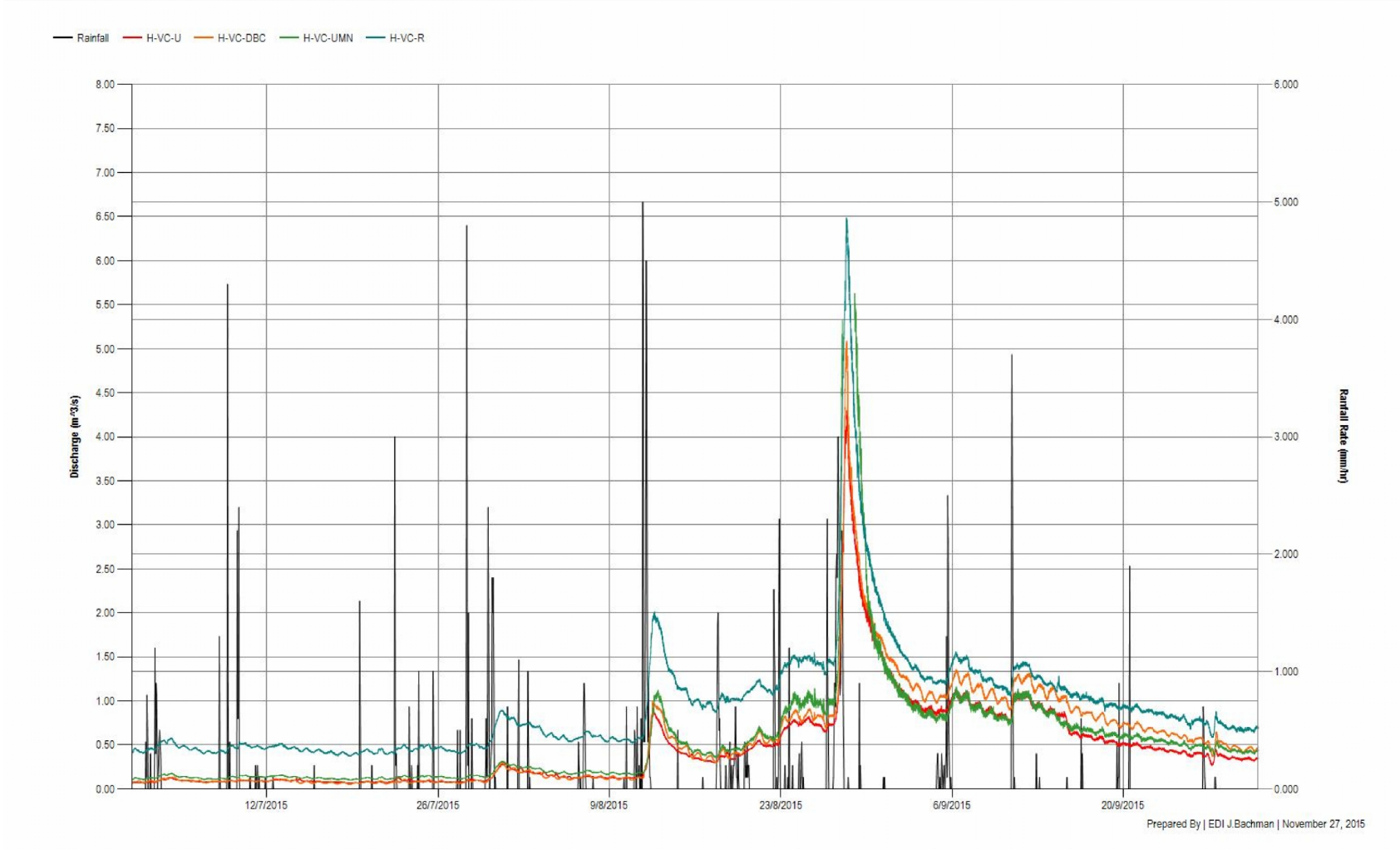


Figure 4B. 13 Hydrologic Response of the Victoria Creek hydrometric stations to rainfall events between July 1, 2015 and September 30, 2015.

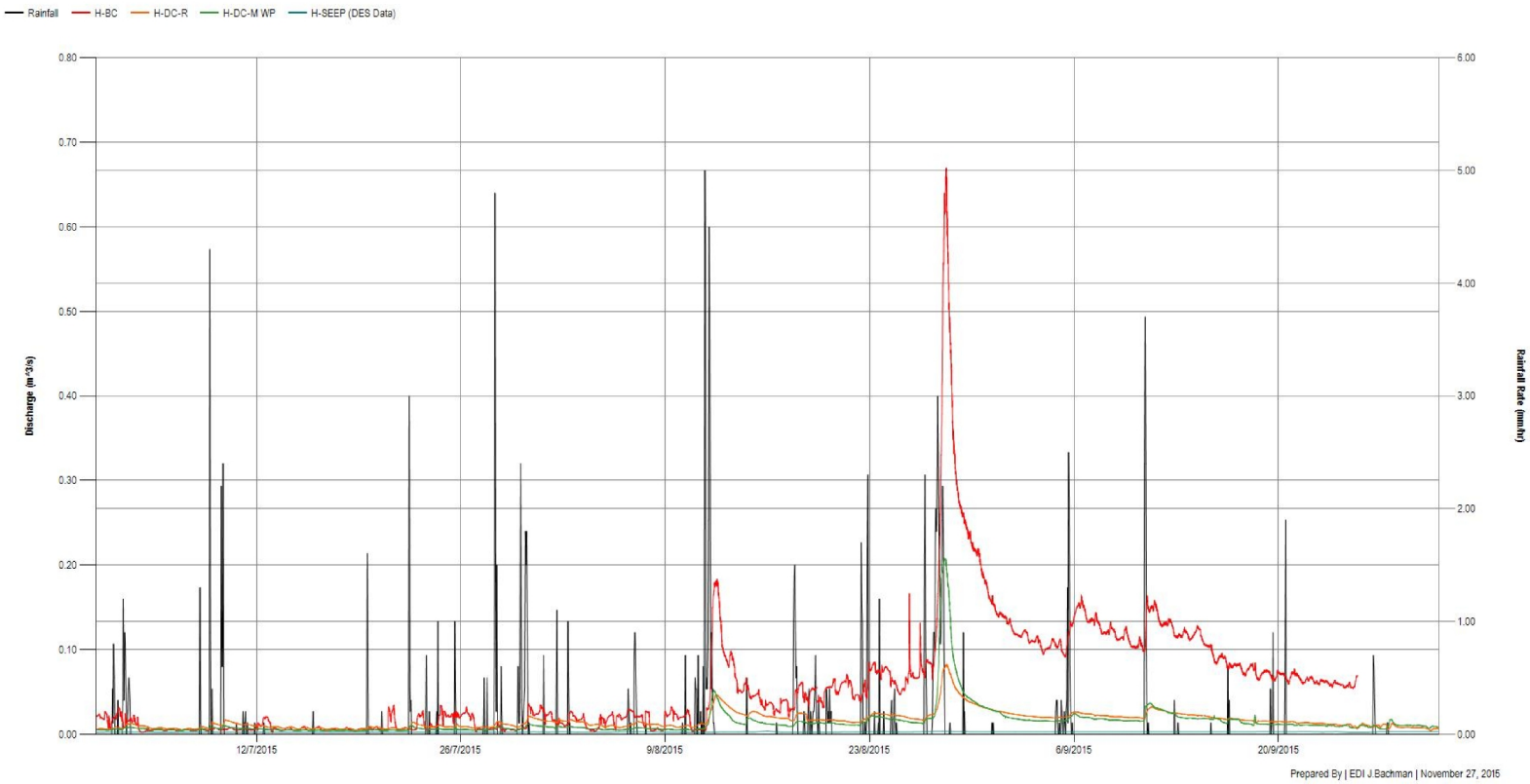


Figure 4B. 14 Hydrologic Response of the Dome Creek and Back Creek hydrometric stations to rainfall events between July 1, 2015 and September 30, 2015.

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

Date Received: 15-OCT-15
Report Date: 30-OCT-15 14:11 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1688545

Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 15-Y-0146
C of C Numbers: 1, 2, 3, 4, 5
Legal Site Desc:

Can Dang
Senior Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1688545-1 Water 14-OCT-15 16:45 WQ-CH-P-13-01	L1688545-2 Water 15-OCT-15 08:20 WQ-DC-11	L1688545-3 Water 15-OCT-15 08:00 WQ-MS-S-03	L1688545-4 Water 15-OCT-15 07:50 WQ-DC-10	L1688545-5 Water 15-OCT-15 08:50 WQ-DC-15
WATER						
Physical Tests	Conductivity (uS/cm)	1310	1140	1170	1150	1140
	Hardness (as CaCO3) (mg/L)	888	733	747	746	724
	pH (pH)	6.52	7.46	7.41	7.86	7.24
	Total Suspended Solids (mg/L)	13.6	<3.0	27.9	12.0	<3.0
	Total Dissolved Solids (mg/L)	1120	869	901	886	864
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	8.6	285	294	288	286
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	8.6	285	294	288	286
	Ammonia, Total (as N) (mg/L)	0.0074	0.0181	0.0515	0.0348	0.0232
	Chloride (Cl) (mg/L)	<1.0 DLA	<1.0 DLA	<1.0 DLA	<1.0 DLA	<1.0 DLA
	Fluoride (F) (mg/L)	0.041	0.169	0.173	0.171	0.167
	Nitrate (as N) (mg/L)	0.193	0.021	<0.010 DLA	0.023	0.025
	Nitrite (as N) (mg/L)	<0.0020 DLA	<0.0020 DLA	<0.0020 DLA	<0.0020 DLA	<0.0020 DLA
	Sulfate (SO4) (mg/L)	798	433	454	444	432
	Anion Sum (meq/L)	16.8	14.7	15.3	15.0	14.7
	Cation Sum (meq/L)	18.1	15.0	15.4	15.3	14.9
	Cation - Anion Balance (%)	3.8	1.0	0.4	1.1	0.5
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanate (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.173	0.0039	1.44	0.0540	0.0081
	Antimony (Sb)-Total (mg/L)	0.00012	0.0110	0.0245	0.0112	0.0112
	Arsenic (As)-Total (mg/L)	0.00053	0.0239	0.407	0.0578	0.0348
	Barium (Ba)-Total (mg/L)	0.00990	0.0117	0.0468	0.0168	0.0114
	Beryllium (Be)-Total (mg/L)	0.000035	<0.000020	0.000078	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	0.000423	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	0.00784	0.00206	0.00881	0.00204	0.00237
	Calcium (Ca)-Total (mg/L)	210	185	185	187	181
	Chromium (Cr)-Total (mg/L)	0.00019	<0.00010	0.00189	0.00014	<0.00010
	Cobalt (Co)-Total (mg/L)	<0.00010	0.00081	0.00266	0.00093	0.00085
	Copper (Cu)-Total (mg/L)	0.00105	<0.00050	0.0302	0.00183	<0.00050
	Iron (Fe)-Total (mg/L)	0.063	0.180	10.4	1.75	0.302
	Lead (Pb)-Total (mg/L)	<0.000050	0.000051	0.0680	0.00283	<0.000050
	Lithium (Li)-Total (mg/L)	0.0023	0.0105	0.0114	0.0105	0.0101

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1688545-6 Water 15-OCT-15 08:35 WQ-DC-DX+105	L1688545-7 Water 15-OCT-15 08:45 WQ-DC-DX+105-R	L1688545-8 Water 14-OCT-15 10:50 WQ-BC	L1688545-9 Water 14-OCT-15 13:05 WQ-DC-U	L1688545-10 Water 14-OCT-15 13:40 WQ-SEEP
WATER						
Physical Tests	Conductivity (uS/cm)	1140	1140	387	1320	1490
	Hardness (as CaCO3) (mg/L)	730	724	211	843	893
	pH (pH)	7.30	7.28	8.04	7.99	7.17
	Total Suspended Solids (mg/L)	<3.0	<3.0	4.1	9.4	27.7
	Total Dissolved Solids (mg/L)	863	867	243	1060	1240
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	281	288	125	220	258
	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)	281	288	125	220	258
	Ammonia, Total (as N) (mg/L)	0.0231	0.0224	0.0056	1.14	4.51
	Chloride (Cl) (mg/L)	<1.0 DLA	<1.0 DLA	<0.50	<1.0 DLA	<2.5 DLA
	Fluoride (F) (mg/L)	0.168	0.171	0.091	0.096	0.082
	Nitrate (as N) (mg/L)	0.025	0.026	0.0766	0.382	1.01
	Nitrite (as N) (mg/L)	<0.0020 DLA	<0.0020 DLA	<0.0010	0.0064	0.0230
	Sulfate (SO4) (mg/L)	432	433	87.4	614	694
	Anion Sum (meq/L)	14.6	14.8	4.34	17.2	19.7
	Cation Sum (meq/L)	15.0	14.9	4.44	17.8	20.6
	Cation - Anion Balance (%)	1.2	0.2	1.2	1.7	2.3
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	0.0107
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	0.0243
	Cyanate (mg/L)	<0.20	<0.20	<0.20	0.75	2.01
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	4.10
Total Metals	Aluminum (Al)-Total (mg/L)	0.0074	0.0057	0.209	0.0842	0.0189
	Antimony (Sb)-Total (mg/L)	0.0115	0.0112	0.00028	0.00172	0.00054
	Arsenic (As)-Total (mg/L)	0.0349	0.0333	0.00239	0.0164	0.0460
	Barium (Ba)-Total (mg/L)	0.0117	0.0116	0.0704	0.0466	0.0652
	Beryllium (Be)-Total (mg/L)	<0.000020	0.000021	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	0.027	0.059
	Cadmium (Cd)-Total (mg/L)	0.00235	0.00240	0.000231	0.000114	0.000561
	Calcium (Ca)-Total (mg/L)	188	186	56.9	199	254
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	0.00037	0.00031	0.00056
	Cobalt (Co)-Total (mg/L)	0.00087	0.00086	0.00034	0.00199	0.00863
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	0.00200	0.00159	0.00387
	Iron (Fe)-Total (mg/L)	0.303	0.289	0.340	2.64	11.2
	Lead (Pb)-Total (mg/L)	0.000076	0.000082	0.00104	0.000112	0.000063
	Lithium (Li)-Total (mg/L)	0.0104	0.0101	0.0022	0.0033	0.0012

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1688545-11 Water 13-OCT-15 18:20 WQ-PC-D	L1688545-12 Water 13-OCT-15 16:20 WQ-DC-R	L1688545-13 Water 13-OCT-15 15:56 WQ-VC-R	L1688545-14 Water 13-OCT-15 18:35 WQ-PC-U	L1688545-15 Water 13-OCT-15 17:00 WQ-VC-UMN
WATER						
Physical Tests	Conductivity (uS/cm)	435	1140	234	444	244
	Hardness (as CaCO3) (mg/L)	230	687	118	225	127
	pH (pH)	7.73	7.90	7.98	7.83	7.99
	Total Suspended Solids (mg/L)	19.6	3.4	<3.0	7.8	<3.0
	Total Dissolved Solids (mg/L)	284	869	134	283	143
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	81.0	190	81.4	81.6	87.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	81.0	190	81.4	81.6	87.0
	Ammonia, Total (as N) (mg/L)	0.460	0.590	0.0076	0.537	0.0062
	Chloride (Cl) (mg/L)	<0.50	<1.0 DLA	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.053	0.091	0.055	0.054	0.048
	Nitrate (as N) (mg/L)	0.140	0.465	0.129	0.113	0.137
	Nitrite (as N) (mg/L)	0.0016	0.0092	0.0010	0.0014	<0.0010
	Sulfate (SO4) (mg/L)	146	501	39.9	147	42.4
	Anion Sum (meq/L)	4.68	14.3	2.47	4.69	2.63
	Cation Sum (meq/L)	4.87	14.5	2.52	4.79	2.69
	Cation - Anion Balance (%)	2.1	0.7	0.9	1.0	1.0
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanate (mg/L)	0.29	0.37	<0.20	0.32	<0.20
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.399	0.0317	0.0757	0.220	0.0505
	Antimony (Sb)-Total (mg/L)	0.00206	0.00168	0.00021	0.00106	0.00020
	Arsenic (As)-Total (mg/L)	0.00906	0.0132	0.00119	0.00627	0.00098
	Barium (Ba)-Total (mg/L)	0.0690	0.0455	0.0602	0.0762	0.0600
	Beryllium (Be)-Total (mg/L)	0.000027	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	0.000079	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	0.023	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	0.000622	0.0000558	0.0000320	0.0000544	0.0000316
	Calcium (Ca)-Total (mg/L)	64.3	169	30.5	63.6	31.7
	Chromium (Cr)-Total (mg/L)	0.00056	0.00029	0.00023	0.00043	0.00039
	Cobalt (Co)-Total (mg/L)	0.00061	0.00139	0.00017	0.00069	0.00011
	Copper (Cu)-Total (mg/L)	0.00536	0.00115	0.00151	0.00155	0.00138
	Iron (Fe)-Total (mg/L)	1.47	2.34	0.263	1.45	0.107
	Lead (Pb)-Total (mg/L)	0.00660	0.000140	0.000287	0.00162	0.000205
	Lithium (Li)-Total (mg/L)	0.0010	0.0026	<0.0010	<0.0010	<0.0010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1688545-16 WQ-VC-UMN-R	L1688545-17 TRAVEL BLANK	L1688545-18 WQ-DC-B-R	L1688545-19 WQ-DC-D1B	L1688545-20 WQ-DC-8
	Sample ID	L1688545-16	L1688545-17	L1688545-18	L1688545-19	L1688545-20
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-OCT-15		14-OCT-15	14-OCT-15	14-OCT-15
	Sampled Time	17:05		15:00	17:55	18:05
	Client ID	WQ-VC-UMN-R	TRAVEL BLANK	WQ-DC-B-R	WQ-DC-D1B	WQ-DC-8
WATER						
Physical Tests	Conductivity (uS/cm)	243	<2.0	1300	1460	1590
	Hardness (as CaCO3) (mg/L)	125	<0.50	852	998	1110
	pH (pH)	7.97	5.45	7.86	8.10	7.86
	Total Suspended Solids (mg/L)	<3.0	<3.0	12.3	5.4	66.8
	Total Dissolved Solids (mg/L)	142	<1.0	1060	1230	1370
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	86.5	<1.0	218	307	306
	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)	86.5	<1.0	218	307	306
	Ammonia, Total (as N) (mg/L)	0.0063	<0.0050	0.150 DLA	0.135 DLA	0.426 DLA
	Chloride (Cl) (mg/L)	<0.50	<0.50	<1.0	<2.5	<2.5
	Fluoride (F) (mg/L)	0.051	<0.020	0.085	0.13	0.12
	Nitrate (as N) (mg/L)	0.136	<0.0050	0.174	0.100 DLA	0.204 DLA
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	0.0023	<0.0050	<0.0050
	Sulfate (SO4) (mg/L)	42.5	<0.30	627	696	793
	Anion Sum (meq/L)	2.63	<0.10	17.4	20.6	22.6
	Cation Sum (meq/L)	2.66	<0.10	17.6	20.4	22.8
	Cation - Anion Balance (%)	0.6	0.0	0.5	-0.4	0.4
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanate (mg/L)	<0.20	<2.0 DLIS	<0.20	<0.20	<0.20
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0448	<0.0030	0.140	0.481	0.553
	Antimony (Sb)-Total (mg/L)	0.00021	<0.00010	0.00272	0.0124	0.0198
	Arsenic (As)-Total (mg/L)	0.00096	<0.00010	0.0101	0.0444	0.101
	Barium (Ba)-Total (mg/L)	0.0618	<0.000050	0.0441	0.0318	0.0566
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	0.020	0.039	0.063
	Cadmium (Cd)-Total (mg/L)	0.0000316	<0.0000050	0.000107	0.00140	0.00275
	Calcium (Ca)-Total (mg/L)	32.1	<0.050	192	211	241
	Chromium (Cr)-Total (mg/L)	0.00017	<0.00010	0.00037	0.00079	0.00080
	Cobalt (Co)-Total (mg/L)	0.00011	<0.00010	0.00042	0.00061	0.00102
	Copper (Cu)-Total (mg/L)	0.00136	<0.00050	0.00124	0.00264	0.00279
	Iron (Fe)-Total (mg/L)	0.105	<0.010	3.05	2.37	9.05
	Lead (Pb)-Total (mg/L)	0.000195	<0.000050	0.000188	0.00995	0.0109
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	0.0041	0.0079	0.0056

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1688545-21	L1688545-22	L1688545-23	L1688545-24	L1688545-25
	Description	Water	Water	Water	Water	Water
	Sampled Date	14-OCT-15	14-OCT-15	14-OCT-15	14-OCT-15	14-OCT-15
	Sampled Time	19:00	18:40	09:07	08:50	14:50
	Client ID	WQ-MS-S-A	WQ-DC-DX	WQ-VC-U	WQ-VC-DBC	WQ-DC-B
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	1850	549	187	192	1330
	Hardness (as CaCO3) (mg/L)	1360	296	95.5	97.7	881
	pH (pH)	7.95	7.76	7.83	7.81	7.92
	Total Suspended Solids (mg/L)	54.9	13.3	<3.0	<3.0	12.3
	Total Dissolved Solids (mg/L)	1620	367	104	106	1070
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	411	112	82.4	81.8	219
	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)	411	112	82.4	81.8	219
	Ammonia, Total (as N) (mg/L)	0.0500	0.0196	<0.0050	<0.0050	0.151
	Chloride (Cl) (mg/L)	<2.5 DLA	<0.50	<0.50	<0.50	<1.0 DLA
	Fluoride (F) (mg/L)	0.17	0.056	0.046	0.050	0.094
	Nitrate (as N) (mg/L)	<0.025 DLA	0.0613	0.135	0.137	0.175
	Nitrite (as N) (mg/L)	<0.0050 DLA	<0.0010	<0.0010	<0.0010	<0.0020 DLA
	Sulfate (SO4) (mg/L)	912	186	17.6	19.1	628
	Anion Sum (meq/L)	27.2	6.11	2.02	2.05	17.5
	Cation Sum (meq/L)	27.7	6.23	2.03	2.08	18.2
	Cation - Anion Balance (%)	1.0	1.0	0.2	0.8	2.1
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanate (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.160	0.139	0.0225	0.0246	0.123
	Antimony (Sb)-Total (mg/L)	0.0143	0.00142	0.00010	<0.00010	0.00257
	Arsenic (As)-Total (mg/L)	0.0974	0.00472	0.00032	0.00033	0.00933
	Barium (Ba)-Total (mg/L)	0.0185	0.0430	0.0638	0.0633	0.0421
	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)	0.013	<0.010	<0.010	<0.010	0.018
	Cadmium (Cd)-Total (mg/L)	0.00266	0.0000308	0.0000141	0.0000214	0.0000877
	Calcium (Ca)-Total (mg/L)	291	77.0	24.0	24.8	187
	Chromium (Cr)-Total (mg/L)	0.00033	0.00031	0.00015	0.00015	0.00043
	Cobalt (Co)-Total (mg/L)	0.00129	0.00032	<0.00010	<0.00010	0.00039
	Copper (Cu)-Total (mg/L)	0.00437	0.00159	0.00133	0.00125	0.00101
	Iron (Fe)-Total (mg/L)	0.859	0.569	0.056	0.065	2.96
	Lead (Pb)-Total (mg/L)	0.0223	0.000259	<0.000050	<0.000050	0.000170
	Lithium (Li)-Total (mg/L)	0.0121	<0.0010	<0.0010	<0.0010	0.0037

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1688545-26	L1688545-27	L1688545-28		
	Description	Water	Water	Water		
	Sampled Date	14-OCT-15	14-OCT-15	14-OCT-15		
	Sampled Time	14:05	15:30	16:30		
	Client ID	WQ-TP	FIELD BLANK	WQ-DES5-01		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	1170	<2.0	897		
	Hardness (as CaCO3) (mg/L)	705	<0.50	543		
	pH (pH)	8.00	5.49	6.17		
	Total Suspended Solids (mg/L)	3.6	<3.0	84.2		
	Total Dissolved Solids (mg/L)	968	<1.0	704		
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	79.8	<1.0	3.9		
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Total (as CaCO3) (mg/L)	79.8	<1.0	3.9		
	Ammonia, Total (as N) (mg/L)	0.0590	<0.0050	<0.0050		
	Chloride (Cl) (mg/L)	<1.0 DLA	<0.50	<1.0 DLA		
	Fluoride (F) (mg/L)	0.243	<0.020	0.042		
	Nitrate (as N) (mg/L)	0.113	<0.0050	0.069		
	Nitrite (as N) (mg/L)	0.0023	<0.0010	<0.0020 DLA		
	Sulfate (SO4) (mg/L)	636	<0.30	506		
	Anion Sum (meq/L)	14.8	<0.10	10.6		
	Cation Sum (meq/L)	15.0	<0.10	11.1		
	Cation - Anion Balance (%)	0.6	0.0	2.3		
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050		
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050		
	Cyanate (mg/L)	<0.20	<0.20	<0.20		
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0379	<0.0030	1.72		
	Antimony (Sb)-Total (mg/L)	0.0333	<0.00010	0.00069		
	Arsenic (As)-Total (mg/L)	0.117	<0.00010	0.0115		
	Barium (Ba)-Total (mg/L)	0.0107	<0.000050	0.0493		
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	0.000079		
	Bismuth (Bi)-Total (mg/L)	0.000167	<0.000050	<0.000050		
	Boron (B)-Total (mg/L)	0.070	<0.010	<0.010		
	Cadmium (Cd)-Total (mg/L)	0.000769	<0.0000050	0.00368		
	Calcium (Ca)-Total (mg/L)	205	<0.050	137		
	Chromium (Cr)-Total (mg/L)	0.00018	<0.00010	0.00238		
	Cobalt (Co)-Total (mg/L)	0.00050	<0.00010	0.00067		
	Copper (Cu)-Total (mg/L)	0.0251	<0.00050	0.00491		
	Iron (Fe)-Total (mg/L)	0.340	<0.010	2.68		
	Lead (Pb)-Total (mg/L)	0.0169	<0.000050	0.00318		
	Lithium (Li)-Total (mg/L)	0.0063	<0.0010	0.0012		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1688545-1 Water 14-OCT-15 16:45 WQ-CH-P-13-01	L1688545-2 Water 15-OCT-15 08:20 WQ-DC-11	L1688545-3 Water 15-OCT-15 08:00 WQ-MS-S-03	L1688545-4 Water 15-OCT-15 07:50 WQ-DC-10	L1688545-5 Water 15-OCT-15 08:50 WQ-DC-15
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)	70.9	61.4	62.4	63.0	61.1
	Manganese (Mn)-Total (mg/L)	0.202	1.14	1.74	1.10	1.22
	Mercury (Hg)-Total (mg/L)	0.0000061	<0.0000050	0.0000377	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	<0.000050	0.000312	0.000402	0.000280	0.000316
	Nickel (Ni)-Total (mg/L)	0.00672	0.00178	0.00333	0.00168	0.00180
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	0.215	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.37	3.63	4.04	3.69	3.55
	Selenium (Se)-Total (mg/L)	0.000073	<0.000050	0.000082	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	8.78	6.26	8.61	6.39	6.19
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	0.00126	0.000072	<0.000010
	Sodium (Na)-Total (mg/L)	5.66	5.15	5.00	5.11	5.05
	Strontium (Sr)-Total (mg/L)	0.478	0.429	0.438	0.441	0.428
	Sulfur (S)-Total (mg/L)	267	145	148	151	145
	Thallium (Tl)-Total (mg/L)	<0.000010	0.000095	0.000197	0.000083	0.000099
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.0012 DLM	<0.00030	0.0802	0.00299	0.00103
	Uranium (U)-Total (mg/L)	<0.000010	0.00456	0.00408	0.00416	0.00440
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	0.00698	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	2.88	0.768	1.15	0.734	0.776
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.139	0.0010	0.0015	0.0010	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	0.0111	0.0127	0.0105	0.0112
	Arsenic (As)-Dissolved (mg/L)	0.00042	0.00932	0.0956	0.0364	0.0157
	Barium (Ba)-Dissolved (mg/L)	0.00982	0.0117	0.0154	0.0150	0.0113
	Beryllium (Be)-Dissolved (mg/L)	0.000031	<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)	0.00745	0.00138	0.000575	0.000894	0.00137
	Calcium (Ca)-Dissolved (mg/L)	235	190	194	193	188
	Chromium (Cr)-Dissolved (mg/L)	0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	0.00080	0.00140	0.00086	0.00087
	Copper (Cu)-Dissolved (mg/L)	0.00091	<0.00020	0.00021	0.00023	<0.00020
	Iron (Fe)-Dissolved (mg/L)	0.032	0.050	2.30	1.19	0.146
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	0.000156	0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0022	0.0103	0.0105	0.0101	0.0100

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1688545-6	L1688545-7	L1688545-8	L1688545-9	L1688545-10
Description	Water	Water	Water	Water	Water
Sampled Date	15-OCT-15	15-OCT-15	14-OCT-15	14-OCT-15	14-OCT-15
Sampled Time	08:35	08:45	10:50	13:05	13:40
Client ID	WQ-DC-DX+105	WQ-DC-DX+105-R	WQ-BC	WQ-DC-U	WQ-SEEP
Grouping **Analyte**					
WATER					
Total Metals Magnesium (Mg)-Total (mg/L)	62.9	61.8	14.5	74.3	54.7
Manganese (Mn)-Total (mg/L)	1.26	1.23	0.618	1.96	5.96
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	0.0000051	<0.0000050	0.0000126
Molybdenum (Mo)-Total (mg/L)	0.000314	0.000363	0.000924	0.000428	0.000890
Nickel (Ni)-Total (mg/L)	0.00187	0.00181	0.00072	0.00134	0.00379
Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total (mg/L)	3.65	3.63	0.98	3.65	6.33
Selenium (Se)-Total (mg/L)	<0.000050	0.000050	<0.000050	0.000110	0.000310
Silicon (Si)-Total (mg/L)	6.40	6.37	7.34	6.11	7.19
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	0.000019	<0.000010	0.000030
Sodium (Na)-Total (mg/L)	5.17	5.03	4.25	14.5	34.5
Strontium (Sr)-Total (mg/L)	0.439	0.432	0.421	0.622	0.738
Sulfur (S)-Total (mg/L)	149	147	29.0	203	232
Thallium (Tl)-Total (mg/L)	0.000101	0.000105	<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)	<0.00030	<0.00030	0.00632	0.00432	<0.0015 DLM
Uranium (U)-Total (mg/L)	0.00456	0.00444	0.00209	0.00236	0.00225
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	0.00070	0.00077	0.00199
Zinc (Zn)-Total (mg/L)	0.801	0.786	0.0073	0.0229	0.0679
Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	0.00060
Dissolved Metals Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)	<0.0010	<0.0010	0.0120	0.0058	0.0117
Antimony (Sb)-Dissolved (mg/L)	0.0113	0.0114	0.00019	0.00175	0.00052
Arsenic (As)-Dissolved (mg/L)	0.0144	0.0145	0.00142	0.0126	0.0379
Barium (Ba)-Dissolved (mg/L)	0.0113	0.0114	0.0692	0.0442	0.0645
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	0.023	0.054
Cadmium (Cd)-Dissolved (mg/L)	0.00144	0.00138	0.000222	0.0000718	0.000407
Calcium (Ca)-Dissolved (mg/L)	190	187	59.3	209	264
Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	0.00010	0.00013	0.00041
Cobalt (Co)-Dissolved (mg/L)	0.00083	0.00085	0.00026	0.00200	0.00867
Copper (Cu)-Dissolved (mg/L)	0.00023	0.00022	0.00147	0.00102	0.00206
Iron (Fe)-Dissolved (mg/L)	0.128	0.124	0.051	0.792	9.83
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	0.000050	<0.000050	0.000277 DTC
Lithium (Li)-Dissolved (mg/L)	0.0099	0.0099	0.0019	0.0032	0.0011

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1688545-11	L1688545-12	L1688545-13	L1688545-14	L1688545-15
Description	Water	Water	Water	Water	Water
Sampled Date	13-OCT-15	13-OCT-15	13-OCT-15	13-OCT-15	13-OCT-15
Sampled Time	18:20	16:20	15:56	18:35	17:00
Client ID	WQ-PC-D	WQ-DC-R	WQ-VC-R	WQ-PC-U	WQ-VC-UMN
Grouping / **Analyte**					
WATER					
Total Metals Magnesium (Mg)-Total (mg/L)	14.4	63.9	9.70	14.6	10.2
Manganese (Mn)-Total (mg/L)	0.322	1.34	0.0753	0.417	0.0670
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total (mg/L)	0.000213	0.000374	0.000382	0.000183	0.000408
Nickel (Ni)-Total (mg/L)	0.00089	0.00106	0.00051	0.00078	<0.00050
Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total (mg/L)	0.85	3.18	0.73	0.79	0.67
Selenium (Se)-Total (mg/L)	<0.000050	0.000087	0.000054	<0.000050	<0.000050
Silicon (Si)-Total (mg/L)	7.05	6.01	6.08	6.96	5.72
Silver (Ag)-Total (mg/L)	0.000063	<0.000010	<0.000010	0.000022	<0.000010
Sodium (Na)-Total (mg/L)	4.36	12.1	2.88	4.44	3.05
Strontium (Sr)-Total (mg/L)	0.402	0.521	0.257	0.414	0.278
Sulfur (S)-Total (mg/L)	48.0	168	13.1	48.3	13.8
Thallium (Tl)-Total (mg/L)	0.000018	<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)	0.0131	0.00116	0.00190	0.00917	0.00127
Uranium (U)-Total (mg/L)	0.00121	0.00192	0.000614	0.00130	0.000640
Vanadium (V)-Total (mg/L)	0.00155	0.00065	<0.00050	0.00127	<0.00050
Zinc (Zn)-Total (mg/L)	0.0597	0.0096	<0.0030	0.0067	<0.0030
Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)	0.0115	0.0099	0.0200	0.0085	0.0134
Antimony (Sb)-Dissolved (mg/L)	0.00160	0.00166	0.00018	0.00096	0.00019
Arsenic (As)-Dissolved (mg/L)	0.00385	0.00637	0.00085	0.00431	0.00078
Barium (Ba)-Dissolved (mg/L)	0.0637	0.0432	0.0609	0.0722	0.0613
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	0.019	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved (mg/L)	0.000548	0.0000354	0.0000310	0.0000290	0.0000246
Calcium (Ca)-Dissolved (mg/L)	67.2	169	31.1	65.4	33.4
Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00017	0.00014	<0.00010	<0.00010
Cobalt (Co)-Dissolved (mg/L)	0.00039	0.00135	0.00013	0.00056	<0.00010
Copper (Cu)-Dissolved (mg/L)	0.00330	0.00087	0.00125	0.00077	0.00114
Iron (Fe)-Dissolved (mg/L)	0.315	0.635	0.093	0.661	0.034
Lead (Pb)-Dissolved (mg/L)	0.000377	<0.000050	<0.000050	0.000130	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0010	0.0025	<0.0010	<0.0010	<0.0010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1688545-16	L1688545-17	L1688545-18	L1688545-19	L1688545-20
Description	Water	Water	Water	Water	Water
Sampled Date	13-OCT-15		14-OCT-15	14-OCT-15	14-OCT-15
Sampled Time	17:05		15:00	17:55	18:05
Client ID	WQ-VC-UMN-R	TRAVEL BLANK	WQ-DC-B-R	WQ-DC-D1B	WQ-DC-8
Grouping / **Analyte**					
WATER					
Total Metals Magnesium (Mg)-Total (mg/L)	10.4	<0.10	87.6	97.6	108
Manganese (Mn)-Total (mg/L)	0.0667	<0.00010	0.706	0.842	3.20
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	0.0000061	0.0000094
Molybdenum (Mo)-Total (mg/L)	0.000426	<0.000050	0.000337	0.000226	0.000216
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	0.00093	0.00124	0.00175
Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	0.101
Potassium (K)-Total (mg/L)	0.69	<0.10	3.15	4.23	4.47
Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	0.000086	0.000083	0.000107
Silicon (Si)-Total (mg/L)	5.86	<0.050	6.23	6.53	7.48
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	0.000124	0.000116
Sodium (Na)-Total (mg/L)	3.05	<0.050	8.95	6.90	8.19
Strontium (Sr)-Total (mg/L)	0.283	<0.00020	0.625	0.544	0.624
Sulfur (S)-Total (mg/L)	14.2	<0.50	208	215	255
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	0.000048	0.000066
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	0.00111	<0.00030	0.00708	0.0327	0.0321
Uranium (U)-Total (mg/L)	0.000649	<0.000010	0.00282	0.00326	0.00213
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	0.00090	0.00220	0.00220
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	0.0303	0.343	0.662
Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals Dissolved Mercury Filtration Location	FIELD		FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	FIELD		FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)	0.0137		0.0045	0.0028	0.0031
Antimony (Sb)-Dissolved (mg/L)	0.00020		0.00272	0.0111	0.0179
Arsenic (As)-Dissolved (mg/L)	0.00079		0.00475	0.0136	0.0300
Barium (Ba)-Dissolved (mg/L)	0.0610		0.0398	0.0254	0.0375
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		0.016	0.035	0.057
Cadmium (Cd)-Dissolved (mg/L)	0.0000242		0.0000408	0.000245	0.000974
Calcium (Ca)-Dissolved (mg/L)	32.9		195	230	255
Chromium (Cr)-Dissolved (mg/L)	0.00011		<0.00010	<0.00010	<0.00010
Cobalt (Co)-Dissolved (mg/L)	0.00010		0.00035	0.00023	0.00047
Copper (Cu)-Dissolved (mg/L)	0.00119		0.00054	0.00074	0.00079
Iron (Fe)-Dissolved (mg/L)	0.041		1.58	0.481	2.58
Lead (Pb)-Dissolved (mg/L)	<0.000050		<0.000050	<0.000050	0.000056
Lithium (Li)-Dissolved (mg/L)	<0.0010		0.0038	0.0077	0.0050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1688545-21	L1688545-22	L1688545-23	L1688545-24	L1688545-25
	Description	Water	Water	Water	Water	Water
	Sampled Date	14-OCT-15	14-OCT-15	14-OCT-15	14-OCT-15	14-OCT-15
	Sampled Time	19:00	18:40	09:07	08:50	14:50
	Client ID	WQ-MS-S-A	WQ-DC-DX	WQ-VC-U	WQ-VC-DBC	WQ-DC-B
Grouping	**Analyte**					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)	150	21.5	7.97	8.21	84.4
	Manganese (Mn)-Total (mg/L)	1.30	0.0991	0.0451	0.0581	0.665
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.000192	0.000069	0.000400	0.000403	0.000314
	Nickel (Ni)-Total (mg/L)	0.00135	<0.00050	<0.00050	<0.00050	0.00091
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	5.62	4.65	0.55	0.57	3.06
	Selenium (Se)-Total (mg/L)	0.000128	0.000082	<0.000050	<0.000050	0.000074
	Silicon (Si)-Total (mg/L)	6.38	4.76	6.06	6.06	6.04
	Silver (Ag)-Total (mg/L)	0.000369	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	8.27	3.63	2.43	2.43	8.25
	Strontium (Sr)-Total (mg/L)	0.691	0.244	0.263	0.265	0.585
	Sulfur (S)-Total (mg/L)	313	60.4	5.88	6.46	199
	Thallium (Tl)-Total (mg/L)	0.000241	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)	0.00877	0.00808	0.00036	0.00044	0.00645
	Uranium (U)-Total (mg/L)	0.00572	0.000383	0.000507	0.000537	0.00266
	Vanadium (V)-Total (mg/L)	0.00083	0.00083	<0.00050	<0.00050	0.00083
	Zinc (Zn)-Total (mg/L)	0.223	<0.0030	0.0034	<0.0030	0.0275
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0011	0.0083	0.0142	0.0136	0.0047
	Antimony (Sb)-Dissolved (mg/L)	0.00808	0.00142	<0.00010	<0.00010	0.00272
	Arsenic (As)-Dissolved (mg/L)	0.0727	0.00347	0.00028	0.00033	0.00476
	Barium (Ba)-Dissolved (mg/L)	0.0149	0.0421	0.0638	0.0640	0.0400
	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	0.015
	Cadmium (Cd)-Dissolved (mg/L)	0.00209	0.0000269	0.0000181	0.0000250	0.0000338
	Calcium (Ca)-Dissolved (mg/L)	295	81.6	24.7	25.5	203
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00114	0.00027	<0.00010	<0.00010	0.00035
	Copper (Cu)-Dissolved (mg/L)	0.00114	0.00109	0.00118	0.00117	0.00046
	Iron (Fe)-Dissolved (mg/L)	0.368	0.356	0.039	0.038	1.64
	Lead (Pb)-Dissolved (mg/L)	0.000380	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0118	<0.0010	<0.0010	<0.0010	0.0037

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1688545-26	L1688545-27	L1688545-28		
	Description	Water	Water	Water		
	Sampled Date	14-OCT-15	14-OCT-15	14-OCT-15		
	Sampled Time	14:05	15:30	16:30		
	Client ID	WQ-TP	FIELD BLANK	WQ-DES5-01		
Grouping	**Analyte**					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)	38.8	<0.10	41.9		
	Manganese (Mn)-Total (mg/L)	0.183	<0.00010	0.116		
	Mercury (Hg)-Total (mg/L)	0.0000103	<0.0000050	0.0000127		
	Molybdenum (Mo)-Total (mg/L)	0.00122	<0.000050	0.000171		
	Nickel (Ni)-Total (mg/L)	0.00083	<0.00050	0.00563		
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	0.112		
	Potassium (K)-Total (mg/L)	13.0	<0.10	0.58		
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	0.000157		
	Silicon (Si)-Total (mg/L)	2.25	<0.050	10.7		
	Silver (Ag)-Total (mg/L)	0.000272	<0.000010	0.000104		
	Sodium (Na)-Total (mg/L)	13.7	<0.050	4.15		
	Strontium (Sr)-Total (mg/L)	0.523	<0.00020	0.321		
	Sulfur (S)-Total (mg/L)	203	<0.50	162		
	Thallium (Tl)-Total (mg/L)	0.000138	<0.000010	0.000045		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	0.00035	<0.00030	0.0498		
	Uranium (U)-Total (mg/L)	0.000900	<0.000010	0.000126		
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	0.00586		
	Zinc (Zn)-Total (mg/L)	0.0660	<0.0030	1.52		
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	0.0071	<0.0010	0.0864		
	Antimony (Sb)-Dissolved (mg/L)	0.0323	<0.00010	0.00020		
	Arsenic (As)-Dissolved (mg/L)	0.0820	<0.00010	0.00057		
	Barium (Ba)-Dissolved (mg/L)	0.0102	<0.000050	0.0193		
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	0.063	<0.010	<0.010		
	Cadmium (Cd)-Dissolved (mg/L)	0.000639	<0.0000050	0.00321		
	Calcium (Ca)-Dissolved (mg/L)	216	<0.050	145		
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	0.00012		
	Cobalt (Co)-Dissolved (mg/L)	0.00043	<0.00010	<0.00010		
	Copper (Cu)-Dissolved (mg/L)	0.0188	<0.00020	0.00143		
	Iron (Fe)-Dissolved (mg/L)	0.024	<0.010	0.053		
	Lead (Pb)-Dissolved (mg/L)	0.00115	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0066	<0.0010	<0.0010		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1688545-1 Water 14-OCT-15 16:45 WQ-CH-P-13-01	L1688545-2 Water 15-OCT-15 08:20 WQ-DC-11	L1688545-3 Water 15-OCT-15 08:00 WQ-MS-S-03	L1688545-4 Water 15-OCT-15 07:50 WQ-DC-10	L1688545-5 Water 15-OCT-15 08:50 WQ-DC-15
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	73.5	62.6	63.5	63.9	61.9
	Manganese (Mn)-Dissolved (mg/L)	0.168	1.14	1.47	1.08	1.21
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	0.000301	0.000274	0.000254	0.000299
	Nickel (Ni)-Dissolved (mg/L)	0.00648	0.00178	0.00194	0.00160	0.00180
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.42	3.63	3.64	3.70	3.69
	Selenium (Se)-Dissolved (mg/L)	0.000079	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	8.98	6.31	6.17	6.29	6.34
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	5.94	5.06	5.05	5.05	4.98
	Strontium (Sr)-Dissolved (mg/L)	0.493	0.427	0.438	0.431	0.423
	Sulfur (S)-Dissolved (mg/L)	274	141	146	146	142
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	0.000091	0.000083	0.000072	0.000093
	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)	<0.000010	0.00437	0.00399	0.00407	0.00432
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	2.94	0.780	0.915	0.734	0.798
	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

Grouping	Analyte	L1688545-6 Water 15-OCT-15 08:35 WQ-DC-DX+105	L1688545-7 Water 15-OCT-15 08:45 WQ-DC-DX+105-R	L1688545-8 Water 14-OCT-15 10:50 WQ-BC	L1688545-9 Water 14-OCT-15 13:05 WQ-DC-U	L1688545-10 Water 14-OCT-15 13:40 WQ-SEEP
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	62.2	62.6	15.1	78.0	56.9
	Manganese (Mn)-Dissolved (mg/L)	1.21	1.23	0.607	2.01	6.06
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000307	0.000311	0.000927	0.000435	0.000869
	Nickel (Ni)-Dissolved (mg/L)	0.00176	0.00180	0.00064	0.00125	0.00379
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	3.74	3.66	0.97	3.97	6.69
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	0.000107	0.000336
	Silicon (Si)-Dissolved (mg/L)	6.38	6.26	7.19	6.05	7.26
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	4.98	4.97	4.23	14.9	34.9
	Strontium (Sr)-Dissolved (mg/L)	0.426	0.428	0.422	0.647	0.739
	Sulfur (S)-Dissolved (mg/L)	141	142	29.2	205	232
	Thallium (Tl)-Dissolved (mg/L)	0.000093	0.000096	<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	<0.0012 DLM
	Uranium (U)-Dissolved (mg/L)	0.00438	0.00440	0.00208	0.00243	0.00226
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00170
	Zinc (Zn)-Dissolved (mg/L)	0.800	0.801	0.0045	0.0158	0.0678
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	0.00060

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1688545-11 Water 13-OCT-15 18:20 WQ-PC-D	L1688545-12 Water 13-OCT-15 16:20 WQ-DC-R	L1688545-13 Water 13-OCT-15 15:56 WQ-VC-R	L1688545-14 Water 13-OCT-15 18:35 WQ-PC-U	L1688545-15 Water 13-OCT-15 17:00 WQ-VC-UMN
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	15.1	64.5	9.86	14.9	10.5
	Manganese (Mn)-Dissolved (mg/L)	0.299	1.31	0.0696	0.407	0.0626
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000170	0.000347	0.000374	0.000182	0.000402
	Nickel (Ni)-Dissolved (mg/L)	0.00056	0.00101	<0.00050	0.00054	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.80	3.21	0.70	0.79	0.69
	Selenium (Se)-Dissolved (mg/L)	<0.000050	0.000085	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	6.70	5.76	6.09	6.68	5.95
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	4.37	12.0	2.88	4.45	3.01
	Strontium (Sr)-Dissolved (mg/L)	0.406	0.514	0.257	0.410	0.276
	Sulfur (S)-Dissolved (mg/L)	48.5	166	13.2	48.5	14.0
	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)	0.00120	0.00187	0.000590	0.00127	0.000627
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0510	0.0097	0.0020	0.0031	0.0047
	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	L1688545-16	L1688545-17	L1688545-18	L1688545-19	L1688545-20
Description	Water	Water	Water	Water	Water
Sampled Date	13-OCT-15		14-OCT-15	14-OCT-15	14-OCT-15
Sampled Time	17:05		15:00	17:55	18:05
Client ID	WQ-VC-UMN-R	TRAVEL BLANK	WQ-DC-B-R	WQ-DC-D1B	WQ-DC-8
Grouping **Analyte**					
WATER					
Dissolved Metals Magnesium (Mg)-Dissolved (mg/L)	10.4		88.5	103	114
Manganese (Mn)-Dissolved (mg/L)	0.0627		0.684	0.749	2.13
Mercury (Hg)-Dissolved (mg/L)	<0.0000050		<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.000405		0.000299	0.000213	0.000179
Nickel (Ni)-Dissolved (mg/L)	<0.00050		0.00076	0.00079	0.00113
Phosphorus (P)-Dissolved (mg/L)	<0.050		<0.050	<0.050	<0.050
Potassium (K)-Dissolved (mg/L)	0.70		3.14	4.52	4.71
Selenium (Se)-Dissolved (mg/L)	0.000053		0.000066	0.000065	0.000080
Silicon (Si)-Dissolved (mg/L)	5.91		5.93	6.10	6.55
Silver (Ag)-Dissolved (mg/L)	<0.000010		<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	3.05		8.80	7.22	8.16
Strontium (Sr)-Dissolved (mg/L)	0.277		0.616	0.560	0.626
Sulfur (S)-Dissolved (mg/L)	13.9		202	219	255
Thallium (Tl)-Dissolved (mg/L)	<0.000010		<0.000010	0.000030	0.000035
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)	0.000623		0.00274	0.00332	0.00208
Vanadium (V)-Dissolved (mg/L)	<0.00050		<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved (mg/L)	0.0017		0.0234	0.277	0.528
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

Grouping	Analyte	L1688545-21 Water 14-OCT-15 19:00 WQ-MS-S-A	L1688545-22 Water 14-OCT-15 18:40 WQ-DC-DX	L1688545-23 Water 14-OCT-15 09:07 WQ-VC-U	L1688545-24 Water 14-OCT-15 08:50 WQ-VC-DBC	L1688545-25 Water 14-OCT-15 14:50 WQ-DC-B
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	152	22.5	8.20	8.26	91.0
	Manganese (Mn)-Dissolved (mg/L)	1.23	0.0980	0.0431	0.0567	0.689
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000175	0.000055	0.000377	0.000376	0.000301
	Nickel (Ni)-Dissolved (mg/L)	0.00117	<0.00050	<0.00050	<0.00050	0.00073
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	5.72	4.94	0.56	0.55	3.22
	Selenium (Se)-Dissolved (mg/L)	0.000135	0.000113	<0.000050	<0.000050	0.000075
	Silicon (Si)-Dissolved (mg/L)	6.05	4.78	6.14	6.11	6.07
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	8.08	3.69	2.40	2.47	8.59
	Strontium (Sr)-Dissolved (mg/L)	0.693	0.247	0.258	0.262	0.616
	Sulfur (S)-Dissolved (mg/L)	299	62.0	5.93	6.43	209
	Thallium (Tl)-Dissolved (mg/L)	0.000222	<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)	0.00563	0.000371	0.000488	0.000530	0.00280
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.203	0.0013	0.0019	0.0012	0.0229
	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	L1688545-26	L1688545-27	L1688545-28		
	Description	Water	Water	Water		
	Sampled Date	14-OCT-15	14-OCT-15	14-OCT-15		
	Sampled Time	14:05	15:30	16:30		
	Client ID	WQ-TP	FIELD BLANK	WQ-DES5-01		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	40.0	<0.10	43.8		
	Manganese (Mn)-Dissolved (mg/L)	0.153	<0.00010	0.0312		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.00119	<0.000050	<0.000050		
	Nickel (Ni)-Dissolved (mg/L)	0.00075	<0.00050	0.00436		
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050		
	Potassium (K)-Dissolved (mg/L)	13.7	<0.10	0.37		
	Selenium (Se)-Dissolved (mg/L)	0.000050	<0.000050	0.000063		
	Silicon (Si)-Dissolved (mg/L)	2.27	<0.050	8.97		
	Silver (Ag)-Dissolved (mg/L)	0.000028	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	13.6	<0.050	4.14		
	Strontium (Sr)-Dissolved (mg/L)	0.525	<0.00020	0.322		
	Sulfur (S)-Dissolved (mg/L)	205	<0.50	167		
	Thallium (Tl)-Dissolved (mg/L)	0.000136	<0.000010	<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	0.00031		
	Uranium (U)-Dissolved (mg/L)	0.000889	<0.000010	<0.000010		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	0.0503	<0.0010	1.57		
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030		

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Alkalinity, Total (as CaCO3)	B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Boron (B)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Aluminum (Al)-Total	MS-B	L1688545-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Total	MS-B	L1688545-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Boron (B)-Total	MS-B	L1688545-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Total	MS-B	L1688545-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Total	MS-B	L1688545-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L1688545-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9

Reference Information

	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1688545-1, -10, -11, -12, -13, -14, -15, -16, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
DLA	Detection Limit adjusted for required dilution
DLIS	Detection Limit Adjusted: Insufficient Sample
DLM	Detection Limit Adjusted due to sample matrix effects.
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

Reference Information

ALK-TITR-VA Water Alkalinity Species by Titration APHA 2320 Alkalinity

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

HARDNESS-CALC-VA Water Hardness APHA 2340B

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

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

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

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

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

IONBALANCE-VA Water Ion Balance Calculation APHA 1030E

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

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are

Reference Information

included where data is present. Ion Balance is calculated as:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United

Reference Information

States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

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

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

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

TDS-CALC-VA	Water	TDS (Calculated)	APHA 1030E (20TH EDITION)

This analysis is carried out using procedures adapted from APHA 1030E "Checking Correctness of Analyses".

TSS-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.

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

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

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

Chain of Custody Numbers:

1 2 3 4 5

GLOSSARY OF REPORT TERMS

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

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

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1688545-COFC

COC Number: 14 -

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

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

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

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

Analysis Request

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-PCT-VA,EC-PCT-VA,PH-PCT-VA	ANIONS-ALL-IC-WR,TSS-MAN-WR	CN-WAD-CFA-VA,CN-T-CFA-VA	CN-CNO-WT	CN-SCN-VA	NH3-F-VA	MET-T-BCMDG-VA	MET-D-BCMDG-VA	IONBALANC-VA, TDS-CALC-VA					Number of Containers
							P	P	P	P	P	F/P						
	WQ-CH-P-13-01	14 - Oct -15	16:45	Water	R	R	R	R	R	R	R	R	R					9
	WQ-DC-11	15 - Oct -15	8:20	Water	R	R	R	R	R	R	R	R	R					9
	WQ-MS-S-03	15 - Oct -15	8:00	Water	R	R	R	R	R	R	R	R	R					9
	WQ-DC-10	15 - Oct -15	7:50	Water	R	R	R	R	R	R	R	R	R					9
	~~WQ~~	- Oct -15		Water	R	R	R	R	R	R	R	R	R					9
		- Oct -15		Water	R	R	R	R	R	R	R	R	R					9
		- Oct -15		Water	R	R	R	R	R	R	R	R	R					9

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

SAMPLE CONDITION AS RECEIVED (lab use only)

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

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
1.0	1.0	2.3	2.0		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: BRODIE SMITH	Date: 15OCT15	Time: 15:00	Received by:	Date: 15Oct15	Time: 1500	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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

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

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

Analysis Request

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-PCT-VA,EC-PCT-VA,PH-PCT-VA (P)	ANIONS-ALL-IC-WR,TSS-MAN-WR (P)	CN-WAD-CFA-VA,CN-T-CFA-VA (P)	CN-CNO-WT (P)	CN-SCN-VA (P)	NH3-F-VA (P)	MET-T-BCMDG-VA (P)	MET-D-BCMDG-VA (F/P)	IONBALANC-VA, TDS-CALC-VA	Number of Containers
	WQ-DC-15	15 - Oct -15	8:50	Water	R	R	R	R	R	R	R	R	R	9
	WQ-DC-DX+105	15 - Oct -15	8:35	Water	R	R	R	R	R	R	R	R	R	9
	WQ-DC-DX+105-F	15 - Oct -15	8:45	Water	R	R	R	R	R	R	R	R	R	9
	WQ-BC	14 - Oct -15	10:50	Water	R	R	R	R	R	R	R	R	R	9
	WQ-DC-V	14 - Oct -15	13:05	Water	R	R	R	R	R	R	R	R	R	9
	WQ-SEEP	14 - Oct -15	13:40	Water	R	R	R	R	R	R	R	R	R	9
		- Oct -15		Water	R	R	R	R	R	R	R	R	R	9

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

SAMPLE CONDITION AS RECEIVED (lab use only)

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

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
1.0	1.0	2.3			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: BRODIE SMITH	Date: 15OCT 15	Time: 15:00	Received by:	Date: 15Oct15	Time: 1500	Received by:	Date:	Time:

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

Invoice To	Same as Report To ☑ Yes ☑ No	Invoice Distribution	Analysis Request
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	EDI	Email 1 or Fax sienner@edynamics.com	
Contact:	S Jenner	Email 2 mmarjanovic@edynamics.com	

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-PCT-VA,EC-PCT-VA,PH-PCT-VA	ANIONS-ALL-IC-WR,TSS-MAN-WR	CN-WAD-CFA-VA,CN-T-CFA-VA	CN-CNO-WT	CN-SCN-VA	NH3-F-VA	MET-T-BCMDG-VA	MET-D-BCMDG-VA	IONBALANC-VA, TDS-CALC-VA					Number of Containers
					P		P	P	P	P	P	F/P						
	WQ-PC-D	13 - Oct -15	1820	Water	R	R	R	R	R	R	R	R	R					9
	WQ-DC-R	13 - Oct -15	1620	Water	R	R	R	R	R	R	R	R	R					9
	WQ-VC-R	13 - Oct -15	1556	Water	R	R	R	R	R	R	R	R	R					9
	WQ-PC-U	13 - Oct -15	1835	Water	R	R	R	R	R	R	R	R	R					9
	WQ-VC-UMN	13 - Oct -15	1700	Water	R	R	R	R	R	R	R	R	R					9
	WQ-VC-UMN-R	13 - Oct -15	1705.	Water	R	R	R	R	R	R	R	R	R					9
		- Oct -15		Water	R	R	R	R	R	R	R	R	R					9

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

SAMPLE CONDITION AS RECEIVED (lab use only)

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

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
1.0	1.0	1.0	2.3	2.6	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
SCOTT DILLING	15-OCT-2015	1300		15Oct15	1500			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1688545-COFC

COC Number: 14 -

Page 1 of 1

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

Invoice To	Same as Report To ☑ Yes ☑ No	Invoice Distribution	Analysis Request
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	EDI	Email 1 or Fax sjenner@edynamics.com	
Contact:	S Jenner	Email 2 mmarjanovic@edynamics.com	

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-PCT-VA,EC-PCT-VA,PH-PCT-VA	ANIONS-ALL-IC-WR,TSS-MAN-WR	CN-WAD-CFA-VA,CN-T-CFA-VA	CN-CNO-WT	CN-SCN-VA	NH3-F-VA	MET-T-BCMDG-VA	MET-D-BCMDG-VA	IONBALANC-VA, TDS-CALC-VA					Number of Containers
					P	P	P	P	P	P	P	F/P						
	Travel Blank	- Oct -15	—	Water	R	R	R	R	R	R	R	R	R					~~7~~ 8
	WQ-DC-B-5	14 - Oct -15	15:00	Water	R	R	R	R	R	R	R	R	R					9
	WQ-DC-D1b	14 - Oct -15	17:55	Water	R	R	R	R	R	R	R	R	R					9
	WQ-DC-8	14 - Oct -15	18:05	Water	R	R	R	R	R	R	R	R	R					9
	WQ-MS-S-A	14 - Oct -15	19:00	Water	R	R	R	R	R	R	R	R	R					9
	WQ-DC-DX	14 - Oct -15	18:40	Water	R	R	R	R	R	R	R	R	R					9
		- Oct -15		Water	R	R	R	R	R	R	R	R	R					9

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

SAMPLE CONDITION AS RECEIVED (lab use only)

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C		
~~15.0~~	1.0 2.3	1.0	1.0 2.0	~~2.3~~		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: BRODIE SMYTH	Date: 15 OCT 15	Time: 15:00	Received by:	Date: 15 Oct 15	Time: 15:00	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1688545-COFC

COC Number: 14 -

Page 1 of 1

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

Invoice To	Same as Report To ☑ Yes ☑ No	Invoice Distribution	Analysis Request
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	EDI	Email 1 or Fax sjenner@edynamics.com	
Contact:	S Jenner	Email 2 mmarjanovic@edynamics.com	

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

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-PCT-VA,EC-PCT-VA,PH-PCT-VA	ANIONS-ALL-IC-WR,TSS-MAN-WR	CN-WAD-CFA-VA,CN-T-CFA-VA	CN-CNO-WT	CN-SCN-VA	NH3-F-VA	MET-T-BCMDG-VA	MET-D-BCMDG-VA	IONBALANC-VA, TDS-CALC-VA					Number of Containers
					P	P	P	P	P	P	P	F/P						
	WQ-VC-U	14 - Oct -15	9:07	Water	R	R	R	R	R	R	R	R	R					9
	WQ-VC-DBC	14 - Oct -15	8:50	Water	R	R	R	R	R	R	R	R	R					9
	WQ-DC-B	14 - Oct -15	14:50	Water	R	R	R	R	R	R	R	R	R					9
	WQ-TP	14 - Oct -15	14:05	Water	R	R	R	R	R	R	R	R	R					9
	FIELD BLANK	14 - Oct -15	15:30	Water	R	R	R	R	R	R	R	R	R					9
	WQ-DESS-01	14 - Oct -15	16:30	Water	R	R	R	R	R	R	R	R	R					9
		- Oct -15		Water	R	R	R	R	R	R	R	R	R					9

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

SAMPLE CONDITION AS RECEIVED (lab use only)

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C		
1.0	1.0	1.0	2.3			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
BRODIE SMITH	15OCT15	15:00		15/10/15	1500			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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

Date Received: 15-OCT-15
Report Date: 26-OCT-15 16:38 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1688590

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

Can Dang
Senior Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1688590-1				
	Description	Water				
	Sampled Date	15-OCT-15				
	Sampled Time	10:20				
	Client ID	WQ-PW				
Grouping	**Analyte**					
WATER						
Physical Tests	Colour, True (CU)	<5.0				
	Conductivity (uS/cm)	343				
	Hardness (as CaCO3) (mg/L)	182				
	pH (pH)	8.16				
	Total Dissolved Solids (mg/L)	192				
	Turbidity (NTU)	<0.10				
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	160				
	Chloride (Cl) (mg/L)	<0.50				
	Fluoride (F) (mg/L)	0.095				
	Nitrate (as N) (mg/L)	0.131				
	Nitrite (as N) (mg/L)	<0.0010				
	Sulfate (SO4) (mg/L)	28.4				
	Anion Sum (meq/L)	3.81				
	Cation Sum (meq/L)	3.87				
	Cation - Anion Balance (%)	0.7				
Bacteriological Tests	E. coli (MPN/100mL)	<1				
	Coliform Bacteria - Total (MPN/100mL)	<1				
Total Metals	Aluminum (Al)-Total (mg/L)	<0.010				
	Antimony (Sb)-Total (mg/L)	<0.00050				
	Arsenic (As)-Total (mg/L)	0.00043				
	Barium (Ba)-Total (mg/L)	0.080				
	Boron (B)-Total (mg/L)	<0.10				
	Cadmium (Cd)-Total (mg/L)	<0.00020				
	Calcium (Ca)-Total (mg/L)	42.2				
	Chromium (Cr)-Total (mg/L)	<0.0020				
	Copper (Cu)-Total (mg/L)	<0.0010				
	Iron (Fe)-Total (mg/L)	<0.030				
	Lead (Pb)-Total (mg/L)	0.00058				
	Magnesium (Mg)-Total (mg/L)	18.5				
	Manganese (Mn)-Total (mg/L)	<0.0020				
	Mercury (Hg)-Total (mg/L)	<0.00020				
	Potassium (K)-Total (mg/L)	0.84				
	Selenium (Se)-Total (mg/L)	<0.0010				
	Sodium (Na)-Total (mg/L)	4.8				
	Uranium (U)-Total (mg/L)	0.00157				
	Zinc (Zn)-Total (mg/L)	<0.050				

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Sulfate (SO4)	MS-B	L1688590-1
Matrix Spike	Sulfate (SO4)	MS-B	L1688590-1
Matrix Spike	Sulfate (SO4)	MS-B	L1688590-1
Matrix Spike	Copper (Cu)-Total	MS-B	L1688590-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

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

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

COLOUR-TRUE-VA Water Colour (True) by Spectrometer BCMOE Colour Single Wavelength

This analysis is carried out using procedures adapted from British Columbia Environmental Manual "Colour- Single Wavelength." Colour (True Colour) is determined by filtering a sample through a 0.45 micron membrane filter followed by analysis of the filtrate using the platinum-cobalt colourimetric method.
Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

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

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

ECOLI-COLI-BCDW-VA Water E.coli 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 obtained by comparing the positive responses to a probability table.

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

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

HARDNESS-CALC-VA Water Hardness APHA 2340B

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

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

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

IONBALANCE-VA Water Ion Balance Calculation APHA 1030E

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

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

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

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

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

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

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

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the

Reference Information

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

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

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

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

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

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

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

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

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

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

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

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

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

TCOLI-COLI-BCDW-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".

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

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

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 Turbidity

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

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

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

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

Chain of Custody Numbers:

1

Reference Information

GLOSSARY OF REPORT TERMS

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

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

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1688590-COFC

COC Number: 14 -

Page 2 of 2

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

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

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q49312	Approver ID:	Cost Center:
Job #:	MOUNT NANSEN 15-Y-0146	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	

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

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	FULL-TOT-DW-WR	Number of Containers
	WQ-PW	15-Oct-15	10:20	Water	R	3

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

SAMPLE CONDITION AS RECEIVED (lab use only)

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

INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C		
1.0	1.0	1.0	2.3	2.0

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
BRODIE SMITH	15OCT15	15:00		15/04/15	1500			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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

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

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

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

Contact Information · *Coordonnées de la personne ressource*

Contact Person / *Personne ressource*: MEGHAN MARJANOVIC
Phone / *Téléphone*: 861-393-4887
Mailing address / *Adresse postale*: 2195 - 2ND AVE
Fax / *Télécopieur*:
WHITEHORSE, YT.
Postal code / *Code postal*:
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 / *Adresse municipale*: MT. NANSEN - ~~PUMPHOUSE~~
Subdivision / *Lotissement*:
Legal Description Lot / *Désignation officielle Lot*:
Quad / *Quadrilatère*:
Plan no. / *Plan n°*:
Other Information (e.g., Location, Business / Building Name)
Autres renseignements (ex. : emplacement, nom de l'entreprise, nom de l'édifice):

Sample Collection / *Prélèvement de l'échantillon*

Sample Collected By / *Échantillon prélevé par*: SCOTT DILLING
Date / *Date*: 15-OCT-2015 (YY/MM/DD · *AA/MM/JJ*)
Time / *Heure*: 1030 am / (pm)
Sampling Site (e.g., kitchen tap)
Point d'échantillonnage (ex. : robinet de cuisine): PUMPHOUSE WELL
Is this a Resample from a Previous Test? / *Est-ce un deuxième échantillon d'un test antérieur?*: ☐ Yes / *Oui* ☑ No / *Non*
Previous Sample Number / *Numéro de l'échantillon précédent*:

Sample Supply / *Source d'approvisionnement en eau*

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

Sample Source / *Provenance de l'échantillon*

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

Water Treatment / *Traitement de l'eau*

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

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

Receipt of Sample / ***Réception de l'échantillon***: Date / *Date*: 15/10/15 (YY/MM/DD · *AA/MM/JJ*) Time / *Heure*: 300 am / (pm) By / *Par*: L
6.4

Condition of Sample / ***État de l'échantillon***: ☑ Satisfactory / *Satisfaisant* ☐ Unsatisfactory / *Non satisfaisant* Details / *Précisez*:

Incubation / ***Incubation***: Date / *Date*: 15-10-15 (YY/MM/DD · *AA/MM/JJ*) Time / *Heure*: 3:55 am / (pm) By / *Par*: N Incubator / *Incubateur*: 2

Analysis Completed / ***Analyse terminée***: Date / *Date*: 15-10-16 (YY/MM/DD · *AA/MM/JJ*) Time / *Heure*: 400 am / (pm) By / *Par*: SS

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

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

Comments / *Commentaires*

Report Authorized By / *Rapport autorisé par*: [signature] Position / *Poste*: WLT Date / *Date*: 15-10-16 (YY/MM/DD · *AA/MM/JJ*)

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

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Sample Number / ***Numéro de l'échantillon***: 62113